SPAIN 2050

Fundamentals and proposals for a Long-Term National Strategy



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If one does not know to which port one is sailing, no wind is favourable.

Séneca

Let us try to be more the fathers of our future than the sons of our past.

Miguel de Unamuno

SPAIN: A COUNTRY HUNGRY For the future

Foreword by the Prime Minister

Spain is one of the most developed countries in the world.¹ Those of us who have the privilege of living here enjoy **satisfactory and very long lives**,² only surpassed in length by those of Switzerland and Japan.³ This is due to the virtues of our climate, our Mediterranean diet and our particular way of life,⁴ but also to the existence of a modern and robust welfare state⁵ which has provided us with quality health care⁶ and education,⁷ safe streets⁸ and a network of infrastructures⁹ and housing¹⁰ of the highest standard.

To finance this well-being, Spain has **an innovative**¹¹ **and competitive economy**:¹² the 4th largest in the EU¹³ and the 6th most important in its contribution to international trade.¹⁴ Our country is a world leader in tourism¹⁵ and a benchmark in sectors such as construction,¹⁶ transport, logistics,¹⁷ renewable energies,¹⁸ agri-food,¹⁹ banking,²⁰ and fashion.²¹

Part of our success is due to the **exceptional geostrategic position** we occupy, located at the crossroads of three continents, as well as to the enormous natural wealth of our country. Spain has more Biosphere Reserves than any other country in the world,²² and is home to one of the most extensive and diverse networks of protected areas in Europe.²³ We have no abundance of oil, gas or gold deposits, but we have **natural resources that will be fundamental in the economy of the 21st century**: we have more hours of sunlight than any other EU member state, one of the largest lithium deposits on the continent, and optimal conditions for harnessing the wind and the power of water.²⁴ This fact, together with the strong environmental awareness of our population,²⁵ means that Spain is now the 3rd European country in terms of capacity for renewable energy generation,²⁶ 11th in terms of lowest CO2 emissions per inhabitant,²⁷ and 14th most sustainable in the world, according to Yale University's latest *Environmental Performance Index.*²⁸

We also have an **exceptional artistic and historical wealth**. Spain is home to the third largest concentration of monuments and sites declared World Heritage Sites by UNESCO, behind only China and Italy.²⁹ It has one of the most extensive repertoires of intangible heritage,³⁰ the second most spoken native language in the world,³¹ and a rich linguistic variety as well as acclaimed artists and sportsmen. We also have one of the best leisure and entertainment offerings.³² These are all reasons why we are considered a cultural powerhouse of the first order.³³

The international admiration for our country is also explained by the values that characterise our people: personal affection, tolerance,³⁴ solidarity and a commitment to Europe,³⁵ and multilateralism. According to the main indicators available, Spain is one of the 10 countries in the world with the strongest bonds of affection,³⁶ one of the 10 best countries to be a woman,³⁷one of the 5 best countries to live and work as a foreigner,³⁸ and one of the most respectful of sexual orientation,³⁹ religion⁴⁰ and people's culture.

At institutional level, we occupy an equally remarkable position. According to the prestigious V-Dem report, **Spain is the 9th fullest and most consolidated democracy in the world**;⁴¹ it has a solid rule of law,⁴² and levels of freedom higher than those of France, Italy and the United States;⁴³ and we exert significant influence within the main international organisations.

This list of rankings is more than just a set of numbers; it is quantitative proof of an important truth: in just four decades of democracy, Spain has managed to become a modern, prosperous and inclusive country with a key role in Europe. This is an immense feat that we should not overlook as a society. And it is something of which we should be proud.

Nevertheless, this does not mean that we should be complacent or conformist. Spain should not stop here. **We can, and must, be even better**. It is this certainty that feeds and inspires the *Spain 2050* project. In the last three decades, our country has managed to close the gap that separated us from the European pack to the point where, in terms of most indicators, we have converged with the EU-27 average. Now is the time to be bold, to pedal harder, and move to the top of Europe's most advanced countries - labelled here as the "EU-8" (Austria, Germany, Belgium, Denmark, Finland, France, Netherlands and Sweden).⁴⁴

To achieve this, we Spaniards will need to consolidate our achievements to date and sort out old unresolved issues: our low productivity, the shortcomings in our education system, the issues in our cities and rural areas, our disproportionate unemployment rate, and our high levels of inequality and poverty. At the same time, we will need to be able to deal with the challenges and seize the opportunities that future trends such as climate change, digitalisation and demographic ageing will bring.

Achieving all this will not be easy but it will not be impossible either. Backed by empirical evidence, this study demonstrates that convergence with the EU-8 countries by 2050 is both necessary and feasible. Spain has the right foundations, the necessary resources and a suitable track record on many fronts. In fact, it can be deduced from the analysis that the improvements Spain would need to undertake in the next thirty years to move to the forefront of Europe are not very different in nature or scale to those we made over the last forty years.

The megatrends that will develop in the future will serve as catalysts for change. Demographic ageing, the green transition, digitalisation, and the growth of cities will add pressure to existing challenges, but will also bring immense opportunities that, if well exploited, will allow us to do things that were hitherto unimaginable. Moreover, the crisis caused by coronavirus will help to speed up the necessary transformations. The dramatic effects of the pandemic have reminded Spanish society of the importance of carrying out reforms that will allow us to be more resilient socially, economically and environmentally. They have accelerated trends to modernise that needed to take place in both the public and private sectors. And they have led to the creation of European recovery funds with which we will finance and implement many of the necessary changes.

Spain has all the ingredients it needs to converge with the most advanced countries in Europe. What we lack is more ambition and a holistic, effective long-term strategy shared by most of our social partners. *Spain 2050* aims to be the seed for both of these. To set it in motion, we have brought together a hundred renowned experts from a wide range of academic disciplines, ages, geographical origins and political sensitivities. They have worked for almost a year on an unremunerated basis and fully independently, debating, studying and leveraging all the available scientific knowledge in order to shed light on the major structural challenges that Spain will have to face and overcome in the coming decades if it wants to converge with the most advanced countries in the EU.

I believe the result is exemplary and, in many ways, pioneering at European level. But I also know it is only a first step: an initial proposal that will need to be corrected, expanded and improved in the coming months through a national dialogue involving our country's main public institutions, companies, trade unions, employers, universities, think tanks, foundations, civil service bodies, associations and political forces. The future belongs to us all and everyone needs to participate in its design.

Ultimately, the goal is **to get those of us who live in Spain to look to the future** and to do so in ways that are different to how we look at the present - with more audacity, a greater focus on agreement, and with greater self-confidence. We are capable of achieving this. We must achieve it. We owe it to our parents and to our children.

Pedro Sánchez Prime Minister of Spain

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EXECUTIVE SUMMARY

THE PROJECT

Spain 2050 is a strategic foresight exercise that has a dual goal:

- To improve our understanding of the social, economic and environmental challenges and opportunities that our country will face over the coming decades; and
- To create a multi-stakeholder dialogue that generates a Long-Term National Strategy that will allow us to set priorities, coordinate efforts, and ensure the prosperity and well-being of our citizens in the future.

This study is a first step in this direction. In preparing this document, we have divided the 27 EU Member States into three groups of countries based on their level of performance (low, medium and high) according to a set of standard economic, social and environmental indicators. We then analysed how, over the last thirty years, Spain has successfully moved from the low to the medium performance group in regard to most of these indicators and asked what we would have to do to join the high-performance group (which we call the "EU-8") in the next thirty years.

The result is a set of *Fundamentals and Proposals* that includes:

- a diachronic and foward-looking analysis of nine major challenges that Spain will have to overcome between now and 2050 if it wants to consolidate its position as one of Europe's most advanced countries;
- more than 200 proposals to achieve this; and
- a set of 50 quantitative targets and indicators to use in designing areas of action, taking specific measures, and monitoring progress over the coming years.

These *Fundamentals and Proposals* have been drawn up by the National Office of Foresight and Strategy of the Spanish Government along with a hundred renowned experts from different generations, political views and a range of disciplines (economics, environmental sciences, demography, sociology, history, political science and law, among others). Support was also provided by several government departments, the AIReF, the Bank of Spain and the European Commission's Joint Research Centre.

Thinking about the future is a State responsibility, not a governmental one, because the time horizon of the exercise spans several parliamentary terms. For this reason, the analysis has been conducted from a non-partisan perspective that places methodological rigour and empirical evidence above political positions. The entire study is based on a broad empirical, measurable and verifiable base, consisting of over 500 data series and some 1,650 scientific publications - mostly peer-reviewed academic articles and reports produced by European institutions, international organisations, think tanks and third sector entities of proven technical competence.

The study, therefore, takes a national approach. The aim is neither to endorse nor refute any political party's programme, although it does aspire to help all of them, as well as public institutions, companies, NGOs, trade unions, universities, foundations, associations and other organisations of our civil society.

We present it not as a *fait accompli*, but as an initial proposal that will need to be improved and completed over the coming months through a national dialogue involving all the stakeholders of the country.

We believe that Spain must look more to the future and that it should do it in a way that differs from the way it tends to look at the present: that is, with less confrontation, more scientific rigour and greater optimism. Our hope is that this exercise will help to achieve this.

ANALYSIS

The content of Spain 2050 can be summarised in three central ideas:

- I. Spain has improved considerably in the last four decades of democracy.
- II. Spain faces great present and future challenges.
- III. Spain can overcome them all and position itself as one of the most advanced countries in Europe by the middle of the century.

We believe these three statements are simultaneously empirically true and that any strategy we design should take them into account.

I. Spain has improved considerably in the last four decades of democracy

Over the past forty years, Spain has undergone a profound transformation that, in many respects, is exemplary and unique on a global scale. In just four decades, we have gone from an impoverished country poorly connected with the rest of the world to a prosperous and open country, with a modern business environment and an extensive welfare state that has allowed us to reach, or even surpass, the EU-27 average on a wide range of indicators.

Economic progress has been more than remarkable. Between 1978 and today, our per capita income has doubled; our employment rate has increased by 15 points (which is equivalent to generating 8 million net jobs); and our infrastructure network has improved to become one of the top 10 in the world. At the same time, our companies have successfully integrated into international trade and financing networks, increasing our trade openness rate from 27% of GDP to over 67% (that is, more than countries such as France or Italy), and making Spain a world leader in sectors such as tourism, construction, transport, renewable energies, agri-food, banking and fashion.

The quality of our human capital has also improved immensely. Between 1978 and today, the average number of years that our population spends in education has doubled; the school dropout rate has fallen from 70% to 16%; and the proportion of people with higher education (university or higher vocational training) has increased from 16% (among those born in the 1940s) to 47% (among those born in the 1980s). As a result, the skills of our population have improved dramatically, at a rate only comparable to that of Finland over the same period, and are practically in line with the EU-27 average.

This progress would have been impossible without the advances and consolidation of our welfare state, whose capacity to provide quality public services and to support those most in need has increased steadily since the transition to democracy. Today, inequality is down by 37% (doubling the early 70s rate), the State provides us with universal and first-class health cover and supports more than a million people who have dependency needs. Among other things, this has enabled Spain to achieve one of the loftiest goals to which any country can aspire: to have the third highest life expectancy in the world, surpassed only by Switzerland and Japan. Our country's millennials will live, on average, 36 years longer than their grandparents, and 18 years longer than their peers in Morocco. They will also do so in better health.

On the institutional front, Spain's progress has also been enormous. In 1980, the Museum of Modern Art in New York refused to return Picasso's Guernica, arguing that the necessary democratic freedoms did not yet exist in our country. Today, Spain is, according to all indexes, one of the fullest democracies in the world, with levels of electoral reliability, freedom, social rights and citizen security higher than those of countries such as France or the United States.

In the area of social inclusion, our progress has been equally remarkable. Spain records one of the lowest gender gaps (in employment, wages, education, rights and political participation) in the EU and become a country that is tolerant of differences and otherness. According to the latest data, Spain is one of the ten best countries in the world to live and work as a woman, and one of the most respectful of people's sexual orientation, religion and culture.

It is also one of the countries most concerned about the climate emergency. In the last two decades, Spain has reduced the amount of municipal waste it produces by 27%, lowered pollution in its cities, and increased its electricity generation from renewable sources to 100,000 gigawatt hours - enough to power more than half of its homes. Thanks to this, Yale University's latest *Environmental Performance Index* ranks us as the 14th most sustainable country on the planet.

All these data illustrate something that should never be forgotten: Spain is a success story. When we think about what is happening by limiting ourselves to the immediate present, it is easy to succumb to pessimism and the feeling that "things aren't getting better" or that "they are getting worse". However, when the empirical evidence and medium- and long-term trends are analysed, it is clear that our country is on a positive trajectory on most fronts.

II. Spain faces severe challenges - now and in the future

Of course, this does not mean that Spain does not have problems or that it should be satisfied with what it has achieved. It is undeniable that many of the changes between 1978 and 2008 were insufficient or inadequate, and that they were often built on weak foundations which, with the crises of 2008 and 2011, began to collapse. Today, the country still has major challenges and faces significant challenges which, if not overcome in the coming decades, will continue to limit our ability to grow in a sustained and sustainable manner in the future; will continue to make us more vulnerable to crises; and will prevent us from converging with the most advanced countries in Europe in terms of key aspects for economic development, environmental sustainability, and social equity and welfare. Of these many challenges, we look at nine here, which we believe will be particularly relevant to our future.

Chapter 1 examines the challenge of productivity and the pattern of economic growth. Despite the many advances made since 1980s, Spain today still has a level of productivity considerably lower than that of its European neighbours. This means that we generate less wealth and opportunities than other countries around us - something that is compromising the development of the whole society and explains the lower salaries, longer working hours, and poor competitiveness of many of our companies.

The demographic ageing that will take place in the coming decades could aggravate this situation. It is estimated that by mid-century, the Spanish population between 16 and 64 years of age could fall by 3.7 million to below 27 million (1996 levels), even if improvements are achieved in the birth rate and hundreds of thousands of immigrants arrive every year. In the absence of productivity improvements, this contraction of the labour force could cause our economy to stagnate between 2023 and 2050, with annual GDP growth of between 0.3% and 1.1% - well below the 2% growth we saw between 1996 and 2019. This would push us even further away from the advanced countries of Europe.

To avoid this negative scenario, Spain will need to make a firm and decisive commitment to education (from birth to old age), redouble its efforts in R&D, accelerate the modernisation of its business environment by taking advantage of the opportunities of digitalisation and green transition, promote the growth of its small- and medium-sized companies, reduce as far as possible the distortions created by administrative obstacles, and successfully tackle the issue of the black economy.

Chapter 2 examines the challenge of educating the younger population. While it has improved considerably, our education system still does not perform to the levels of most of the countries around us. This can be seen, among other things, in our high retake and dropout rates, as well as our learning outcomes, which are still below the EU-27 and OECD average. Without significant reforms, these shortcomings will continue to hamper the country's prosperity and the lives of our population. Between now and 2050, 3.4 million students could have to retake courses, 2.2 million could drop out of school prematurely, and Spain could be surpassed in learning and educational outcomes by countries like Portugal, Hungary and Latvia.

To avoid this, Spain will need to carry out extensive reforms of its education system, taking advantage of the benefits that both digitalisation and demographic change will offer. We need to transform teachers' careers, modernise the curriculum, expand the autonomy of our schools, create an effective evaluation system, strengthen support mechanisms for the most disadvantaged groups, and promote education from 0 to 3 years of age. The goal must be to become one of Europe's education powerhouses by the middle of the century.

The third chapter addresses the challenge of training and requalifying the workforce. In the last four decades, Spain has greatly increased its proportion of the population with a third-level degree (university or higher vocational training) and has converged with the EU-8 countries. However, it still has an excessively high proportion of people (48% of the active population) without professional training. This affects productivity, employment and the welfare of the whole country. Furthermore, our adult population has a considerably lower mastery of basic skills than our European counterparts. So much so that, in Spain, people with a third-level education have a lower level of reading literacy and mathematical ability than those with a baccalaureate in the Netherlands.

In the future, as the knowledge economy advances, as technology transforms our business environment, as the working population shrinks, and as global competition increases, these shortcomings will become more acute for the country. And having a well-trained, up-to-date workforce will become even more important. In order not to be left behind in this emerging scenario, Spain will need to: reduce the population with only secondary education (from the current 40% to 15%); significantly increase the proportion of people who obtain a university or higher vocational qualification; and put in place a comprehensive retraining system that will allow us to upskill or reskill at least one million workers (employed and unemployed) every year. Only then will we be able to reap the productivity gains we need, successfully implement the green transition, and ensure the long-term sustainability of our welfare state.

Chapter 4 explores the climate and environmental challenge. Like most developed countries, throughout the 20th century, Spain adopted a pattern of economic growth based on the abusive and linear use of natural resources ("extract, produce, consume and dispose"). This pattern has caused unprecedented environmental degradation and has set in motion a climate crisis that could have catastrophic effects in the near future. The Spain of 2050 will be warmer, drier and more unpredictable than today. If we do not take decisive action quickly, droughts will affect a further 70% of our territory; fires and floods will become more frequent and destructive; sea levels and temperatures will rise; key industries such as agriculture and tourism will suffer severe damage; 27 million people will live in water-scarce areas; and 20,000 people will die each year from rising temperatures.

To avoid this scenario, we will need to become a circular, carbon-neutral economy by 2050, take steps to minimise the impacts of climate change, and transform the way we relate to nature. This will involve, among other things, radically changing the way we produce energy, move around, and produce and consume goods and services. We must take advantage of our great wealth in renewable energy sources, electrify transport, reinvent value chains, rethink our use of water, minimise the waste we generate, invest in organic farming, and promote green taxation. This will have to be done in record time, without reducing the competitiveness of our economy, and without leaving anyone behind.

Chapter 5 looks at the challenge of adapting our welfare state to a society that is living longer. Over the next three decades, the life expectancy of the Spanish population will continue to increase (potentially by more than 3 years), which will lead to strong degree of ageing within our demographic pyramid. In 2050, one in three Spaniards will be 65 or older, and for every person in this age group there will be only 1.7 people between the ages of 16 and 64 (today, there are 3.4). Potential possible improvements in the birth rate and a potential increase in immigration will not be able to completely reverse this scenario. Demographic ageing will bring important social and economic opportunities to the country, but also a significant challenge to the sustainability of our welfare state. By the middle of the century, health spending could rise by more than 1 GDP point, public spending on pensions could increase by up to 5 GDP points, and the number of older people benefiting from care could double, with public spending on care rising from 0.8% today to more than 2% of GDP by 2050.

In order to deal with these changes, Spain will need to commit to technology, redesign part of its National Health System, ensure the sustainability and adequacy of its public pension system, and ensure that older people play an increasingly active and satisfactory role in the economic and social life of the country. The way we think about old age and the division between work and retirement will also have to change - something that will benefit not only the state but also the public as a whole.

Equally important will be knowing how to structure and organise balanced, fair and sustainable territorial development; a challenge addressed in chapter 6. It is estimated that in 2050, 88% of our population will live in cities and that rural Spain will lose almost half of its current inhabitants. If we do not take action, large cities and their metropolitan areas will become larger and less sustainable, and problems such as access to housing and social segregation will worsen, especially in cities like Madrid, Barcelona and Valencia. Conversely, many rural towns and medium and small cities will lose their economic dynamism and suffer a sharp decline in terms of society and assets.

To mitigate these processes, we will need to restore the compact and proximity city model typical of Mediterranean culture; promote the creation of public and social housing; encourage the refurbishment of buildings; and transform the mobility model in favour of public or shared transport and the pedestrianisation of urban spaces. At the same time, we will need to revitalise rural Spain and medium-sized cities through a firm commitment to technological integration, public transport, remote working and economic diversification, taking advantage of the green transition, digitalisation and the development of the silver economy (which is associated with the needs of people over 50).

Chapter 7 examines the shortcomings of our labour market and potential future developments within it. Spain continues to record disproportionately high levels of unemployment and job insecurity that are splitting our society into two and damaging the prosperity of the whole country. This problem could be aggravated in the coming decades by the demographic and technological transformations that will take place. On the one hand, if we do not increase the rates of people getting into work, ageing could lead to a fall in the number of employed people at a rate of -0.5% a year between now and 2050, compared with the 2% increase we saw between 1995 and 2019. To avoid this scenario, we will need to raise the employment rate of women, young people and people over 55; encourage legal immigration; and foster the recovery and attraction of talent. On the other hand, the general spread of digital technologies will lead to a strong modernisation of our business environment that, in the short term, could result in job losses and a worsening of the working conditions of certain groups. To neutralise this risk, a strong expansion of active employment policies will be required; the regulatory framework will need to be adapted; and social safety nets will have to change to protect people rather than jobs.

These measures will also be essential in confronting another of the great challenges facing our country: to reduce levels of poverty and inequality. This is the focus of chapter 8. While Spain has improved considerably in terms of redistribution and social protection, it is still today what it was three decades ago: the EU country with the third highest income inequality and the fourth in terms of risk of poverty. In regard to wealth, the situation is somewhat more favourable, with a level of inequality in Spain similar to the EU average. However, for some years now there has been a worrying trend towards a concentration of wealth, with particularly sharp inter-generational differences. So far this century, the wealth gap between 65-year-olds and 35-year-olds has doubled, and now resembles that of the United States.

Without improvements in productivity and employment, and changes in the education system, inequality will continue to increase in the future, aggravated by trends such as demographic ageing and technological transformation. To avoid this, our country will, among other things, need to change its growth pattern, reactivate upward social mobility, tackle the housing problem, and undertake a gradual but profound tax reform that will provide the system with greater revenue-raising capacity and progressiveness and allow social safety nets to be strengthened.

Ultimately, all of the reforms listed should serve to achieve one goal: to increase the welfare of all citizens until Spain becomes one of the happiest countries in the world. After all, this is the purpose of public policies and of scientific, economic and social progress. **How to turn that progress into greater well-being is examined in chapter 9.**

III. Spain can overcome these challenges and position itself as one of the most advanced countries in Europe by the middle of the century

Overcoming these challenges will not be easy, but it is perfectly possible. The trajectory analyses and comparative policy exercises in this study indicate that, if it puts its mind to it, Spain will be able to weather the difficulties that future trends will bring, take advantage of opportunities and thus converge with the EU-8 countries by 2050. In fact, to achieve this, in many cases it will have to implement reforms and improvements similar in difficulty and magnitude to those already implemented over the last four decades. If we succeeded in doing it in the past, we can do it again, aided by the socio-economic transformations that the pandemic has accelerated and the ambitious recovery funds and plans that the European Union has set out.

Let's consider, for instance, **the economic challenge.** To catch up with the EU-8 countries and close the per capita income gap with them, Spain will need to foster its productivity by 50% between now and the middle of the century, while increasing its employment rates. It may seem like a lot, but the truth is that several European countries (including our own) have already made similar progress in the recent past. The fact that Spain is starting from lower levels of productivity and employment, and that there are favourable trends underway (such as digitalisation and the development of artificial intelligence, women's educational and employment equality, increased training, and the green transition) increase our chances of achieving this.

The same possibilism should guideour approach to **challenges relating to human capital.** To coverage with the EU-8, Spain must do two things: improve its learning levels (for instance, with a 20-point increase in the PISA standardised tests) and increase the proportion of the population aged 25-34 with more than compulsory secondary education by 23 percentage points. Can it be done? We think so. For two reasons. First, because Spain has already made similar progress in learning and coverage in the recent past. Second, because the demographic and technological transformations that are already taking place will serve as a tailwind to achieving this. By 2050, Spain will have almost one million fewer students between the ages of 3 and 24. This will allow us to double spending per student to the level of, for example, Denmark without incurring a significant increase in public spending. This injection of resources, together with the widespread use of technologies such as big data, will help us to combat more effectively phenomena such as school dropout and segregation; uncover and make better use of the potential of the younger population; and reap the gains in coverage and learning that we need in order to place ourselves at the forefront of European education.

As far as **training the working population** is concerned, the truth is that we already have the institutions, infrastructures and human resources necessary to articulate the comprehensive retraining system needed. What is needed now is to implement a series of gradual regulatory and cultural changes which, to a certain extent, are already underway. If Spain was able to create almost 2 million training places in higher vocational training and university between 1980 and 2020, then it must be able to create a million places for much shorter training programmes between now and 2050 - especially if it makes use of digital technologies and hybrid teaching formats.

Turning to **environmental matters**, the challenges we will have to overcome in the future are particularly significant. To curb climate change and avoid its most harmful effects, our country, like the rest of the world, will have to go through profound transformations that will enable it to become a carbon-neutral and resource-efficient society, with sustainable and responsible consumption and production patterns. At the same time, Spain will need to increase its resilience to climate change, adapting to emerging risks and transforming the way we relate to the natural environment. Doing so will not be easy, and our track record to date warns us of the need for strong and immediate action in the coming years. Nevertheless, we can be optimistic based on the changes that have taken place since the beginning of the century (in terms of recycling, efficiency in the use of materials, water and energy, and the expansion of organic crops) as well as the plethora of legislative, economic and technological initiatives that are already underway. To the extent that most experts agree that Spain will play a leading role at European level in the green transition.

We should also be optimistic about **the challenges posed by increasing longevity**. The key is to understand that the cost to the State is determined not only by the number of years that citizien live, but also the degree of health they enjoy until the time they die, and their level of work and social activity up until then. Old age in the future will not be the old age of the past. It will start much later, will be more dynamic, and will not be so closely associated with phenomena such as inactivity or dependence. This means that, if we make the necessary institutional and cultural changes, in the coming decades the employment rate of older Spaniards could increase considerably and because they themselves wish it. Along with a series of reforms in our health system and the increase in public revenue that will be achieved by the means described in this *Strategy*, this could mean that by 2050 public spending in Spain on pensions, health and care services will increase, but at a manageable level of no more than 25% of GDP, which is similar to that of countries like Austria and France today.

Another of the great challenges our country faces is **guaranteeing the habitability, social cohesion and environmental sustainability of its cities while mitigating rural depopulation and ensuring territorial balance**. Between now and 2050, the proportion of the Spanish population living in cities will increase by more than 8 percentage points - something that could undoubtedly put additional pressure on current challenges such as access to housing, social segregation and environmental sustainability. However, we must not lose sight of the fact that, in the last four decades, Spain has already recorded a similar increase in urbanisation and that, even so, its levels of residential quality, access to housing, public safety and environmental pollution have improved or remained stable at levels comparable to those of the European average. If we were able to manage the urbanisation process relatively successfully in the past, we should be able to continue to do so in the future, helped by new technologies, phenomena such as teleworking and shared mobility, the increase in social housing, the generalised use of alternative housing tenure formulas, and a much more sophisticated and comprehensive knowledge of urban planning and socio-economic and territorial dynamics than existed in the past.

In some cases, the depopulation of rural Spain will not be halted. But this does not mean that all villages will empty or that opportunities and quality of life for people living in them will be reduced. Advances such as 5G, satellite internet and robotics will allow us to bring employment (remote working) and services (health, education and transport) to places where they have not reached so far; the silver economy, tourism and organic farming will boost economic and social activity in many villages; and the energy transition will provide clean energy and new job opportunities even in the most remote parts of the country. In 2050, fewer people will live in rural Spain, but those who do could live better than they do now.

Adapting our labour market to the new social, economic and technological realities must also be approached from a possibilist perspective. Demographic change will substantially reduce our labour force, but if we manage to cut the unemployment rate and raise the employment rate to the current levels of the most advanced countries in Europe (that is, a 15-point increase to 80%), we will be able to neutralise to a large extent the negative effects of ageing. From losing 2.5 million potential jobs, we will create 1.5 million by 2050. The same will happen with technological transformation. History teaches us that technology always ends up creating more jobs than it destroys. If we are able to take advantage of all its benefits, we will generate new jobs, increase productivity and improve working conditions for the majority of the working population.

Another aspiration must be to reduce inequality and poverty rates. If we succeed in laying the foundations for economic growth based on productivity gains and creating stable, quality employment, we will be able to improve the purchasing power of the population as a whole; greatly reduce the effects of economic crises on inequality and poverty; and generate sufficient public revenue to increase social spending. If we also improve the quality of our human capital at the levels covered by this study, we will manage to reactivate upward social mobility and provide more and better economic and employment opportunities for our population. Reducing inequality to the levels of the most advanced countries in Europe and halving our poverty rate by 2050 is entirely feasible.

The same possibilist approach can and should be applied to other challenges that may arise in the future. Spain has severe shortcomings and will face significant obstacles between now and 2050. Even so, the truth is that, since it has existed as a country, Spain has done nothing but progress and there is no reason to think it should stop doing so now. The future is brighter than we think.

THE PROPOSALS

Of course, progress will not happen on its own. In order to continue improving and converge with Europe's most advanced countries, today's generations living in Spain will need to implement profound reforms and bold and sustained initiatives over time.

This study suggests more than 200 that can be summarised into 12 main fronts:

- A firm commitment to improving the education of our population from birth and throughout life.
- Robust and ambitious support for innovation on all areas, not only in the scientific-technological field.
- Strong modernisation of our productive system and business culture.
- Transition towards a sustainable and environmentally friendly model of development.
- Dramatic expansion of opportunities for young people, especially in areas such as education, employment and access to housing.
- Achieving full gender equality.
- Encouraging legal immigration and attracting foreign talent as additional ways to boost our economy and underpin the viability of our welfare state.
- Strengthening public services, with a special focus on education, health and care.
- Redesigning social benefits to move progressively towards a model that protects citizens on the basis of their needs and not only on their employment history.
- Reforming our tax system to increase its revenue-raising capacity and improve its progressivity, so that it is able to finance the strengthening of our welfare state without compromising the sustainability of public accounts.
- Modernising public administration to create efficiency gains, and improving the policymaking process through a greater attention to empirical evidence, experimentation, evaluation, social collaboration, and the analysis of trade-offs.
- A core commitment to the rights and interests of future generations. The decisions we take today cannot end up jeopardizing our children's well-being.

It is difficult to achive that which cannot be measured. Therefore, we have created a dashboard that includes 50 specific goals that Spain should meet by 2050 if it wants to converge with the most advanced countries in Europe. When designing and selecting these, we have tried to adhere to the following three conditions:

- The goals are quantifiable. That is, they all can be measurable using datasets that are European in scope, regularly published, and widely approved by the academic community.
- The goals should be ambitious but realistic. The convergence pathways have been designed through a careful analysis that takes account of past trajectories, projected future trends, dozens of comparative policy cases and the interdependence between goals.
- The goals and indicators are capable of being updated and can be modified or replaced by others as the current situation changes, so that they do not end up being obsolete by 2050.

JUST THE FIRST STEP

These goals and measures are merely a proposal - an initial draft that will need to be completed over the coming months through a national dialogue involving the country's main stakeholders. They will need to be reviewed every few years in response to new social, economic, environmental and technological realities as they arise. In other words, this study is not intended to be a rigid roadmap for change, but an invitation to change. A call for reflection, dialogue and collective action.

We humans cannot predict the future, but we can dream it, plan for it and make it a reality. Let's be optimistic. Let's regain confidence in progress, in our country and in ourselves. The well-being of current and future generations depends on it.

Introduction TOWARDS A LONG TERM NATIONAL STRATEGY

THE LONG TERM: WHY LOOK TO 2050?

We humans are short-sighted creatures. Our brains went through their main evolutionary leap 300,000 years ago, in a world where our sapiens ancestors were subjected to immediate threats (the big cat that preyed on them in the savannah, the infection that killed them in a few days) and when the precariousness of science and technology meant that the consequences of their actions barely extended a few decades in time. As a result, **we ended up building a strong cognitive bias towards the short term**.¹ Our minds are designed to prioritise immediate benefits and threats over those in the future. This is why we find it so hard to stop smoking or to start exercising, and why we tend to put off indefinitely changes that benefit our lives.

Social institutions, and later **States**, were created to mitigate this natural inclination towards the short term and to look after the interests of society in the more distant future. "The origin of civil government," wrote the Enlightenment philosopher David Hume in 1739, is that "men are not capable of correcting, either in themselves or in others, the narrowness of thought which makes them prefer the present to that which is remote."²

Unfortunately, today's democracy has ended up exacerbating short-termism instead of offering a solution to it. In recent decades, the acceleration of technological change, globalisation, the digitalisation of the public debate and a range of institutional changes have meant that **Western countries' political horizons have narrowed dramatically**. Today's governments face more frequent elections than ever before; they need to manage increasingly rapid social, economic and technological processes; and they have to deal with a frenetic news flow in which "current" affairs last only a few hours and where events are rarely analysed with the necessary depth and calm.

The result is an increasingly short-sighted society, in which that which is urgent tends to overshadow that which is important and tactics prevail over strategy. **The costs of this short-termism are high**: decisions that backfire due to lack of anticipation, missed opportunities, laws that quickly become obsolete, and problems that are addressed too late.³ Short-termism is damaging our well-being and is preventing us from effectively addressing the great challenges of our time. Phenomena such as climate change, demographic ageing, low economic growth, inequality, educational stagnation and democratic discontent are not new: they have been decades in the making. And if they are as significant as they are today, it is partly due to our inability in the past to anticipate them or to tackle them by implementing far-reaching reforms that are sustained over time.

Short-termism is also mortgaging the welfare of future generations. Just as Europeans of the past colonised other parts of the world and used them to compensate for the shortcomings of their economic growth patterns and social models, we 21st-century Europeans are using the future as a sort of distant colony into which we are pouring all the inefficiencies of the current system: environmental degradation, technological risks and social fracture.⁴ In a way, we are "colonising the future," putting the rights and interests of the 47 million people who live in Spain today before those of the approximately 44 million who will inhabit it over the next century.⁵ This is not just wrong from a strictly economic point of view, it is also ethically unacceptable.

Fortunately, more and more countries are opening their eyes to this problem. In recent years, a number of governments have launched initiatives aimed at increasing the time horizon for their political actions and developing their capacity for "anticipatory governance." Evidence of this include: the setting up of **strategic foresight units** in several countries around the world (Germany,

Canada, France, Finland, Singapur, Sweden and the UK, among others); the proliferation of longterm multi-sector plans (such as *Agenda 2030* or the *Roadmap to a low-carbon economy by 2050*); and the creation of institutions and legal frameworks designed to protect the rights of future generations⁶ (for example, *Walle's Well-being of Future Generations Act.*)

The pandemic has accelerated this trend. The disruptive impact of the coronavirus has reminded many governments that they can no longer rely on traditional methods of policy-making and that they need analytical tools that allow them to **rethink the future, anticipate scenarios, and articulate structural responses over the long term**. So much so that, in the last year, several of our neighbouring countries (like France, the UK and the US) have begun preparing *grand strategies* to adapt to a post-Covid world,⁷ and The European Commission has set up a Vice-Presidency of Foresight and the EU-wide Foresight Network aimed at making foresight a key part of Europe's policy making.⁸

With the creation of **its National Office of Foresight & Strategy** in 2020,⁹ Spain joined this movement and resumed the path that had been established in 1976 when Adolfo Suárez set up the National Foresight Institute within the Office of the Prime Minister, mandating it to study "the problems of the future in a multi-disciplinary way" and to assist the country during the crucial years of transitioning to democracy.¹⁰

Spain is now facing a decade of change as dizzying and decisive as it was then. This is why it is essential for our country to look ahead once more and develop a *Long-Term National Strategy* that help us to anticipate the challenges and take advantage of the opportunities that megatrends such as climate change, demographic ageing and technological transformation will bring in the coming years. As we will discuss below, **it is not a question of forecasting the future, but of understanding it better** through the objective analysis of empirical evidence, and of fostering the national dialogue needed to build it.

THE METHOD: DIACHRONIC ANALYSIS AND STRATEGIC FORESIGHT

Spain 2050 is a strategic foresight exercise that has a dual goal:

- improve our understanding of the social, economic and environmental challenges and opportunities that our country will face over the coming decades; and
- create a multi-stakeholder dialogue that generates a Long-Term National Strategy that will enable us to set priorities, coordinate efforts, and ensure the prosperity and well-being of our citizens in the future.

This study is **a first step** in this direction. It contains:

- a diachronic and prospective analysis of nine major challenges that Spain will have to overcome between now and 2050 if it wants to consolidate its position as one of Europe's most advanced countries;
- more than 200 proposals to achieve this; and
- a set of 50 quantitative goals and indicators to use in designing areas of action, taking specific measures, and monitoring progress over the coming years.

These *Fundamentals and Proposals* have been drawn up by the **by the National Office of Foresight and Strategy of the Prime Minister's Office and a team of more than a hundred renowned experts** who have worked *ad honorem* and with full independence more than 900 hours of research and debate. Most of them are scholars in Spanish and foreign universities, although there are also analysts from international institutions, think tanks, think tanks and NGOs. Two criteria have been used for selecting them: merit (we have chosen people who have published top-notch research on the topics addressed) and diversity (we have tried to achieve diversity in terms of age, gender, geographical origin, academic discipline and political sensitivities).

In addition to these experts, the Office has had the valuable support of several government ministries, the AIReF, the Bank of Spain and the European Commission's Joint Research Centre, and has held meetings with specialists from international organisations like the World Bank, the OECD and the United Nations.¹¹

We have divided the exercise into two phases:

I. In the first phase (scenario-building), we created a range of future scenarios (scenariobuilding) to serve as a basis for reflection and strategic conversation. Contrary to popular belief, these scenarios are not *predictions* but rather *descriptions* of probable futures. To craft them, we examined the previous evolution of the main demographic, societal, economic, technological, environmental and institutional trends¹² in Spain and Europe. Then, we projected their potential future evolution combining the (economics, environmental sciences, demographics, sociology, history, political science and law) with qualitative and quantitative foresight techniques.¹³

No one can predict the future. Social change is not governed by universal laws like physics. And it is constantly altered by accidents, individual decisions, and disruptions that are impossible to anticipate. However, it also depends on the continuity of certain institutions, the recurrence of many social behaviours, and the prevalence of long-term structural processes that are subject to economic, environmental and legal constraints that make them less susceptible to short-term changes and, therefore, easier to anticipate. Good examples are demographic changes,¹⁴ labour market shifts,¹⁵ and climate transformations¹⁶. In this study,¹⁷ we use these stuctutal processes to project trends and establish a restricted range of probable futures–which in turn helps us to reflect on our options, map uncertainty, and design effective and resilient long-term policy strategies.

For practical reasons,¹⁸ we have reduced the range of working scenarios to two [Fig. 1]:

- A baseline scenario that projects past trends on the assumption that no major changes occur.
- A convergence scenario that assumes the occurrence of major changes that allow Spain to reduce or close its gap with the most advanced member states of the EU on key issues such as human capital, employment, productivity, sustainability and social welfare.

The use of just two scenarios helps us to make the exercice more accesible to the general public, to illustrate better the differences between action and inaction, and to find shared goals.



Fig. 1. Scenario building (phase I of the exercise)

II. In the second phase of the exercise (backcasting), we outlined a realistic roadmap that would allow Spain to move from its current state to the desired converge scenario. Such roadmap includes 50 specific goals and indicators and over 200 concrete policy measures to achieve them [Fig. 2]. This was done in the knowledge that nothing can be set in stone and that most of these goals, indicators and measures will have to be revised and updated over time, so they are adapted to the changing priorities of citizens, the information avaliable, and the new societal, economic, environmental and technological realities that will arise.

Fig. 2. Backcasting (phase II of the exercise)



Some people may find this approach strange or inadequate, but the truth is that this is how major transformations usually happen. The scientific community decided to search for the Higgs boson in 1964 - at a time when neither the knowledge nor the technology to do so existed. They set the goal, mobilised resources, started experimenting and, in 2012, after half a century of work, they found it.

The European Union was born out of a similar process. After the Second World War, a number of intellectuals created the vision of an association of countries united in common values and interests, without knowing how this could be achieved. This vision gave way to a dialogue, which in turn led to the cultural and institutional transformations that eventually resulted in the creation of the Union that we are today. The same approach drives initiatives such as the 2030 Agenda (2030 Agenda en cursiva) and the missions of the *Horizon Europe* 2021-2027 programme.

Very often, **major transformations often begin with the creation of a shared vision**; a distant goal that helps us set priorities, coordinate efforts, and make sense of decades of effort. When such visions are created, there is not usually a detailed roadmap. Their design emerges progressively, through study, negotiation, experimentation, and constant adaptation to changing circumstances.

If the day-to-day political debate is not as constructive and cohesive as it should be, it is often because the first step has been skipped: **the shared vision, the common goals, have not been set**. Where we want to end up has not been stated explicitly and, as a result of this void, the discussions about which path to take result difficult, tense or even useless.

Strategic foresight seeks to solve this problem by placing the search for future goals at the very centre of the conversation. It focuses on the identification of common and realistic goals based on historical experience and empirical evidence. Success stories from countries such as Finland, Canada, the UK and Singapore illustrate the many benefits of this method:¹⁹

- It serves to anticipate risks and opportunities that are often not evident in the immediate present, which in turn saves time and enables us to respond proactively (rather than reactively) to them.
- It helps with setting priorities.
- It opens the mind to new possibilities.
- It reveals the costs of inaction.
- It enables the design of more resilient policies.
- t helps to bridge differences, bring positions closer together, and reach agreements because:
 - Negotiations that start from clear and ambitious goals tend to general better outcomes.²⁰
 - Anticipatory outlooks allow all prties to better understand the potential consequences of a given course of action and this. in turn, helps positions to converge.
 - The level of resistance to change is lower, the less immediate or disruptive the change is perceived to be is perceived to be (in other words, measures tend to have a higher approval when they are progressive and when a transitional period for the adaptation of all the affected stakeholders is envisaged.

In summary, the use of strategic foresight has great advantages, which is why it is widely used by the world's most advanced governments, businesses, and international organisations. It does not predict the future, but it does help face it, and it fosters an informed and constructive conversation about the crucial issues that will mark the future of a country and its inhabitants over the medium and long term.

Our methodological principles

Ten methodological principles guided the design and execution of this exercise:

A vision for the country. Policies for the future need to be State policies, not government policies, as they need to span several legislatures. For this reason, our analysis has been conducted from a non-partisan perspective that puts data and empirical evidence before political positions. This *Strategy* intends neither to endorse nor refute any political party's programme. It does, however, aspire to help them all, along with public institutions, companies, NGOs, trade unions, universities, foundations, associations and other organisations within our civil society.

Empirical rigour. In the field of foresight, there are plenty of sensationalist studies that attempt to grab headlines with predictions that are as eye-catching as they are unfounded. In this exercise, we have avoided such device and have based our analysis on a broad empirical, measurable and verifiable base, consisting of over 500 data series aand some 1,650 scientific peer-reviewed

articles and publications produced by international organisations, think tanks, and non-profit entities of recognized technical competence.

European ambition. We divided the 27 EU Member States into three groups of countries based on their level of performance (low, medium and high) according to a set of standard economic, social and environmental indicators. We then analysed how, over the last thirty years, Spain successfully moved from the low to the medium performance group in regard to most of these indicators, and asked what we would have to do to join the high performance group (which we call the "EU-8") ²¹ in the next thirty years.

Comprehensive approach. *Spain 2050* seeks to outline a holistic vision of Spain's challenges and opportunities, taking into account both the interdependence between them (trade-offs and synergies), and the need to address them through public-private collaboration and coordinated action by all areas of government (the so-called Whole-of-Government Approach). To this end, all plans and strategies drawn up by the national government's departments, European institutions, and international organizatioons have been examined [Fig. 3]. Special attention has been paid to the *Recovery, Transformation and Resilience Plan*²² and the *2030 Agenda*.





Recognition of complexity. Public debate today tends to oversimplify reality, often presenting it in a biased way that omits or minimises the existence of nuances, disagreements and uncertainties. The truth is, however, that things are never simple, since all of them are part of the universe, which is notoriously complex. This *Strategy* seeks to embrace and resolve that complexity and convey it in a clear and accessible way to the public.

Applicable and transformative. *Spain 2050* has been conceived as an applied research device that aspires to be useful for society. Our work is part of the *transformative foresight* trend, which consists of studying the future in order to change decision-making in the present. The aim is to identify the likely futures that are to be avoided or achieved, and to suggest policies for doing so. Each chapter therefore includes a series of concrete goals for the coming decades, along with empirical indicators to measure them, as well as recommendations on how to achieve them.

Prioritising that which is important. We have left aside the issues that are of minor causal relevance (and which tend to clog up the media debate), and have focused on the issues that are truly decisive for the future of the country and we have also focused on guidelines for tackling them.

Gender perspective. The gender perspective permeates the analysis of all the issues addressed, with the conviction that, without eliminating the many structural inequalities that still afflict our country, we will not be able to achieve the best possible future.

Transparency. The names of the experts who participated in the exercise, the databases used, and the methodology employed are explained and available for anyone to download, compare and use in their own analysis.

Agreement focused. Long-term policies need to be born out of agreement. Without it, they are bound to die halfway through. Our intention has been to create a study that brings together the consensus reached in recent decades by the academic community in relation to the different challenges that our country faces now and in the future. It is obvious that empirical evidence does not provide all the answers and that there will always be decisions that are more ideological than technical in nature. But it is also true that science has more to say about how to govern a country than we tend to acknowledge and that the points of disagreement are fewer and less acute than the media debate lets on.²³ Spaniards agree on many things. Experts do too. We must take advantage of these shared visions to build a space of broad agreement - a solid pillar of the State around which day-to-day policies can oscillate according to the different governments and the public's changing views.
ANALYSIS AND PROPOSALS: ACHIEVEMENTS, CHALLENGES AND OPPORTUNITIES OF A COUNTRY FULL OF FUTURE.

Over the past forty years, Spain has undergone a profound transformation that, in many respects, is exemplary on a global scale. In just four decades, our country has gone from an agrarian-based economy, weak and poorly connected with the rest of the world, to a modern and competitive economy, with a trade opennes rate higher than France and Italy, and a plethora of leading companies in industries such as tourism, construction, transport, renewable energies, agri-food, banking and fashion.

This economic development has allowed us to: generate more wealth as a country than at any other time in our history; increase our employment rate by 15 points (which is equivalent to generating 8 million net jobs); successfully incorporate women into the labour market; and double our per-capita income. It has also helped us to build a welfare state of European standard that provides high quality social benefits and public services to all citizens. As a result, skills levels among the Spanish population have improved dramatically, at a rate only comparable to that of Finland over the same period, and is now practically in line with the EU average.

At the intangible level, progress has been equally remarkable. Spain today is home to one of the most inclusive, pluralistic and tolerant societies in the West. We have a higher level of freedoms than the USA ,and a democracy that is ranked as one of the most complete and stable in the world.

In short, **ours is a great country and its short democratic journey is a clear success story**. When we think about what is happening by limiting ourselves to the immediate present, it is easy to succumb to pessimism and the feeling that "things aren't getting better" or that "they are getting worse". However, when the empirical evidence is analysed, it can be seen that Spain is on a positive trajectory on most fronts. And in terms of many of them, it is already a global leader [Fig. 4].



● Spain ● EU-27 ● EU- 8 ● Other countries
Severe housing deprivation rate (highest to lowest) ³⁴ 6th of 27
●
Internet access ³⁵ 10th of 100
Best countries to live and work as a woman ³⁶ 8th of 153
● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
Best countries to live and work as a foreigner ³⁷ 4th of 33
Environmental sustainability ³⁸ 14th of 180
● · · · · · · · · · · · · · · · · · · ·
Installed capacity of renewable energy ³⁹ 9th of 220
Protected natural areas ⁴⁰ 40th of 211
Monuments and World Heritage Sites ⁴¹ 3rd of 167
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Global cultural influence ⁴² 3rd of 73
People who are not alone and have someone to count on ⁴³ 2nd of 33
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Source: Authors' own, based on data from the different sources cited.

The EU-27 and the EU-8 represent the simple average of the values of each of their countries, based on the available data.

Of course, this does not mean that Spain does not face significant problems or that it should be satisfied with what it has achieved. It is undeniable that, in many respects, the changes that have occurred so far have been insufficient or inadequate, and that many of them have not benefited the entire population equally. Our country still has severe shortcomings in its productive sector, its human capital and its institutional architecture and these have prevented it from converging with its European neighbours in terms of key aspects for economic development, environmental sustainability and social welfare [Fig. 5]. In addition, we face important challenges that, if not successfully addressed in the coming decades, could worsen as a result of *megatrends* such as demographic ageing, climate change, technological transformation, growing cities, and the reconfiguration of the global order.

Of these many challenges, we look at nine here, which we believe will be particularly relevant to our future in the medium and long term:

- 1. Be more productive for better growth.
- 2. Move to the forefront of education.
- 3. Improve training and retraining of our population.
- 4. Becoming a carbon-neutral, sustainable and climate-resilient society.
- 5. Get our welfare state ready for a longer-lived society.
- 6. Promote balanced, fair and sustainable territorial development.
- 7. Solve the deficiencies of our labour market and bring it into line with the new social, economic and technological realities.
- 8. Reducing poverty and inequality and repairing the social elevator.
- 9. Broaden the foundations of our future well-being.

Why these challenges and not others? The selection is based on several criteria. We have focused on these nine because in our view they are: 1) key to the economic development of the country, the prosperity and health of its population and the sustainability of the welfare state; and 2) because there is abundant empirical evidence, academic studies and success stories in countries around us from which we can draw lessons and ideas.

As can be seen, these challenges are eminently domestic, but they have all been analysed from a European perspective and as part of the global reality under which they fall.

It is clear that the list does not reflect all our country's challenges. There are key issues that are not explicitly mentioned but that are addressed in detail accros the chapters, such as scientific and technological innovation, public administration modernisation, gender equality, and support for young people, which, altought they are not explicitly mentioned, are addressed in detail and apply across all the challenges. There are also important issues, such as Spain's role in the world and the structuring of the autonomous State, that have been left out or have not been analysed in the depth they deserve and which will be dealt with in future projects.

Fig. 5. Map of Spain's weak

Areas in which our country is still in a low position compared to the most advaced countries in Europe





Source: Authors' own, based on data from the different sources cited.

The EU-27 and the EU-8 represent the simple average of the values of each of their countries and based on the available data.

A realistic ambition

Overcoming the above-mentioned challenges will not be easy, but it is certainly possible. For some time now, there has been a sense of growing pessimism among the Spanish population. A number of surveys reveal that many citizens believe the country will not be able to cope successfully with phenomena such as technological change and youth unemployment. Consequently, they think that present generations will end up having worse lives than their parents. This pessimism is a common reaction among human beings when they think about the future.⁶⁴ However, we are convinced that, in the case of our country, it is unfounded.

The analysis of how far we have come and the comparative politics exercises contained in this study indicate that **Spain is making positive progress on practically all fronts and, if the necessary changes were implemented, it would continue to do so in the future.** This would allow us to overcome the challenges discussed and experience immense economic and social progress, which would lead us to surpass the EU-27 average in the next decade and converge with the most advanced countries in Europe (EU-8) before 2050.

That is our proposed ambition for Spain. The Spain of 1978 dreamed of democracy, economic development and full incorporation into the European community. Those dreams have been fulfilled. The Spain of 2021 can, and must, look even further ahead. It must aspire to sustainable and globally competitive growth and a strong, effective welfare state that raises its population's well-being levels to the highest standards in the world.

This ambition is as necessary as it is realistic. To understand why, we need to avoid two mistakes we humans tend to make when we look to the future. The first is *focalism*, which means focusing attention only on some aspects of the phenomenon under analysis (generally the most negative ones) and ignoring the rest.⁶⁵ For example, when we think about the ecological transition, we calculate the billions of euros we will have to spend on redesigning our production and transport systems, but we forget the billions we will save on importing fossil fuels. Similarly, when we think about digitalisation, we worry about the jobs that the new technologies will destroy, but not about the many new ones they will create, nor the huge gains in productivity and working conditions that will occur in most jobs. This biased way of looking at the future leads to pessimism and prevents us from gauging our potential for change.

The other common mistake is to lose historical perspective. We often forget that most of the social rights and material possibilities we enjoy today were completely unthinkable just fifty years ago. This forgetfulness produces in us the blindness of immediacy, which means that any proposal far removed from today's reality is discarded as utopian or unfeasible. Thus, only those goals that are close to what already exists are accepted as "realistic". We must free ourselves from that blindness and put our challenges in perspective. If we make the most of it, thirty years is a long time. In fact, it should be borne in mind that **the reforms and improvements that Spain will need to make in order to converge with the EU-8 countries are, in most cases, similar in difficulty and magnitude to those already implemented by Spain and other neighbouring countries during the last four decades. If we did it in the past, we can do it again.**

The proposals

Obviously, nothing will be achieved by the simple inertia of history. To overcome our challenges and converge with the EU-8, today's generation will have to carry out far-reaching reforms and launch bold and sustained initiatives. **This study suggests more than 200** that can be summarised into 12 main groups:

- A firm commitment to improving the education of our population from birth and throughout life.
- Robust and ambitious support for innovation on all fronts, not only in the scientifictechnological field.
- Strong modernisation of our economy and business culture.
- Transition towards a sustainable and environmentally friendly model of development.
- Dramatic expansion of opportunities for young people, especially in areas such as education, employment and access to housing.
- Achieving full gender equality.
- Encouraging legal immigration and attracting foreign talent as additional ways to boost our economy and underpin the viability of our welfare state.
- Strengthening public services, with a special focus on education, health and care.
- Redesigning social benefits to move progressively towards a model that protects citizens on the basis of their needs and not only on their employment history.
- Reforming our tax system to increase its revenue-raising capacity and improve its progressivity, so that it is able to finance the strengthening of our welfare state without compromising the sustainability of public accounts.
- Modernising public administration to create efficiency gains, and improving the policymaking process through a greater attention to empirical evidence, experimentation, evaluation, social collaboration, and the analysis of trade-offs.
- A core commitment to the rights and interests of future generations. The decisions we take today cannot end up reducing our children's well-being.

None of these reforms can be made within one single legislature. We need to understand and accept that there is no such thing as immediate change. Economic, political and social transformations are usually incremental; they occur slowly and gradually (in history, disruptions are rare and almost never good). True progress is not just a fleeting impulse, the fruit of a few individuals' genius. Rather, it is an effort sustained over time, by several generations. It is therefore important that we define a clear and shared direction and that we are able to maintain it over a long period of time. When sailing a hard-to-handle slow boat, it is essential to have a well-defined course.

The compass: 50 goals for 2050

It is difficult to attain that which cannot be measured. We have therefore created a **dashboard that includes 50 specific goals that Spain should achieve by 2050** if it wants to converge with the most advanced countries in Europe [Fig. 6]. When designing and selecting these, we have tried to adhere to the following three conditions:

- The goals should be quantifiable. That is, they should be measurable using specific indicators based on accessible data that are European in scope, regularly published, and recognised as valid by the academic community.
- The goals should be ambitious but realistic. The convergence pathways have been designed through a careful analysis that takes account of past trajectories, projected future trends, dozens of comparative policy cases and the interdependence between goals.
- The goals and indicators should be updateable and capable of being modified or replaced by others as the actual situation changes, so that they do not end up being obsolete by 2050.

What we present here is nevertheless just an **initial proposal that should be constantly reviewed and updated**, as the country changes, scientific knowledge advances and better indicators emerge. It should also be borne in mind that these 50 quantitative goals are only an indicative tool and should in no way replace (or overshadow) the many qualitative goals set out in *The Strategy*.

Fig. 6.Dashboard of indicators and targets

Indicators	Average 2015-2019 or latest	Average 2015-2019 or latest		
	data available*	2030	2040	

Challenge 1: Be more productive for better growth

1	Gap in per capita incom	e with the EU-8 ⁶⁶	-22%	-18%	-15%	-10%
2	2 Labour productivity levels (constant euros, PPP 2015) ⁶⁷		42	46	53	63
3	3 Employment rate ⁶⁸		62%	68%	72%	80% ⁶⁹
4	4 Total R&D expenditure (% of GDP) ⁷⁰		1.2%	3.0% ⁷¹	3.5%	4.0%
5	5 Firms by size	Large (+250 employees)	31%*	32%	33%	35%
(by % of employment) ⁷²	Medium (20-249)	23%*	25%	28%	30%	
	Small (1-19)	45%*	42%	38%	35%	
6	Shadow economy (% of	GDP) ⁷³	20%	15%	12%	10%

Challenge 2: Move to the forefront of education

7	7 Percentage of pupils who have repeated at least one grade at age of 15 ⁷⁴		29%*	18%	10%	5%
8	Early school dropout rate ⁷⁵		17%*	10%76	6%	3%
9	Population aged 25-34 with more than lower secondary education ⁷⁷		70%*	78%	86%	93%
10	10 Importance of socio-economic differences on the probability of repetition at equal skills levels ⁷⁸		3.9*	3.0	2.0	1.0
11	Percentage of 15 year olds with	Reading	20%	18%	15%	<15%
	low performance in PISA (below	Mathematics	23%	20%	18%	<15%
	level 2)/7	Science	20%	18%	15%	<15%
12	Percentage of 15-year-olds with	Reading	5%	6%	8%	10%
high performance in PISA (level	Mathematics	7%	10%	13%	16%	
	5 OF ADOVE)	Science	5%	6%	8%	10%
13	Public expenditure on education (%	% of GDP) ⁸¹	4.3%	5.1%	5.3%	5.5% ⁸²

Indicators	Average 2015-2019 or latest	Average 2015-2019 or latest		
	data available*	2030	2040	

Challenge 3: Improve training and retraining of our population

14	4 Female students enrolled in tertiary education in the STEM field (% of total) ⁸³		28%	35%	42%	50%
15	Proportion of adult popul with at least basic digital	ation (16-74 years old) skills ⁸⁴	55%	70% ⁸⁵	100%	100%
16	Adult population (25-64) that they do not speak an (% of total) ⁸⁶	years old) who recognise Iy foreign languages	46%*	40%	30%	25%
17	7 Proportion of adult population (25-64 years old) who report having taken part in a retraining programme in the last year ⁸⁷		30%*	50% ⁸⁸	70%	90%
18	18 Proportion of unemployed population (25-64 years old) with recent learning experience ⁸⁹		32%*	35%	50%	70%
19	19 Active labour market policies devoted to training (% of GDP) ⁹⁰		0.11%	0.25%	0.30%	0.40%
20	Percentage of	Large (+250 employees)	92%	95%	100%	100%
enterprises that carry out training for their	Medium (50-249)	82%	88%	92%	95%	
	employees by size ⁹¹	Small (10-49)	51%	60%	70%	75%

Challenge 4: Become a carbon neutral and sustainable society that is resilient in the face of climate change

21	GHG emissions (thousands of tonnes of $\rm CO_{2-eq})^{92}$	330,640	223,000 ⁹³ (-23%)	126,000 (-57%)	29,000 ⁹⁴ (-90%)
22	Water demand (hm³/year)95	30,983*	29,434 ⁹⁶ (-5%)	27,885 (-10%)	26,335 (-15%)
23	Primary energy intensity (kilograms of oil equivalent/ thousands of euros) ⁹⁷	115 ⁹⁸	73 ⁹⁹ (-36%)	56 (-51%)	42 ¹⁰⁰ (-63%)
24	Electricity generated by renewable energy sources (% of total) ¹⁰¹	36%	-74% ¹⁰²	87%	100% ¹⁰³
25	Environmental tax (% of GDP) ¹⁰⁴	1.8%	2.6%	4.0%	5.0% ¹⁰⁵
26	Organic farming area (% of total cultivated area) ¹⁰⁶	10%*	25% ¹⁰⁷	43%	60%
27	Annual reforestation rate (hectares/year) ¹⁰⁸	15,103 ¹⁰⁹	20,000 ¹¹⁰	20,000	20,000

Indicators	Average 2015-2019 or latest		Targets	
	data available*	2030	2040	

Challenge 5: Get our welfare state ready for a longer-lived society

28 Activity rate ¹¹¹	Between 55 and 64 years old (%)	62%*	63%	64%	67%
	Between 65 and 74 years old (%)	5%*	7%	9%	11%
29 Public expendit health expendit	29 Public expenditure on health (% GDP) excluding health expenditure on long-term care ¹¹²		7.0%	7.0%	7.0%
30 Public expendit (% of GDP) ¹¹³	 Public expenditure on long-term care (% of GDP)¹¹³ 		1.5%	2.0%	2.5%
31 Percentage of people who are entitled to SAAD benefits but do not receive them ¹¹⁴		17%*	0%	0%	0%

Challenge 6: Promote a balanced, fair and sustainable development of the country

32 Percentage of population suffering housing cost overburden ¹¹⁵	9.5%	8.0%	6.5%	4.5% ¹¹⁶
 33 Proportion of dwellings rehabilitated per year (% of total stock)¹¹⁷ 	0.1%	1.5%	1.8%	2.0%
34 Municipal waste sent to landfill (% of total generated) ¹¹⁸	55%	10% ¹¹⁹	5%	0%
 35 Population exposed to air pollution levels (PM_{2.5} particles) above WHO recommendations (% of total)¹²⁰ 	51%	25%	15%	2% ¹²¹
36 Energy poverty (% of population unable to keep their dwelling at an adequate temperature) ¹²²	7.5%*	6.0% ¹²³	3.0%	0.0% ¹²⁴

Challenge 7: Resolve the shortcomings in our labour market and adapt it to the new social, economic and technological realities

37 Unemployment rate ¹²⁵	18%	12%	10%	7%
38 Employment rate of women ¹²⁶	57%	65%	75%	82%
39 Youth unemployment rate ¹²⁷	40%	30%	21%	14%
40 Employment rate (55-64 years) ¹²⁸	51%	56%	62%	68%
41 Temporary rate ¹²⁹	26%	23%	18%	15%
42 Involuntary part-time rate ¹³⁰	9%	7%	5%	3%
43 Hours worked per week ¹³¹	37.7	37.0	36.0	35.0
44 Gender wage gap ¹³²	14%	10%	5%	0%
45 People satisfied with their employment situation ¹³³	85%*	87%	90%	93%

Indicators	Average 2015-2019 or latest		Targets			
	data available*	2030	2040			

Challenge 8: Reduce poverty and inequality and reactivate the social elevator

46 Gini Index (income inequality) ¹³⁴	34	32	31	29 ¹³⁵
47 Population at risk of poverty (% of total) $^{\rm 136}$	22%	18%	15%	10%
48 Tax revenue (% of GDP) ¹³⁷	35%	37%	40%	43%
49 Public expenditure on social protection (% of GDP) ¹³⁸	17%	18%	19%	20%

Challenge 9: Broaden the foundations of our future well-being

50 Percentage of people satisfied with their life ¹³⁹	83%	86%	89%	92%
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Note: This is the summary version of the chart. For the expanded version containing more detail, please see Appendix 50 goals for 2050.

Just the first step

Spain 2050 intends to be a plural and inclusive strategic foresight exercise that brings together the vision of all our country's social and economic stakeholders. What we present here, **therefore is not the** *Strategy* **as such, but as the title indicates, an initial imperfect, incomplete proposal that will need to be corrected, expanded and built upon through a national dialogue** that will involve the country's autonomous governments, main public institutions, companies, trade unions, universities, think tanks, associations, foundations, third sector organisations and political parties [Fig. 7].

Our hope is that this dialogue will allow us to reach not a *consensus* (in which all parties end up thinking the same thing), **but an** *agreement* (resulting from concessions made by all parties) **that will result in the** *Long-Term National Strategy*. A rigorous, plural and grounded Strategy that will serve to sharpen up the strategic vision of our public and private institutions, as well as strengthen the design of the second phase of the *NextGenerationEU* plan (to cover the period 2023-26) and guide Spaniards' decision-making over the coming decades.

Fig. 7. Spain 2050 Phases of the exercise



Some will consider such an agreement to be impossible, especially in such seemingly polarised times as now. Nevertheless, history shows that our country was able in the past to look with optimism at the future and to come to terms with situations that are as tough (if not more so) than the current one. We must therefore try. The well-being of current and future generations depends on it.





BEING MORE PRODUCTIVE TO GROW BETTER

EXECUTIVE SUMMARY

- Since the advent of democracy, Spain has undergone a remarkable economic and social transformation. Our per-capita income has doubled, our employment rate has increased by more than 15 points and our companies have successfully integrated into international trade and finance networks. This has enabled us to jump on the bandwagon of European progress and consolidate our position as a modern, developed and globally competitive economy.
- Even so, Spain has not succeeded in substantially reducing the income gap between it and the most advanced economies in the EU. The main cause is low productivity, which affects practically all of our economic sectors. Some of the main reasons for this low productivity are the lower quality of our human capital, the deficit in innovation and technological integration of our companies, and the shortcomings of our regulatory framework.
- Low productivity is compromising the whole country's economic development and is strongly related to low wages, long working hours and many companies' lack of competitiveness.
- The demographic ageing that will take place in the coming decades could aggravate this situation. By mid-century, the Spanish population aged 16-64 is expected to shrink by 3.7 million to below 27 million (1996 levels). Without major changes, this contraction of the labour force could cause our future economy to stagnate. Between 2023 and 2050, Spain's GDP could grow between 0.3 and 1.1% per year a far cry from the 2% of the period 1996-2019. This would distance us even further from the advanced countries of Europe and aggravate problems such as unemployment and inequality.
- To avoid this scenario, we will need to boost our productivity and, at the same time, increase our employment rate. It will be an arduous, but not impossible, task. In the last 30 years, countries such as Finland, Sweden, Denmark and Germany have succeeded in increasing their productivity by 50% without compromising job creation. If Spain is able to do the same, it could grow at average rates of 1.5% per year and greatly reduce the gap in per capita income that separates it from the European leaders, thus consolidating itself as one of the world's most prosperous economies.
- To achieve this, we will have to make a firm and decisive commitment to education right from birth and throughout life; multiply our efforts in R&D; accelerate the digitalisation of our companies; take advantage of the opportunities of the green transition; reduce as far as possible the distortions created by administrative obstacles; and tackle the black economy. Only by doing this will we be able to create quality jobs, pay higher wages, reduce our vulnerability to crises and external competition, and ensure the maintenance of the welfare state without incurring chronic public deficits or mortgaging future generations' welfare.

THE PAST: ACHIEVEMENTS

Over the last forty years, **Spain has undergone a remarkable transformation**. In a relatively short period of time, our country has successfully combined democratic normalisation with economic modernisation. This has enabled us to recover decades of backwardness and become a prosperous country with a key role in the European economy. In 1980, Spain's per capita income was barely 16,000 euros; today, it is 30,700 euros.¹

This progress has been the result of a host of factors, such as international trends and scientific and technological advances, but also **the ambition of a society that was able to build consensus, make efforts and carry out far-reaching reforms in record time.**

The Moncloa Pacts (1977) were a first milestone on that road. They served to reduce some of the imbalances that Spain had been carrying with it for decades (runaway inflation and a high external deficit), lay the foundations of a modern, diversified economy, open up to the world, and began to build the fiscal system and welfare state that we enjoy today.²

Joining the European Union (EU) in 1986 was a second major milestone in Spain's economic and social transformation. Joining the single market meant consolidating the country's openness, greatly expanding the markets where our companies could buy and sell their products. At the same time, it boosted competition and facilitated the progressive liberalisation of many sectors, in part due to the requirements of regulatory harmonisation established by the EU.³ Furthermore, integrating into Europe enabled the expansion of tourism, foreign capital inflows and the receipt of structural and cohesion funds from the European Community. All these factors played a key role in the modernising of our production sector and the strengthening of our human capital.⁴

The third crucial milestone in Spain's economic development in the recent past was **joining the Economic and Monetary Union** (EMU) in 1998 and the subsequent **adoption of the euro**. Compliance with the convergence criteria helped build our country's economic stability and credibility. Inflation was reduced, public accounts were cleaned up, interest rates fell and exchange rates became more stable (the peseta had gone through repeated devaluations in previous years). This strengthened our trade relations and provided a stimulus for incoming foreign capital and the international expansion of our companies. Since then, the Spanish economy has continued to diversify its basket of exported products and services⁵, and has increased its presence in the markets of America, Asia and Africa,⁶ with an growing number of companies expanding their business beyond our borders.⁷

Today, the result of that historic effort is evident in most indicators available. Between 1978 and 2019, Spain's trade openness rate has gone from 27% of GDP to over 67% [Fig. 1], surpassing neighbouring countries such as France, Italy and the United Kingdom. The process of financial internationalisation has been equally remarkable: in 1980, Spain's volume of foreign direct investment accounted for barely 2% of GDP; today, it represents 54%.⁸

Fig. 1. Rate of trade openness in Spain



Spain's economy has successfully opened up to the world. And the same has happened in the opposite direction: our companies have drastically increased their overseas investments¹⁰ making us one of the world's nations with the largest stock of investment abroad. In relation to the size of our economy, the stock of Spanish foreign direct investment abroad has gone from being 0.8% in 1980 to over 43% in 2019 [Fig. 2].





Source: Author's own, based on UNCTAD data.11

The changes in our economic structure are a good reflection of modernisation. In 1980, 15% of the employed population in Spain worked in the agricultural sector, a proportion that today is only 4%. Meanwhile, employment in the service sector has increased by almost 30 percentage points[Fig. 3], following the same trend described by the most advanced EU economies. Spain is a world leader in tourism, both in terms of visitor numbers¹² [Fig. 4] and in terms of the sector's competitiveness¹³. It also occupies a prominent position on a global scale in sectors such as construction,¹⁴ automotive,¹⁵ banking,¹⁶ renewable energy generation,¹⁷ agri-food¹⁸ and fashion.¹⁹



Fig. 4. Proportion of international tourism, 2018



Source: Drafted by the authors based on data from AMECO.²⁰



This transformation from a closed, interventionist economy to open and modern market economy has simultaneously been the cause and consequence of other improvements in those factors determining a country's development and prosperity in the medium and long term: human capital, employment, capital endowment (physical and technological), innovation and productivity.

Regarding the former, progress has been more than remarkable [see chapters 2 and 3]. **Between 1980 and 2020, the education of the Spanish population has improved dramatically.** Average number of years spent in school has doubled,²² the percentage of people with tertiary qualifications (university or Advanced Vocational Training) has risen from 7% to 36%,²³ and mastery of basic skills (reading and mathematics) has increased more than in any other European country, with the sole exception of Finland.²⁴

Improvements in training, together with changes in the productive structure, have resulted in a significant increase in the labour market insertion of the population, with a rise in the employment rate of 15 points since 1980.²⁵ The main protagonists in this process have been women, whose employment rate has more than doubled over the last four decades. Changing roles, the growth of the service sector, the improvement of work-life balance and other social factors have allowed millions of women to join the labour market and thus put their talent to use. At the same time, there has been a drastic reduction in the gender gap.²⁶ Likewise, in this period, the country has managed to incorporate more than 2 million immigrants to the labour market, which is equivalent to a third of all employment generated since 1995.²⁷ The progressive increase in the employment rate has also been accompanied by a reduction in the hours worked per week: from almost 42.5 hours in 1980 to 37 in 2019.²⁸

Improvements in physical capital (housing, infrastructure, machinery) **and technology** have also been significant. In four decades, Spain has managed to double the rate between capital and employment,²⁹ thanks not only to the expansion of residential construction but also to making investments in machinery and transport equipment by Spanish firms and by extending the infrastructure network, both physical and digital. In fact Spain has today the 7th best network

of land, port and air infrastructures in the world [Fig. 5], something that has been key both for the internalisation of its economy and for limiting territorial imbalances.³⁰



Fig. 5. Ranking of the best countries in terms of transport infrastructures

Source: Authors' own, based on World Economic Forum data.³¹

In the fields of science and innovation, changes have also been significant. In 1978, Spain had no deep-rooted culture of scientific research, and its ecosystem of companies and institutions specialising in knowledge generation was small and weak. At that time, only a few companies made significant efforts in R&D, which were often diluted in a context dominated by imported technology and knowledge, and by activities of a traditional nature. Aware that science and innovation were essential for a global competition, our country launched a strong expansion of its research ecosystem,³² both public and private (public research organisations, universities, technology centres, regional development agencies); it approved the first Science Law³³ and set up subsidy programmes for business R&D.³⁴ Although, as we will see below, there is still a long way to go on this front, progress has been remarkable. In 1985, the country devoted barely 0.5% of GDP to R&D expenditure, and applied for only 3 patents per million inhabitants; today, R&D expenditure is around 1.3% of GDP and patent applications are 36 per million inhabitants.³⁵

Finally, it is worth mentioning **the modernisation of our business sector.** Advances in education and innovation, international competition and the new demands of the population were a catalyst for the creation of companies³⁶ and led to a change in business culture, characterised, up until then, by the scarcity of entrepreneurial initiatives and a reluctance to compete and engage in commercial activity.³⁷ Although small and medium-sized companies still predominate in Spain, in the last four decades hundreds of companies have managed to increase their size, improve their production and organisational processes, and design new goods and services. So much indeed that some have become world leaders in their fields. Today, the country has a critical mass of medium and large companies (in 1986, large companies generated only 8% of employment; while in 2018, they generated 31%³⁸), with some of them being among the most competitive in their respective sectors,³⁹ and several brands among the most highly valued in the world.⁴⁰

In short, over the last four decades, Spain has undergone a remarkable economic and social transformation. Improvements in human capital, innovation, infrastructure and the business sector have meant that the output generated by our country for each hour worked has increased

from 25 euros in 1980 to 42 in 2019,⁴¹ while income per inhabitant has doubled [Fig. 6]. **This has** enabled us to jump on the bandwagon of European progress and consolidate our status as a modern, developed and competitive economy on a global scale.

Period	GDP per capita (euros)	Employment rate	Population aged 25 to 64 with education higher than secondary education	Hours worked per week	Labour productivity (GDP per hour worked in euros)	Inflation (%)
1980-89	17,197	48%	-	41.4	29	10.3%
1990-99	22,139	50%	30%	40.6	35	4.2%
2000-10	28,235	63%	46%	39.6	37	3.0%
2010-19	28,353	60%	57%	38.0	41	1.2%
2019	30,720	65%	61%	37.5	42	0.7%

Fig. 6. Some indicators of Spain's economic and social progress

Source: Authors' own, based on AMECO, Eurostat and OECD data. $^{\rm 42}$

TODAY: ROUTES TO IMPROVEMENT

As we have seen, the economic and social changes that Spain has undergone over the last four decades have been of enormous significance. However, in many areas, these have been insufficient and incomplete. For this reason, **our country has not managed to substantially reduce the income gap it maintains with the EU average and the most advanced countries of the continent** (grouped here under the label "EU-8").⁴³ The crises of the 1980s and 90s were a setback for the convergence gains achieved in previous years. The recessions of 2008 and 2011 reversed the progress made since joining the euro, and the expansion that began in 2014 proved insufficient to make up lost ground. Thus, before the coronavirus pandemic hit our economy **in early 2020, Spain's per capita income was still far from that of the most developed countries in Europe** [Figs. 7 and 8].



Over the coming decades, our country will need to accelerate the modernisation of its economy to catch up with them. Doing so is not only possible and desirable, but essential to guarantee future prosperity and a strong welfare state.

How can we do so? What has prevented us from converging with our European partners? The key is low productivity. In the EU-8 countries, the increase in per capita income has been achieved through a more efficient use of resources; in particular, through greater labour insertion, an improved training of the workforce, and more technologically advanced capital. In contrast, in Spain, technological transformation⁴⁶ and improvements in human capital have been more moderate, employed people among the working population are still low, and output per hour worked (labour productivity) has grown considerably less [Figs. 9 and 10].⁴⁷

Fig. 9. Labour productivity levels

Fig. 10. Spain's productivity level vs the EU-28, EU-8 and USA.



Source: Author's own based on data from the OECD.48

Source: Author's own based on data from the OECD.49

Paradoxically, in Spain the highest productivity growth rates were recorded during crises, when least efficient companies tend to disappear and least productive workers lose their jobs. In other words, in Spain, labour productivity tends to grow more when employment is destroyed, whereas in the more advanced economies, employment grows as productivity grows.⁵⁰

The reasons why our country has failed to register sustained productivity gains in recent decades are numerous and go beyond its sectoral structure. In the public debate, weak productivity growth is often associated with the "excessive" size of sectors like tourism and construction. This diagnosis leads to a fatalistic dilemma that seems to limit our options to a choice between A) investing in sectors that are not very productive but generate a lot of employment, or B) sacrificing employment growth at the cost of higher productivity.

However, this is a false dilemma. **Productive specialisation has contributed to the long-run trend of low productivity, but it is not the sole nor the main explanatory factor.** This is evidenced by the fact that mots of our industries, including manufacturing, financial services and IT show lower levels and have recored lower productivity growth than those of the EU-8, since 1995 [Figs. 11 and 12].⁵¹



Fig. 11. Labour productivity levels in Spain by branch of activity (average 1995-2019)

Source: Authors' own, based on Eurostat data.52



Fig. 12. Spain's productivity gaps vs EU-8 by branch of activity (average 1995-2019)

Source: Authors' own, based on Eurostat data.53

All the above-mentioned means that the problem of Spain's low productivity is not exclusive of any particular sector. Rather, it affects practically the whole of its productive system, and derives from five-cross-cutting factors that limit its efficiency. In order to guarantee Spain's progress bewteen now and 2050, we must understand those factors in all their complexity and take advantage of the lessons and opportunities provided by the current crisis to undertake a profound modernisation of our economy.

I. Human capital

Human capital, understood as a population's set of skills and attributes, is one of the factors that most influences a country's prosperity. There is ample empirical evidence showing that a better skilled population is strongly associated with higher levels of economic growth, more innovation, stronger institutions, greater capacity to assimilate knowledge and technological advances, and higher productivity.⁵⁴ Similarly, better human capital is linked to higher levels of employment, health, civic participation, political stability, and even greater rationalisation of energy consumption and natural resources,⁵⁵ essential factors for prosperous, inclusive and sustainable growth.

The educational progress made by our country in the last decades have been remarkable. Even so, **Spain still has a lower level of human capital than the most advanced countries around us**.⁵⁶ The high rate of school dropouts, the low level of learning at all stages, the fact that 48% of the working population aged 25 to 64 does not have vocational training or a university degree, and the low level of implementation of lifelong learning [see chapters 2 and 3] are significant shortcomings limiting improvements in our employment rate and productivity.

The development of **managerial, business leadership and human resource management**, especially in smaller and family businesses, is also an area in which our country shows room for improvement. According to the latest available data, in Spain, almost 40% of the self-employed and 36% of employers have a low level of education, compared to 12% of the EU-8.⁵⁷

II. Innovative capacity

Along with the improvement of human capital, innovation is one of the main tools that advanced economies have to achieve a sustained increase in their productivity. The development of new ideas enables a country to do more with fewer resources (human and natural) and to continue to grow even as its working-age population shrinks. The strategy of manufacturing or implementing intellectual property products that other countries have created may have made sense in the past, but it is not any longer a valid way to generate prosperity or catch up with more advanced economies.

Over the last few decades, **Spain has greatly strengthened its capacity to innovate.** It has done so by improving its human resources, expanding its technological infrastructures and by achieving a greater dynamism in knowledge-intensive sectors and companies.⁵⁸ Despite this, Spain still is below the EU-27 average in most innovation rankings [Fig. 13].





Source: Authors' own, based on the Bloomberg Innovation Index, European Innovation Scoreboard and the Global Innovation Index.59

Spain invests considerably less in intellectual property⁶⁰ than the EU-8 [Fig. 14], spends practically the same proportion of its GDP on R&D as countries in lower income (such as Portugal), and patents less than it should, given the size of its economy.⁶¹



Fig. 14. Investment in intellectual property

A large part of our innovation deficit is concentrated in the business sector. Data reveal that Spanish companies invest less in R&D than their European counterparts [Fig. 15], are less innovative, generate less employment in sectors in high added value (such as those with a high technological level or those intensive in knowledge),⁶³ and create products with a lower degree of complexity.⁶⁴

Source: Authors' own, based on OECD data.62



Fig. 15. R&D investment per capita by the private sector (average 2010-19)

Source: Authors' own, based on Eurostat data.65

Several factors explain this low level of innovation: 1) the predominance of small and medium-sized enterprises; 2) the lower relative weight of innovation-intensive sectors (such as technology);⁶⁶ 3) the limited connection between research in universities and companies; and 4) and the difficulty that Spanish companies have to access to financing tools such as bonds, stocks, and venture capital The latter is a critical handicap for innovation, as it precludes start-ups from being born but also firmly-established businesses from scaling up, because they cannot finance any expansion [Fig. 16].



Fig. 16. Venture capital investment by stage of funding, 2019

Source: Drafted by the authors based on data from OCDE.67

The public administration also contributes to the low levels of innovation. In Spain, state aid for R&D is limited, involves too much bureaucracy⁶⁸ and often lacks a coherent and long-term strategic vision. Moreover, it is frequently biased towards lending, which tends to make access difficult and discourages demand among start-ups and younger companies. The result is that a large part of the aid is wasted and a significant proportion is not implemented. In fact, in 2019, 49% of state funding for R&D was not executed.⁶⁹ These inefficiencies in the use of aid mean a loss of resources that could be invested in R&D and contribute to increase the productivity,⁷⁰ as the role of the public sector as a facilitator of private innovation is key.⁷¹

Finally, we should mention **the situation of research and higher education institution**. Although there have been improvements, Spanish universities still present levels of research [Fig. 17], innovation is crucial [Fig. 18]. Scientific-technical transfer,⁷² and company creation rates (spin-offs)⁷³ that are lower than those of Europe's most advanced countries.



Fig. 17. Number of citations of academic articles per 100,000 population, 2019

Source: Authors' own, based on Eurostat and Scimago74

Fig. 18. R&D expenditure, 2019



Source: Authors' own, based on Eurostat data.75

III. Technological implementation in the business sector

Along with human capital and innovation, **technology is the other key factor in making an economy more productive.** Over the last two decades, Spain has made great progress in technological takeup. As a result, it now ranks 11th in the EU's *Digital Economy and Society Index*, standing out in terms of digital public services (rank 2 out of 28), connectivity (rank 5) and internet use (rank 11). However, in regard to aspects that are relevant for productivity growth, such as the availability of digital skills among the population (rank 16) and the integration of digital technology within business (rank 13), the margin for improvement is still considerable [Fig. 19].





Source: Authors' own, based on European Commission data.⁷⁶

New technologies are spreading at an ever faster rate between countries, a speed not yet matched among companies, many of which are not yet exploiting their potential.⁷⁷ This is a global trend also observed in Spain: before the pandemic, only 11% of our companies used Big Data (compared to 15% in the EU-8),⁷⁸ barely 20% of our SMEs used e-commerce to sell their products (compared to 26% in the EU-8) [Fig. 20], and only 8% of the employed population teleworked (compared to 27% in the EU-8).⁷⁹



Fig. 20. E-commerce use by business size, based on number of employees, 2019

Source: Authors' own, based on Eurostat data.⁸⁰

IV. Institutional and regulatory framework

Productivity developments are also conditioned by the quality of the institutional framework and by regulation. Given equivalent resources, some societies manage to innovate and operate faster than others because they have more agile and efficient institutions. The quality of bureaucracy, the enforcement of contracts and the credibility of political commitments help to reach the full potential of innovation and labour, contributing to a more efficient economy and raising productivity. Similarly, lower barriers of entrance into any sector or territory help to foster innovation and entrepreneurship, increase competition, and raise the quality of the goods and services produced.⁸¹

Our country has greatly advanced on these fronts. Spain has greatly advance on these fronts. In fact, today it appears in all rankings as a fully-fledge state, with freedoms and rights as extensive as those enjoyed by France or Canada.⁸² However, we still have room for improvement in key areas such as accountability, control over corruption and government effectiveness [Fig. 21], where our results are less favourable than those of our European neighbours.



Fig. 21. Quality of the institutional framework, 2018



In terms of regulations, the reforms carried out in recent years have helped to increase competition⁸⁴ and reduce market fragmentation.⁸⁵ Despite this, there are still **legal and administrative obstacles that hinder innovation and business growth.**⁸⁶ These include certain restrictions on starting a business,⁸⁷ entry barriers in the services sector,⁸⁸ different administrative requirements to set up a company in various territorial administrations, regulations linked to business size,⁸⁹ and relatively inefficient insolvency procedures.⁹⁰

Productivity progress has also been constrained by labour regulations [see chapters 3 and 7]. On the one hand, the current design of temporary contracts, which facilitates their widespread use for jobs of an indefinite nature, has contributed to increasing temporary and precarious employment, discouraging the training of the employed population. On the other hand, some inefficient active employment policies have limited the rates of unemployed people finding a job, increasing long-term unemployment and preventing a large portion of our workforce from getting into work.⁹¹

Similarly, Spain's efficiency is hindered by higher **energy costs** than those faced by high energy costs Fig. 22]; by some **features of the public procurement system**, which tend to benefit consolidated companies over newly created ones;⁹² and by the high rate of **informal economy activities** [Fig. 23], which generates inefficiencies in the allocation of resources, limits business growth, and restricts innovation and investment in human capital.⁹³

Fig. 22. Electricity prices for businesses

Fig. 23. Black economy, 2017





Source: Drafted by the authors based on data from Eurostat.94



V. Functioning of the business sector

The last key factor in understanding Spain's low level of productivity is the peculiarities of our business sector,⁹⁶ largely derived from the four core factors mentioned thus far (human capital, innovation, technology and regulatory framework). These peculiarities include: the high presence of small companies and the scarcity of medium-sized companies [Fig. 24], the small size of newly created companies, especially in the services sector,⁹⁷ and Spanish SMEs' low level of productivity [Fig. 25]. This business dynamic has been reinforced by the fact that capital has not always been directed to the most efficient companies that have the highest growth potential,⁹⁸ especially in the years leading up to the 2008 crisis.⁹⁹

This smaller business size is a handicap to our businesses expanding internationally and acquiring new practices at the forefront of knowledge (around 5% of SMEs sell their goods abroad, compared to 62% of large companies¹⁰⁰). Moreover, it also limits the development of new ideas and products and hinders the advance of productivity.


Source: Author's own based on data from the OECD.¹⁰¹



The Spanish economy's vicious circle

As can be seen, Spain's low productivity growth goes beyond the particular weight that a given sector may have in terms of GDP. **There are structural dysfunctionalities that interact and feed back on each other, limiting the whole country's potential development.** The lower quality of human capital, the inefficiencies of the labour market, the bureocractic obstables and the scarcity of financial tools hinder the implementation of innovation projects and the growth of the most efficient companies. This, in turn, causes the production sector to shift towards lower value-added activities where the demand for human capital is also lower than in more advanced countries, thus reducing the incentives for the population to train. In the long run, this results in an educational deficit that hinders i R&D and hampers the growth of enterprises.¹⁰³

This vicious circle, from which just a group of medium-sized and large companies willing to export have escaped, has prevented Spain from reaping sustained productivity gains and has increased its vulnerability to crises and foreign competition. Our economic cycles suffer more accentuated downturns than those of the average European country. And, although expansions are also more accentuated, these do not always last long enough to recover all the lost ground. Job destruction has usually been the adjusting variable when demand falls, with painful implications for household incomes, inequality and public accounts.

We have witnessed the same phenomenon several times in the past. However, it does not have to happen again in the future. As we shall see below, the crisis caused by the Covid-19 pandemic is a huge challenge. But it is also a unique opportunity to solve the problems we have highlighted, and to lay the foundations for sustained productivity growth and bring Spain's per capita income closer to that of the most advanced EU countries by 2050.

THE FUTURE: POSSIBLE DESTINATIONS

The short term: the coronavirus crisis

The coronavirus pandemic has caused the largest drop in global activity in decades – far exceeding the Great Recession of 2008. Our country has been one of the most affected in Europe - for two reasons: First, the structural factors already mentioned,, which are manifested, among other things, in lower teleworking rates, a relatively small percentage of companies operating digitally and greater stress on business financing due to the predominance of SMEs. Second, because of the high proportion of sectors most vulnerable to the pandemic (commerce, hotels, catering and transport) in the economy, accounting for around 21% of GDP compared to 17% in the EU-8.¹⁰⁴

In 2020, Spain lost 11% of its GDP.¹⁰⁵ By 2021, it is expected to recover much of this fall, although it will still register higher levels of unemployment, deficit and public debt than before the crisis.¹⁰⁶ The impact is, in any case, asymmetrical. So far, the downturn has affected mostly demand and employment in hotel and catering services, transport and leisure services, and construction, whereas agriculture, health services and education have experienced increases in activity.¹⁰⁷ The differences in labour productivity have been equally significant,¹⁰⁸ rising in the least affected sectors (thanks to the adoption of innovations such as teleworking and flexible working hours) and declining in those where hygiene measures and safety protocols still add extra hindrances.

The medium and long term: opportunities for better growth

It is hard to ascertain when the crisis will end. Most international and national agencies predict that **Spain will return to pre-pandemic levels of activity by 2023,** although European funds could accelerate this recovery.¹⁰⁹ However, uncertainty is still high. To start with, we do not know for sure when the pandemic will end: whether there will be more virulent strains, whether new vaccines will be needed, or how long it will take for the world's population to become immune. Nor do we know the consequences of the economic crisis: whether the current standstill on private spending expectations will last, the capacity of the sectors least affected by the pandemic to absorb employment, the effectiveness the measures adopted at domestic and European level, and the evolution of the global economic cycle. Finally, we do not know what geopolitical effects the pandemic will have in the medium term. For example, whether or not it will fuel the rift between China and the United States, whether value chains will be reshored, or whether the EU will emerge stronger or weaker.

Be that as it may, in this labyrinth of uncertainties there emerges a certainty shared by experts and the citizenry as a whole that should be used as a star to guide our next steps: Spain must take advantage of the current situation to implement pending reforms and lay the foundations for prosperous, environmentally friendly and socially inclusive economic growth. Furthermore, the European recovery funds give us the potential to do so with a medium and long-term commitment. If at the start of this new decade we are capable of building the necessary consensus and to implementing far-reaching changes that correct the structural shortcomings identified, Spain will be able to adopt a new path for growth and approach the EU's most advanced economies by the middle of the century.

One of the best ways to achieve this is to increase our productivity. Unlike in the recent past, **we are not going to be able to rely on demographics for growth in the coming decades**. Most forecasts suggest that population ageing will result in a severe reduction in our labour force, even if the migration balance we saw in the last two decades is maintained. Specifically, it is estimated that **the Spanish population aged 16 to 64 could fall by 3.7 million people between now and 2050**,¹¹⁰ dropping below 27 million (1996 levels). This means that, by the middle of this century, there could be almost 4 million fewer people in Spain working, generating wealth and paying taxes.

Due to this demographic effect alone, the country would go from growing at rates of 2% (average for the period 1996-2018) to 1%.¹¹¹ On top of that,¹¹² should productivity growth be similar to that observed over the last few decades, then our economic growth could be even lower: with an average of between 0.3% and 1.1% the period 2023-50.¹¹³ The advance in per capita income would be of a similar order [Fig. 26], something that would distance us from the most advanced countries in Europe.¹¹⁴



Fig. 26. Projected ranges for per capita GDP growth (annual average)

Source: Authors' own, based on Eurostat and Aum, Koh and Santaeulàlia-Llopis data.¹¹⁵

In fact, this is the prognosis of most available international studies, which, under similar premises, predict a moderate gradual loss of economic impact for our country in the coming decades [Fig. 27].

Fig. 27. Spain's position based on the size of its economy (volume of GDP)

Report and year	Number of	Spain's position					Projected		
of publication	the ranking	2010	2014	2016	2018	2050	2060	2070	change
CEPII, 2012 ¹¹⁶	147	10				14			\downarrow
PWC, 2015 ¹¹⁷	32		16			26			\downarrow
European Commission, 2018 ¹¹⁸	27			4				3	Î
OECD, 2018 ¹¹⁹	45				12		16		\downarrow

Source: Authors' own based on the studies mentioned above. 120

Avoiding this fate does, of course, lie in our hands. **Spain has the potential to become one of the most advanced economies in the EU.** To achieve this, we will have to make a firm commitment to **improving the training of our human capital, redoubling our efforts in R&D and entrepreneurship**, placing technology-based innovation at the centre of our economic and social organisation; **accelerating the digital transformation of our production sector, and reducing as far as possible any disruptions generated by administrative and regulatory burdens** s in investment and procurement decisions. In short, we will have to increase the efficiency with which we operate, acting on the core causes that explain our low productivity and which economists have called "total factor productivity" (TFP)¹²¹ [Fig. 28].

Fig. 28. Total factor productivity



Source: Authors' own, based on Aum, Koh and Santaeulàlia-Llopis.122

All this will have to be done whilst **increasing our employment rate**, **bringing it closer to our neighbour**'s **average** [see chapter 7] and progressively reducing the gender gap.¹²³ Increasing **productivity and employment are two goals that should go hand in hand.** If a company is able to generate more and more output for every hour its employees work, it will have more incentives to pay them progressively higher salaries, train them and keep them on staff when there is a temporary drop in activity. Improved working conditions will translate into higher spending by the population and, therefore, an increase in recruitment to meet this growing demand.

It is a difficult task, but not impossible. Spain has already carried out economic transformations of this magnitude in the past, such as during the transition to democracy and joining the EU. In our immediate environment, there are several countries which, over the last 30 years, have raised their productivity level by 50% without compromising their employment rates [Fig. 29].

Country	Increase in employment productivity (%)	Increase in employment rate (percentage points)	Employment (%, latest data available)		
Finland	68	2	74		
Sweden	62	0	80		
Denmark	56	0	76		
Germany	51	14	78		
France	46	7	65		

Fig. 29. Labour productivity gains and change in employment rates between 1989 and 2019 in leading European countries

Source: Author's own based on data from the OECD.124

If Spain were to do the same over the next three decades, **its GDP could grow at average annual rates of 1.5%**, which would allow it to close its per capita income gap with the EU-8 [Fig. 30].

Fig. 30.	Spain's GDP	per capita and	l the EU-8 under	r various long-rur	n scenarios
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What-if scenarios		GDP per capita (constant euros, PPP 2015) Spain EU-8		Spain's GDP per capita gap vis-à-vis the EU-8	
1995	Observed	21,819	28,459	-23%	
2019	Observed	30,720	38,762	-21%	
2050	Baseline (lower limit of the range)	31,461	49,627	-37%	
	Baseline (upper limit of the range)	40,743	49,627	-18%	
	Strong convergence in labour productivity	44,664	49,627	-10%	

Source: Authors' own, based on Aum, Koh and Santaeulàlia-Llopis.125

Productivity growth is therefore not just a number. It is the **basis for creating stable, quality** employment, and ensures higher wages without compromising the competitiveness of our companies. It is also the way to **achieve a solid welfare state** that reduces inequality without incurring chronic public deficits, and the only way **to reduce our country's fragility when faced** with episodes of economic crisis such as the current one.

The impact of megatrends on the quest for productivity

In the coming decades, Spain will, together with all of Europe and a large part of the world's developed countries, experience the profound effects of three megatrends: **demographic ageing**, **digital transformation and green transition**. The first of these is inevitable and will happen on its own, while the pace and impact of the digital and green transformations will largely depend on decisions taken at national level. The three megatrends will bring significant challenges, but also huge opportunities that, if well harnessed, could help us to greatly increase our efficiency.

Demographic ageing will have a direct impact on our workforce: by 2050, 1 in 3 people will be 65 or older, compared to 1 in 5 today.¹²⁶ It will also affect labour productivity,¹²⁷ as people's physical, numerical and new technology skills, as well as entrepreneurial and innovative spirit, tend to decline with age.¹²⁸ However, the experience and skills developed over a lifetime can be an invaluable asset. By strengthening the transfer of this senior knowledge to younger generations, promoting the mix of different age profiles within the same company and encouraging "active ageing",¹²⁹ **the negative effects of demographic ageing on productivity could be significantly mitigated** [see chapter 7].¹³⁰ Furthermore, better aligning the employment cycle to increased life expectancy will allow people who are currently withdrawing prematurely from the labour market to remain active, thereby also helping to raise the employment rate in the economy [see chapter 5]. The integration of new technologies into the production sector will be key to this, as it will help older generations to participate more and better in the country's economic and social life.

The consolidation of a longer-lived society will also be a source of business and employment opportunities for many of Spain's economic sectors. The so-called silver economy (which is associated with the needs of the elderly) will transform the supply of health and care services, commerce, tourism, leisure and mobility, among other activities, and will stimulate growth in many areas.¹³¹

Digital transformation is another megatrend that will mark our future and which must be harnessed as a fundamental way to achieve significant productivity gains between now and 2050.¹³² Spain has one of the best connectivity infrastructures in the EU;¹³³ it has made a firm commitment to 5G and is well positioned in the race for artificial intelligence.¹³⁴ In addition, there are several public programmes underway, such as the *Strategy for Science, Technology and Innovation,* or the *Agenda Digital Spain 2025,* with European recovery funds being an important source of funding for this purpose. For these and other reasons, international indices that measure economies' readiness to profit from digital transformation in the near future place Spain in an intermediate position at global level, slightly above the EU-27 average [Fig. 31].



Fig. 31. Indices of readiness for the digital revolution

Source: Author's own, based on data from Cisco, Portulans Institute and World Economic Forum-135

Of course, this does not mean that we should be satisfied with a "medium-high" performance in regard to technological transformation. Spain must aspire to compete with the most advanced countries in this area and reduce the gap between it and the EU-8 countries. To do so, we will have to improve our workforce's digital skills, intensify the digitalisation of our business sector (especially SMEs) and public administrations, substantially increase our efforts in innovation, and increase our specialisation in technology- and knowledge-intensive goods and services¹³⁶ [Fig. 32].¹³⁷ Similarly, we will need to encourage the incorporation of robots into the productive system [Fig. 33], something that will help considerably to increase the productivity of our companies¹³⁸ and which, contrary to what might be believed, need not lead to an increase in unemployment¹³⁹ [see chapter 7].



Fig. 33. Robot density in manufacturing industry,

International Federation of Robotics.141

The third megatrend that will most transform our production system between now and 2050 will be the green transition. For a country like ours, moving towards a low-carbon and resourceefficient economy is an immense challenge, but also an unprecedented opportunity. Spain is one of the European states with the greatest potential for taking advantage of renewable energies, thanks to our natural availability of resources (sun, wind, biomass and lithium), the existence of a research and business ecosystem with knowledge in this field, and the presence of leading global companies in the renewables sector.¹⁴² Moreover, the ecological transition could be a great opportunity for Spain beacuse substantial improvements in energy efficiency can significantly change the forms of investment and result in significant productivity gains.¹⁴³

Therefore, both the decarbonisation process and the drive towards the circular economy can lead to a substantial reduction in imported fossil fuel (in other words, less dependence on foreign energy), lower electricity prices, and higher financial savings due to a more rational use of resources. All of this will greatly benefit productivity and competitiveness in our business sector.¹⁴⁴

From a sector perspective, changes in the way we produce and consume will mean that all activities will need to be adapted or reinvented in order to thrive under the new sustainability paradigm. Demand for certain goods and services will undoubtedly fall, but demand for others will rise sharply. For example, we will consume less food of animal origin and travel less by private car, but we will instead consume more organic food and car-sharing increase. The key therefore is to ensure that our public institutions and our companies adapt as soon as possible to the new framework and adjust their production and business models to compete in a circular economy that is neutral in regard to emissions and less intensive in the use of natural resources. To do so, Spain will have to resolve a series of pending challenges that could limit its performance in the green transition; this explains why the latest index of the World Economic Forum¹⁴⁵ places our country in the 16th position in the EU-27 in "preparing for the transition to a secure, sustainable and affordable energy future". The lack of human capital, the characteristics of our business sector and the low investment in energy innovation (among the lowest in the EU)¹⁴⁶ are some of them.

These obstacles are substantial, and so will be the cost of transition that most sectoros within our economy will have to assume, **but overall the balance is expected to be enormously positive**.¹⁴⁷ In fact, reducing energy intensity and increasing the penetration of renewable energies may be key to achieving our long-term per-capita income target¹⁴⁸ and raising the employment rate. Estimates by the Department for Ecological Transition and Demographic Challenge state that, with the measures included in *Spain's Integrated National Energy and Climate Plan* (PNIEC) until 2030 and the *Long-Term Decarbonisation Strategy* (ELP) up until 2050, **the net increase in employment could be as high as 250,000 people per year and the GDP level almost 2% higher than the trend scenario in 2050**.¹⁴⁹ Other studies for European countries,¹⁵⁰ including Spain, foresee similar gains [see chapter 4].

The great opportunity

As we can see, the demographic, technological, social and environmental changes that will take place in the coming decades will represent a challenge, but also an opportunity for modernisation and great prosperity for Spain. It is essential, therefore, that our country does not miss this train. We must take advantage of the particular situation generated by the pandemic and the megatrends that will occur in the coming years to develop **a productive system governed by innovation and knowledge**, capable of attracting foreign talent and investment, and competing in a global economy marked by technological transformation and environmental sustainability. Only in this way will we succeed in generating wealth, creating quality employment and guaranteeing the maintenance of the welfare state in the long term. The time is now. There will never be another opportunity such as this.

How should we go about it? Some measures are proposed on the following pages.

WHAT NEEDS TO BE DONE TO ENSURE PROSPERITY

Between now and 2050, Spain will need to develop a modern and competitive growth pattern to guarantee its long-term economic prosperity and the viability of its welfare state. To do so, we will have to boost productivity and expand labour participation rates to levels similar to those of the EU's most advanced countries.

This must be the guiding ambition of our national efforts for decades to come.

To achieve this, it is essential that, in the coming years, Spaniards use social dialogue to reach a consensus on **a dashboard of quantifiable indicators and a list of specific goals** that will enable us to monitor the progress made and guide the ambition of the reforms. Here are some suggestions which follow the principles outlined in the Introduction to this *Strategy*:

Goal 1. Reduce the per-capita income gap between Spain and the EU-8 to 10% by 2050.

Goal 2. Raise the economy's labour productivity by 2050 to bring us closer to the levels of the EU-8 countries.

Goal 3. Increase the employment rate from 62% to 80% (the current levels seen in the most advanced economies of Europe) by the middle of the century.

Goal 4. Encourage private R&D so that, along with the boost to public R&D, by 2030 we approach the target of 3% of GDP (currently 1.3%) for total expenditure as recommended by the European Commission for 2020.¹⁵¹ Between 2030 and 2050, R&D efforts should be stepped up so that Spain becomes a European leader in this field (investment-to-GDP ratios of at least 4%).

Goal 5. Increase the average size of Spain's companies, to match the EU-8 average by 2050.

Goal 6. Reduce the weight of the informal economy to levels at least similar to those of the most developed EU countries by 2050.

Table of indicators and targets

	Indicators	Place	Average 2015-19 or latest data available*	2030	Targets 2040	2050
1	Gap in per capita income with the EU-8 ¹⁵²	Spain	-22%	-18%	-15%	-10%
2	Labour productivity levels (constant euros, PPP 2015) ¹⁵³	Spain	42	46	53	63
		EU-27	43	-	-	_
		EU-8	53	-	-	_
		Spain	62%	68%	72%	80% ¹⁵⁵
3	Employment rate ¹⁵⁴	EU-27	68%	-	-	_
		EU-8	73%	-	-	_
	Total R&D expenditure (% of GDP) ¹⁵⁶	Spain	1.2%	3.0%157	3.5%	4.0%
4		EU-27	2.2%	-	_	-
		EU-8	2.8%	-	_	_
5	Firms by size (by % of employment) ¹⁵⁸ Large (+250 employees) Medium (20-249) Small (1-19)	Spain	31%*	32%	33%	35%
			23%*	25%	28%	30%
			45%*	42%	38%	35%
		EU-27	33%*	-	-	_
			28%*	-	-	-
			39%*	-	_	_
		EU-8	36%*	-	-	-
			29%*	-	-	-
			35%*	-	-	_
	Shadow economy (% of GDP) ¹⁵⁹	Spain	20%	15%	12%	10%
6		EU-27	17%	-	-	-
		EU-8	11%	-	_	_

To achieve these goals, Spain will have to undertake **profound reforms and launch ambitious initiatives** on at least the following fronts:

Front 1: Improve the contribution of human capital.

As long as Spain continues to have a poorly educated population, little can be achieved. **Improving the quality of human capital to match that of the most advanced EU countries should be our top priority in the coming years**. This will require reducing school dropout rates, improving learning achievement at primary, secondary and tertiary levels, and creating an integrated system of effective **lifelong learning**, as explained in Chapters 2 and 3 of this *Strategy*.

Front 2: Solve the deficiencies of our labour market

In order to have a competitive economy, it will be essential to improve the functioning of the labour market. The unemployment rate and unwanted temporary employment will need to be reduced, and the rate of employment increased considerably, especially among groups in which

we currently have the greatest gap with the EU-8 countries: women, young people, and the over-55s [see chapter 7]

Front 3: Encourage innovation

We must boost innovation and, in particular, R&D investment. Furthermore, we must do so in a sustained manner over time (reducing the effects of the economic cycle on the volume of funding), considering the net benefits of public initiatives in the medium and long term,¹⁶⁰ and providing the necessary incentives to encourage increased investment in private R&D, where Spain has a greater deficit.¹⁶¹ To this end, we propose:

- Appropriately structuring the investment aid schemes granted by the public administration to allocate resources efficiently, by means of: 1) an ex-ante and ex-post evaluation of the economic-financial situation of companies receiving the support; 2) an increase in direct aid whenever necessary for the success of the project; 3) improved market conditions for subsidised loans; 4) simplified procedures for accessing investment aid and loans, as well as greater transparency on their granting; and 5) an ex-post assessment of the effectiveness of such aid.
- Improving the system of multilevel governance in the field of innovation, with the primary goal of coordinating the country's innovation initiatives from a new holistic perspective¹⁶² and orienting them towards strategic missions that take advantage of emerging areas of opportunity (detecting new markets), in line with the EU's agreed aims. In this regard, the synergies between the range of R&D, innovation, entrepreneurship and digitalisation policies and bodies will need to be strengthened, taking advantage of the opportunities offered by public-private consortia. In particular, public procurement can be key to developing technology and innovation solutions that help meet the specific goals of each mission.
- Strengthening scientific and technological research in universities and its transfer to the productive network. To achieve this, the resources that the Spanish university system allocates to research will need to be increased considerably; to place value on participation in R&D projects in the academic career; to reduce in number and increase in power the Research Results Transfer Offices (OTRIs); the creation of spin-offs and university start-ups increased; and the creation of consortiums between universities, research centres, the private sector and public administrations encouraged, with their own legal status.
- Increasing funding and establishing an appropriate incentive system to encourage the development of internationally renowned centres of excellence, which facilitate the return and retention of national talent, as well as the attraction of foreign talent.¹⁶³ These centres should also focus on disseminating knowledge to society as a whole, with special emphasis on the younger population, through advertising and audiovisual announcements, mentoring programmes and courses to promote scientific thought.¹⁶⁴
- Promoting the creation of a network of innovation hubs in economic sectors where niches in the market with potential for growth and international development have been identified, following the European initiative of the European Research Area (ERA) hubs.¹⁶⁵ These hubs can be used to focus public support for R&D, align the different instruments

for promoting innovation (public procurement, regulation, support and financing for companies), and identify opportunities for growth and expansion to other sectors, regions, and countries (internationalisation process). In this regard, studies into the potential for business growth among SMEs, based on quantitative information at a granular level, could be useful.¹⁶⁶

Front 4: Encourage and facilitate the adoption of technology

We must make progress on the digital transformation of the economy - and, in particular, the business sector. The proposed measures reinforce some of the main programmes set out in the *Digital Spain Agenda 2025*.¹⁶⁷

- Design and implement a comprehensive plan to support digital transformation, adapted to the needs of each sector and business size, with a special focus on the self-employed (subsidies for the purchase of equipment or training pathways for digital skills according to needs).
- Relaunch investment in digital infrastructures¹⁶⁸ (fibre network, 5G technology, smart motorways, access to digitalisation for core strategic sectors - health, education, energy).
- Reduce the uncertainty associated with digitalisation (regulation) and cybersecurity issues. European measures in these two areas should be adopted across the country.
- Create a comprehensive digital platform for the administrative management of SMEs and the self-employed, which coordinates and streamlines the procedures required by the public administration for obtaining grants, subsidies and tenders.
- Encourage the use of robots in manufacturing. This will help increase productivity and create new jobs.

Front 5: Improve business dynamics

To generate efficiency gains, increase the creation of stable employment and increase the openness of the economy, we will need to encourage the creation and growth of companies until the business sector is on a par with that of the EU-8 countries. To do so, the following is suggested:

- Encourage SMEs and the self-employed to access technological innovations, by setting up public institutes that specialise in providing knowledge, technology and innovation transfer, with the aim of boosting business growth. The German experience of Fraunhofer¹⁶⁹ is an excellent example of public-private collaboration in this field (German companies of all sizes regularly set up projects with Fraunhofer and its institutes when tackling technological challenges related to improving the quality of their products). Other countries such as Taiwan (ITRI),¹⁷⁰ South Korea (ETRI)¹⁷¹ and the Netherlands (TNO)¹⁷² have also benefited from similar structures. In Spain, Tecnalia is an interesting point of reference.¹⁷³
- Launch a sponsorship and collaboration programme between large and medium-sized companies that is aimed at transferring knowledge on business management and best practice, as well as the joint development of new products and services. The larger

company, with its experience in business management and human resources, and their strategy and planning in the process of opening new markets, will help the medium-sized company to adopt this knowledge and these skills. Once medium-sized companies acquire these practices, it will be easier to extend them to smaller companies, thereby, through synergies and collaboration agreements, leading to their growth. Setting up trusted environments is fundamental for these programmes to be effective. It is therefore advisable to do so sequentially: large companies \rightarrow medium-sized companies \rightarrow micro-SMEs

Encourage the development of alternatives to banks for business financing, with a special focus on venture capital investment in strategic areas in order to facilitate the development of projects during their initial stages as well as during their growth and expansion phases. The aim would be to raise the share of this funding to EU-8 levels by 2050. To this end, the creation of a public-private National Venture Capital Fund is proposed, the public capital funding of which will serve as a lever for attracting private capital. This will generate a sufficiently high critical mass of financing to cover large-scale projects. An interesting initiative in this area is the "Green Tech" incubator launched by France in 2016 which follows the philosophy outlined above and provides early funding to startups that deliver green innovations.¹⁷⁴

Front 6: Monitor the impact of public policies on improving the country's productivity and employment

Regardless of the measures adopted, in this area and others, their assessment before, during and afterwards is decisive. In order to carry out this assessment and accountability process, it is proposed that an autonomous independent **Productivity and Employment Committee** be set up to pick up any deviation from the established goals (monitoring); recommend the adoption of corrective measures; and facilitate the alignment of legislative proposals with medium and long-term goals. The creation of this committee is in line with the 2016 European Council recommendation for the formation of National Productivity Committees (NPCs) by EU Member States,¹⁷⁵ something that several countries have already done.¹⁷⁶

Front 7: Modernise the public sector

Productivity is not just a matter for the private sector: public administrations must also drastically improve the efficiency and agility of their processes, reducing response times in procedures, **establishing monitoring and evaluation requirements for the quality of public services and policies**, and improving the use of funds granted by the EU [see front 9], among other things. To this end, we propose the following:

- Institutionalise a culture of public policy evaluation (use of resources and effectiveness
 of measures) and accountability among all administrations, following the example of
 countries such as the United Kingdom¹⁷⁷ and the Netherlands.¹⁷⁸
- Complete the digitalisation of public administrations,¹⁷⁹ so that practically all procedures can be carried out remotely, standardising digital access systems in all administrations, while maintaining face-to-face services where required.¹⁸⁰
- Reduce complexity and response times in bureaucratic procedures and formalities.
- Expand the number, quality and accessibility of public databases and incorporate the

use of new technologies such as artificial intelligence so that the information handled by public administrations can be used by public institutions, companies and universities for analysing, designing and evaluating policies and services. Examples of these include real-time data on the evolution of the jobs market, information about the cost of medical interventions and full statistics on social services provided. An interesting example is the OPAL project in France.¹⁸¹

- Adapt the systems for entering the civil service, by reforming the content and nature of the current selection tests to ensure that candidates' knowledge, skills and track record match current needs.
- Strengthen the training of civil servants to improve their digital literacy and use of new technologies their knowledge of leadership and human resource management, and their skills in the internal monitoring and evaluation of public policies. Requalification plans should be addressed that ensure ongoing aligning of knowledge and skills to the needs of the administration.
- Encourage performance appraisal of public employees, strengthening productivity measurement and incentive systems, and increasing flexibility to attract talent from outside public administrations and retain existing talent.

Front 8: Reduce the size of the black economy

Improving human capital [see front 1], increasing rates of entering the jobs market [see front 2] and modernising the public sector [see front 7] are decisive factors in reducing the black economy. Thus, a more educated workforce and a jobs market capable of incorporating excluded groups (especially young people) tend to be associated with lower levels of underground economy.¹⁸² Similarly, a more digitalised public administration, with automated procedures and fewer administrative obstacles, also acts as an incentive to join the formal sector.

There are also specific measures aimed at reducing tax fraud¹⁸³ and strengthening social awareness that are equally important. Among them, we highlight the following:

- Strengthen the tax administration's resources dedicated to inspection. According to the Tax Authority's efficiency index, for every euro invested in the agency in 2018, more than 11 euros were collected in the fight against fraud.¹⁸⁴ However, compared to the EU-27 average, Spain has a lower proportion of employees engaged in inspection and verification functions.¹⁸⁵
- Improve coordination between Spain's National Tax Authority (AEAT) and the regional tax authorities,¹⁸⁶ as well as between AEAT and the Labour and Social Security Inspectorate. For example, the fragmentation of information between departments should be reduced and the sharing of available resources should be encouraged.¹⁸⁷
- Promote the use of new technologies for inspection functions among the tax authorities. Artificial intelligence or the use of massive data open a range of possibilities to facilitate the tasks of the tax authorities. A successful example in this field is the virtual assistant that was introduced in 2017, automatically resolving frequently asked questions and freeing up resources.¹⁸⁸

- Strengthen communication and awareness-raising campaigns. Development of marketing strategies and campaigns with direct reference to the use of tax resources, segmented by profile together with evaluation strategies to ascertain their impact.¹⁸⁹ On this, it would be important to focus efforts on the youngest (future taxpayers) and on long-term measures aimed at changing values and behaviours.¹⁹⁰ Modernising the Tax and Civic Education Portal (PECT)¹⁹¹ could be a first step in this direction.

Front 9: Maximise the use of European funds, applying a proactive and long-term vision

European funds are a fundamental source of financing that have contributed to modernising the production network and social makeup of our country. However, they have often been implemented inefficiently and not always with a long-term vision. The current recovery funds¹⁹² are a unique opportunity to carry out the structural reforms that Spain needs in the coming decades. In order to maximise their impact, we recommend following five guiding principles when allocating and implementing them:

- Realism. It is easy to dream of a Spain at the forefront of quantum computing, Industry 4.0 and artificial intelligence. However, historical experience reveals how difficult it is substantially to transform a country's productive structure in a short period of time, or to catch up with competitors who have been investing in the development of certain technologies for decades. It is important, therefore, to be realistic and take a clinical approach when investing in strategies to be undertaken.
- Cross-sector approach. It is not a matter of focusing on a number of economic sectors (to the detriment of others), but of using the funds to correct the structural weaknesses that are holding back the productivity of the economy as a whole and of each of its sectors, and to do so on the basis of exploring new areas of opportunity, mostly related to existing production structures that need to be transformed (diversification, modernisation or transition). The economy's ability to adapt (resilience) needs to improve, and to do so from a cross-sector perspective across the entire productive system, following strategies of smart specialisation, in line with EU recommendations.¹⁹³ Indeed, the Atlas of Economic Complexity ranks Spain as the country with the greatest potential in the world to start manufacturing and exporting increasingly complex goods. That is to say, the current composition of our production provides us with the necessary know-how in many fields to acquire a comparative advantage in more sophisticated goods. What we must do is to overcome the bottlenecks that prevent us from making the leap.¹⁹⁴
- Public-private collaboration The private sector must play an important role, with priority being given to projects launched by companies with a competitive advantage in each area, in which the public sector and smaller companies also participate.
- Efficiency of execution. Up until the end of 2020, the executed expenditure of the European Structural and Investment Funds (ESIF) for the period 2014-20 was 35% in Spain (among the lowest in the EU), while for the EU-8 it was 57%.¹⁹⁵ It is important to iron out the administrative bottlenecks that delay the application and implementation of funds, and to assess the implementation capacity of projects when allocating them.
- Anticipation. Although it is impossible to anticipate the future with certainty, this Strategy
 publication identifies several sources of demand that are likely to grow over the next
 few decades in the wake of megatrends such as demographic ageing, technological

transformation and the green transition. These include, for example:

- Increased demand in physical and mental health and care, which will bring growth opportunities in areas such as medicine, pharmaceuticals and biotechnology; safe food and preventive healthy habits; diversified and collaborative social and health care services for companionship and care; psychological assistance; connectivity of remote services and home care automation, among others [see chapters 5 and 9].
- Increasing training needs, which will result in a significant growth in the education sector and in adult requalification [see chapters 2 and 3].
- The green transition, which will generate a host of opportunities in sectors such as mobility, logistics and distribution; building construction and refurbishment; clean energy generation, distribution, and storage; production of recycled and recyclable goods; healthy and environmentally friendly food, tourism and sustainable leisure [see chapter 4].
- Digitalisation, which, whilst it will destroy jobs, will create just as many new ones in virtually every sector of our economy, from agriculture to finance [see chapter 7].

By adopting these and other measures, our country could close the gap in productivity and per capita income that currently separates it from the EU-8 and consolidate its position as one of the most prosperous and advanced countries in Europe.



Challenge #2 **NOVE TO THE FOREFRONT OF DUCATION**

EXECUTIVE SUMMARY

- Over the last four decades, Spain has led the most spectacular educational revolution in Europe, comparable only to that carried out by Finland over the same period. As a result, our country has managed to correct decades of being behind and come closer, in many indicators, to the EU average.
- However, this convergence has been partial and incomplete. Our education system still has major shortcomings that prevent us from realising the full potential of every pupil and have negative effects on employment, economic growth, and social progress throughout the country. The most worrying of these are the high retake and drop-out rates; low learning outcomes; educational inequality; and high levels of school segregation.
- If they are not decisively addressed, these shortcomings will continue to hinder the development of the country and its citizens. Without significant reforms, between now and 2050, 3.4 million pupils could have to retake courses, 2.2 million could drop out of school early, and Spain could be surpassed in learning and educational quality by countries like Portugal, Hungary and Latvia, with implications for international competitiveness and influence.
- Avoiding this scenario must be our top priority. If Spain wants to remain a prosperous country in the future, it will need to be at the forefront of education by the middle of the century.
- To do this, we will need to transform the teaching profession, modernise the curriculum, expand the autonomy of our schools, create an effective evaluation system, strengthen support mechanisms for the most disadvantaged groups, and promote education from 0 to 3 years of age as well as Vocational Training.
- Carrying out these reforms is possible. In fact, most of the improvements that are needed to converge with the most advanced EU countries are similar in nature and magnitude to those already achieved since the transition to democracy or those carried out by several southern and eastern European countries in recent years.
- In addition, demographic and technological changes in the near future could act as a tailwind. In 2050, Spain will have 800,000 fewer pupils between the ages of 3 and 15 than it does now. This will allow us to double spending per pupil to the level of Denmark without incurring a significant increase in public spending. This, together with the massification of digital technologies in our schools and homes, will allow us to provide our pupils with a more personalised education, fight more effectively against phenomena such as dropping out of school early and segregation, and reap the rewards in coverage and learning that we need in order to lead the way in education.

THE PAST: ACHIEVEMENTS

Education is one of the most important factors in shaping a country's social, economic, and cultural landscape. As such, it is part of the source and solution for most of its challenges, and is one of the main determining factors of long-term economic and social progress [see chapter 1]. The democratic Spain that was born in 1977 inherited an obsolete educational system from the previous regime that was designed to neither guarantee equal opportunities nor prepare young people to be an active part of society.¹ The Spanish Constitution of 1978 radically changed this fact: it established "the right of all [citizens] to free education" and "the freedom of education", guaranteed "the effective participation" of social stakeholders in the educational system, and set as goals "the full development of human personality with due respect for the democratic principles of coexistence and for basic rights and freedoms."²

This laid the foundations for what would end up being **one of the most spectacular educational revolutions in the developed world - in many respects, comparable only to that of Finland** during the same period. There have been many achievements. Since 1977, Spain has doubled its public spending on education as a percentage of GDP³ and has created an extensive and well-equipped network of nursery schools, primary schools and secondary schools.⁴ It has also created an institutional framework of decentralised and open government that has given a voice to all social stakeholders (students, teachers, families) and has brought education closer to the realities of each region.⁵

Likewise, the curriculum has been modernised and expanded,⁶ incorporating new competencies and including key aspects for development such as civic and environmental culture.⁷ Teacher training has been substantially improved;⁸ assessment systems have been renewed;⁹ and the student/teacher ratio has been reduced to levels similar to those of the most advanced countries in Europe today.¹⁰

Profound reforms have also been carried out **to increase inclusivity and equity in the system**. In the last four decades, Spain has greatly improved the school integration of people with special educational needs,¹¹ has expanded the mechanisms of support and reinforcement for students with more difficulties, and has greatly strengthened its system of scholarships and grants, **to the point where the percentage of non-university students who benefit from a scholarship rose from 7% in 1996 to 21% in 2017**.¹² In addition, the country has managed to incorporate more than 800,000 students of foreign origin, 10% of the total at present,¹³ at a rate and proportion higher than most of the countries around us.

The combination of these and other improvements has resulted in **the effective universal access to primary and lower secondary education**, **and a dramatic improvement in coverage rates in post-compulsory secondary education**. Between 1977 and 2019, the school drop-out rate has fallen from 70% to 17% [Fig. 1]; the number of students held back a year has been reduced by more than a third;¹⁴ the percentage of adults without formal education has fallen from 10% to less than 2%;¹⁵ and the percentage of citizens with at least upper secondary education has risen from 9% to 57% [Fig. 2].¹⁶



Gains in coverage have also been achieved in the initial phases of educational training. In 1977, only 6% of 2 year olds in Spain were in school;¹⁹; today, more than 60% are.²⁰ Similarly, schooling between the ages of 3 and 6 has become practically universal.²¹ This has been a key advance for two reasons. First, because the improvements in training at these early ages are of major importance in cognitive and vital development.²² Second, because it has served to facilitate the professional development of thousands of mothers and fathers.²³

In addition to this major progress in coverage, our education system has made **remarkable progress in terms of learning.** Data from the Programme for the International Assessment of Adult Competencies (PIAAC), suggest that **Spain has, along with South Korea and Finland, been the OECD country that has experienced the largest gains in basic skills** (reading comprehension and mathematical ability) over the last 40 years [Fig. 3]. This has allowed us to correct decades of being behind and to get closer to the OECD and EU-22 average.²⁴



Fig. 3. Differences in reading comprehension between younger people (aged 16-24) and older people (aged 55-65), 2012

Source: Author's own based on OECD data.25

Even more important have been the **gains in terms of equity**. Although there is still work to be done, the data indicate that progress so far has made it possible to reduce the impact of students' social background on their subsequent academic and professional development by more than $30\%^{26}$ As a result, **Spain is now one of the EU countries where socio-economic background has the least influence on learning outcomes** [Fig. 4].



Fig. 4. Variation in academic performance explained by students' socioeconomic status and schools, 2015

Source: Author's own produced from OECD data.27

This greater equity is also manifested in improved performance of the most disadvantaged groups and is seen across the country. On the one hand, Spain is ranked 3rd in the EU-27 in terms of total percentage of "resilient students" - that is, those who come from households with a low family income but who achieve good results in the Programme for International Student Assessment (PISA) [Fig. 5]. On the other hand, the data suggest that the education gap between rural and urban areas is one of the smallest in the world.²⁸





Source: The authors' own, based on data from the OECD and the Department of Education and Vocational Training.²⁹

Progress in terms of freedoms and values has been equally remarkable. In just 40 years, our country has become 8th among EU countries with the greatest freedom of education, ahead of France, Germany and Sweden,³⁰ and has achieved one of the highest levels of tolerance [Fig. 6] and commitment to global problems (poverty, war and climate change) [Fig. 7] in Europe. Moreover, Spain is one of the countries with the best school atmosphere and lowest levels of bullying [Fig. 8], which are both fundamental for academic performance and student well-being.



Fig. 6. Index of student respect for people from other cultures, 2018



Sources: Authors' own, based on data from the OECD and the Department of Education and Vocational Training.³¹

TODAY: ISSUES TO BE RESOLVED

As we have seen, over the last four decades Spain has made great advances in education, some of them so essential and ubiquitous that they are easy to overlook be taken for granted. As a result, the country has recovered much of the lost ground and has succeeded in getting closer, in terms of many of the indicators, to the EU-27 average. **However, this progress has been uneven and incomplete.** Our education system still suffers from significant gaps in coverage and has lower learning outcomes than our European neighbours. As the knowledge society becomes more established, the quality of human capital will become an even more important determiner for country's development. For this reason, it is essential that Spain consolidate the improvements it has achieved in recent decades and extend them in the future. **Our objective must be to become a global leading light in education and converge with the most advanced countries in Europe** (EU-8) **by 2050**, an aspiration that, as we will see below, is as audacious as it is viable and unavoidable.

To achieve this, **Spain will have to resolve major pending issues in its education system.** Here, we highlight six:

The first is the high rate of student retaking years. In Spain, 29% of 15-year-old students have repeated a school year at least once, compared to 11% in the EU-22 and the OECD.³² This phenomenon has nothing to do with their abilities, but with our system's norms and forms of evaluation. Most scientific research considers that the abusive use of retaking years is an ineffective and inefficient mechanism that does not help either those who retake (it does not usually translate into an improvement in results, but rather into an increase in the probability of dropping out) or the system as a whole (it entails additional expenditure).³³

Our second pending issue to be resolved is the persistent levels of students dropping out of school early. Despite the notable improvements of the last three decades, Spain still has the highest school drop-out rate in Europe [Fig. 9], 7 percentage points above the target of 10% set by the EU for 2020.³⁴ This high drop-out rate affects the development of our economy and determines the work and life opportunities for thousands of young people³⁵ who, after leaving school prematurely, are often condemned to unemployment or to precarious and poorly paid jobs for the rest of their lives.³⁶





The high retake and drop-out rates are closely linked to **our third issue to be resolved: insufficient access to post-compulsory studies**. In 2019, the percentage of the population aged 25-34 who had completed compulsory secondary education and were still in education in Spain was 70%, compared to 85% in the EU-27 and the OECD [Fig. 10]. This means that too many citizens leave the system with low levels of education - a shortcoming that we have had for

decades and one that explains why, today, there are more than 10 million adults³⁸ (48% of the working population aged 25-64) without an educational qualification that qualifies them for a professional position³⁹ [see chapter 3].



Fig. 10. Population aged 25-34 by level of education, 2019

Source: Authors' own, based on Eurostat and OECD data.40

Our fourth issue to be resolved is related to learning levels. Over the last twenty years, the amount of resources (human, financial and time) that European states and households devote to the education of their children has increased significantly. However, their learning seems to have stagnated or even fallen in most cases, at least as far as basic skills are concerned.

The results obtained in the PISA tests describe a similar stagnation for Spain,⁴¹ although with an important nuance determined by changes in the sample considered. At the beginning of this century, the proportion of young people taking part in the PISA tests was much lower than in other nearby countries - either because many dropped out of school before the age of 15 (when the test is taken) or because they were excluded from taking the test because,⁴² for example, they were not native speakers and had not mastered one of the official languages [Fig. 11]. The improvements in access we have described above allowed us to correct this difference and have meant that the population covered by PISA in Spain has increased from 76% in 2003 to 92% in 2018, thus converging with the levels of the EU-22 and the EU-8 [Fig. 12]. This change in the sample means that improvements in learning achieved in recent decades are not well reflected in the evolution of the results.



Fig. 12. Population aged 15 covered by PISA



This does not, in any case, change the fact that Spain still has learning levels significantly below those of the EU-8 [Figs. 13, 14, 15 and 16]; ⁴⁵a severe problem that is a determining factor for the country's present and future.



Fig. 13. PISA results in reading comprehension

Fig. 14. PISA results in mathematics



Source: The authors' own, based on OECD and the Department of Education and Vocational Training data.46



Fig. 16. Other relevant skills measured by PISA



Fig. 15. PISA results in science

Source: Author's own based on OECD data.48

The learning outcomes also indicate a low level of excellence. The students with the best performance level in Spain are as good as those in Finland, but only 4-7% (depending on the skill assessed) manage to reach this level, compared to the 10-15% that achieve it in the most advanced countries around us.50

The fifth issue to be resolved in the Spanish education system involves making progress in regard to equal opportunities and reducing school segregation.⁵¹ As we have already seen, in

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Spain, the socio-economic level of student's home has less influence on their learning than in countries such as France, Italy and the United Kingdom. However, it does have a strong impact on retake and drop-out rates.⁵² For example, the data indicate that, with similar mathematics and science skills, those from more disadvantaged backgrounds are four times more likely to have retaken years than those from more advantaged backgrounds, which is double the OECD and EU averages [Fig. 17].⁵³ Similarly, the probability of dropping out of school early due to socioeconomic background is 5 points higher in Spain than in the EU-22.⁵⁴ On the other hand, school segregation in our country exceeds the European average and, in fact, has increased slightly since 2006.⁵⁵ The result of all of the above is that many young people from vulnerable backgrounds do not achieve intermediate and higher qualifications that would allow them to opt for quality employment, and also that educational mobility is still low [Fig. 18].





Source: Author's own, based on Ferrer.56





Source: Author's own based on data from the OECD.57

Last, there is the issue of student demotivation. Spain is one of the countries with the best school atmosphere, the lowest levels of bullying, and the greatest sense of students' belonging to their school.⁵⁸ Spaniards begin their schooling with one of the highest levels of "liking school" in Europe. However, this feeling fades rapidly and they finish secondary school with satisfaction levels below those of the EU-22 average [Fig. 19].⁵⁹ This progressive disaffection with school is both a cause and a consequence of the problems we have mentioned above - from high drop-out rates to low academic achievement.



Fig. 19. Students who very much like school, 2014

Source: Authors' own, based on data from Health Behaviour in School-aged Children.60

Routes to improvement

The weaknesses noted above are due to a host of factors, some of which are exogenous to the education system. The fact that in our country there is a high level of job insecurity and an abundance of low-skilled jobs (in industries such as construction or hotel and catering) has discouraged people from continuing their studies, especially during the years of strong economic expansion⁶¹ [see chapter 7]. In addition, our high levels of inequality and poverty have made it difficult for many of the educational gains made over the past 40 years to reach the entire population [see chapter 8].

However, beyond these contextual factors, it is clear that there are things that can and should be improved within the system itself. Here we highlight five:

I. The curriculum

Spain has an excessively rigid and encyclopaedic educational curriculum that is more oriented to reproducing contents (data, formulas, historical facts) than to developing more relevant competencies for life and deep learning. Our system continues to prioritise (especially in secondary education) instructing "what students should know" as opposed to developing "what students are capable of doing" with the knowledge acquired. Thus, for example, many schools still place greater value on students being able to memorise a list of words in a foreign language than on being able to speak in that language.

In spite of the declared intention of recent educational laws to change towards competence-based learning,⁶² the truth is that, in Spain, teaching continues to be organised around an excessive number of subjects, all of which are overloaded with content, constrained by textbooks, and arranged in direct competition with each other for students' attention. This leads to an excessively academic knowledge that is not linked to experience, does not encourage interdisciplinary learning, and hinders or simply ignores the development of fundamental core skills such as teamwork, the ability to construct an argument, assertiveness and critical thinking.⁶³

In addition to making it difficult to improve the quality of learning, this curricular style of organisation limits teachers, discourages those who wish to innovate in teaching, and acts as a barrier to equity and excellence, as it can exclude students who have less cultural capital due to failure, retakes, and failure at school, and it can restrict the potential of those who have greater abilities.

II. The teaching profession

Teachers are at the heart of any education system and, as such, define much of its potential. In fact, academic research shows that teacher quality is the factor that, along with collaboration and peer learning, has the greatest impact on learning.⁶⁴

Aware of this, Spain has in recent decades implemented a notable improvement in teacher training and performance.⁶⁵ Even so, **our system of teacher selection, training and performance evaluation has several shortcomings** that limit our ability to have the best possible professionals in each classroom. This deficit in professional development is something that the teaching community itself recognises and demands.⁶⁶

The problem starts at the beginning. For decades, a teaching degree has been one of the least demanding Spanish university degrees [Fig. 20], in contrast with other countries, where it is one of the most difficult qualifications to access and attain.⁶⁷ The same is true in secondary education. In Spain, the best graduates do not usually pursue a teaching career in schools or secondary schools, but are mostly inclined towards other professional opportunities in the private sector or academic research. Those who do opt for the teaching profession must face a system of competitive examinations in which memorising is prioritised over other fundamental competencies that are practically ignored.



Fig. 20. Average grade for admission to undergraduate degrees, academic year 2018/19

Source: Authors' own, based on Department of Universities.68

Once teachers are incorporated into the system, training deficiencies are hardly ever corrected. The data indicate that, relative to their counterparts in other OECD countries, trainee teachers in Spain have 1) less access to a mentored induction system to teaching; 2) less peer recognition when they perform well; 3) less contact with forms of co-teaching; 4) less evaluation of their performance; and 5) less supervision and mentoring by their peers [Fig. 21].



Fig. 21. Teachers' perceptions of their careers and professional practice (% of total), 2018

Source: Authors' own, based on TALIS data.69

This situation is aggravated by the unequal distribution of professional capital across our educational landscape. **Teachers and management teams with better skills** in encouraging students' learning progress **tend to be concentrated in the same schools** (generally those with higher socio-economic levels), **while they are scarce among those with more vulnerable students** and where their contribution would be more critcal, due to the lower availability of other support tools.⁷⁰ This phenomenon tends to make the deficiencies described above chronic and deepens the problem of school segregation.

III. Educational governance

In Spain, educational decision-making falls to an overly **bureaucratised institutional system** that often ends up paying more attention to the enactment of laws⁷¹ and the design of "structure" than to introducing "processes" and improving results. This, together with a model of inefficient coordination between the Department of Education and the autonomous communities,⁷² prevents a greater use of the potential for experimentation and exchange of good practices that, in themselves, would facilitate decentralisation.

Another issue is the **low effective autonomy of our schools**, which is lower than that of OECD counterparts [Fig. 22], **and the lack of professional development among management teams**.⁷³ In fact, Spain is the only country in Europe where a professional career path for access to school management has not been established.⁷⁴ This lack of autonomy and professional development makes it difficult for the work in classrooms to align with the real world and needs of the environment, and hinders transformative school leadership - something that is essential to achieving greater equity and excellence.⁷⁵ Likewise, it contributes to the bureaucratisation of educational policy, accentuating the role of the autonomous governments as "administrators from above," instead of promoting a governance of support and collaboration with schools based on aligning objectives, advice for improvement, transparency, and empowering schools.⁷⁶



Fig. 22. Educational decisions taken by level of responsibility, 2017

Source: Author's own based on OECD data.77

To these institutional weaknesses we must add others - such as the low level of professional development among educational administration and management; insufficient cooperation between research and decision-making;⁷⁸ the high degree of politicisation of debate on education at national, regional and municipal levels; the low cooperation of social stakeholders (unions, business organisations, parents' associations, students' associations); and the absence of an adequate framework of accountability. All of these are weaknesses that make it difficult to build consensus (or take advantage of those that already exist) in order to resolve the issues outlined above.⁷⁹

IV. The evaluation system

Having a well-designed evaluation mechanism that measures what really matters and generates accessible, useful and up-to-date data is key to identifying the strengths and weaknesses of educational stakeholders (schools, teachers and authorities) and to setting out a continuous improvement of the system. Spain has made a lot of progress in this area, but it still lacks an effective mechanism to evaluate what happens within and outside the classroom.⁸⁰

As far as **students** are concerned, assessment is still too focused on memorising content and on obtaining grades, which results in prioritising passing rather than learning and is strongly associated with problems such as high rates of retakes.⁸¹ This phenomenon has its corollary in the **compulsory secondary education qualification system and university entrance exams** (EBAU). The former evaluates the possibility of continuing education using a binary "yes" or "no", without offering intermediate options or alternative paths, and this contributes to the increase in school drop outs. The second is heir to a form of learning that is exclusively knowledge-based and, as such, represents an obstacle to the necessary paradigm shift towards competency-based learning that we have been discussing.

With regard to **teachers**, Spain does not yet have a system for evaluating the performance of teaching practice that can guide interventions for teachers' ongoing learning and improvement.⁸²

As for **the authorities**, there is no agreed-upon or generally used model of external student assessment that would enable improvements in the planning, design, and implementation of education policies. The autonomous communities conduct diagnostic assessments, but each one does so in a different way: at different times (mid-stage, end of stage) and with different approaches (for example, some focus more on content and others on competencies). This lack of homogeneity and coherence is preventing us from taking advantage of one of the great profits of having 17 different educational systems - namely, of being able to experiment, compare solutions and extend those that produce the best results.⁸³

V. Financing

Although our public spending on education has doubled since the 1980s,⁸⁴ **it is still insufficient** for two reasons. First, because **it is significantly lower than that of other countries with which we must cooperate and compete in the global knowledge economy**. Spain devotes fewer resources to education than most EU countries, both in terms of expenditure relative to GDP [Fig. 23] and expenditure per student [Fig. 24], a situation that, far from being corrected, has actually worsened in the last twenty years.⁸⁵



Fig. 24. Public spending on Primary and Secondary per student, 2017





Source: Authors' own, based on data from the Department of Education and Vocational Training, and the OECD.⁸⁶



Second, our spending on education is insufficient because **it cannot pay for all the reforms and improvements that our system needs**. If Spain aspires to adopt a more competitive, sustainable and inclusive economic growth model [see chapter 1], it will need to drastically improve the quality of its human capital and, to do so, **it will need to invest as much in education as the EU-8 do**. Only by doing this will we be able to close the gap and guarantee a future among the most advanced countries in the world - especially in the context of strong demographic ageing and intense technological and environmental transformations.

Of course, it is not all about increasing funding. The way it is used will also need to be streamlined and sophisticated. One problem to be addressed in this regard is that, in our country, spending on education is concentrated on teaching staff, frequently at the expense of investment in infrastructure, non-teaching staff, support services and scholarships. Spain is one of the OECD countries with the lowest levels of resources devoted to its educational infrastructures.⁸⁸ As a result, many of our schools have not yet adapted to the new social, technological and environmental realities and lack the digital equipment and facilities necessary to provide flexible, inclusive and individualised attention to their students.

Spain also suffers from a deficit in non-teaching staff (staff with training in guidance, psychology, social work and extracurricular activities) and lack of investment in support services and scholarships for the most vulnerable in schools. This limits the system's capacity to respond effectively to current and future challenges associated with quality and equity.⁸⁹ It is therefore necessary to quantify the real cost of each school place at each educational stage - something that is necessary for public funding to respond adequately to the educational needs, both in the public and in the private government-dependent network.

Today's weaknesses are tomorrow's opportunities

In short, **despite the enormous progress made in recent decades, Spain's education system still has significant issues to resolve,** both in terms of coverage and learning, which are hindering us
from realising the full potential of every student and are having knock-on effects on employment, the economy and well-being in society. If we wish to converge with the most advanced countries in the EU, we will need to address them - not as chronic or inherent problems within our system, but as feasible and specific opportunities for improvement. This is not a utopian aspiration. As we will see below, **Spain's education system has the potential to be among the most advanced in the world**. In fact, the next few years will provide us with a good opportunity to achieve this.

THE FUTURE: POSSIBLE DESTINATIONS

The short term: education during the coronavirus crisis

The coronavirus pandemic has led to an unprecedented educational emergency that has exposed the strengths as well as the fundamental weaknesses in our system. In order to stop the spread of the virus, in March 2020 all schools in Spain were closed and their 9.5 million pupils were forced to continue their education online. This sudden exodus from face-to-face education to *online* training meant **a relative deterioration in the pace of learning. This particularly affected those from more vulnerable socio-economic backgrounds**, due to the differences that exist between schools and between households in terms of capacity for mentoring and access to digital devices⁹⁰ [Figs. 25 and 26]. In fact, the first available studies estimate that, during the initial weeks of the March lockdown, almost a third of children and adolescents in school in Spain had no access to any learning activity or virtual relationship with their teachers or tutors.⁹¹



Fig. 25. Computers in the home by socioeconomic

quartile in Spain, 2018





Source: Authors' own, based on PISA 2018.92

Source: Authors' own, based on PISA 2018.93

Thanks to the enormous effort on the part of teachers, schools, and in students' homes, in-person teaching could be restored and maintained for a good part of the 2020-21 academic year. In fact, the data indicate that **Spain is among the EU countries that have lost the fewest weeks of school as a result of the pandemic** [Fig. 27].



Fig. 27. Number of weeks with schools totally or partly closed from March 2020.

Source: Authors' own, based on UNESCO data.94

Even so, it is clear that levels of "virtual dropping out" suffered in this period will have an impact in the medium and long term. There is already evidence that it has caused **a loss of learning and motivation** among many pupils - something that could eventually lead to **an increase in rates of absenteeism, school drop-out rates and even a reduction in future income among the most disadvantaged groups**.⁹⁵

It also remains to be seen what effects the economic crisis triggered by the pandemic will have. If powerful measures are not taken, **the same patterns seen during the 2008 recession could occur again** between 2021 and 2023. On the one hand, the collapse of the hospitality industry and other ancillary activities will probably reduce the supply of low-skilled jobs, which will discourage pupils from leaving school early and lead to higher graduation rates in upper secondary school, vocational training and High School.⁹⁶ On the other hand, the increase in unemployment and the fall in many households' incomes will probably result in a worsening of learning outcomes, which above all will affect children from the most vulnerable families.⁹⁷

One of the greatest threats, though, is that there will be a reduction in public investment in education, as has happened in the past. Between 2009 and 2014, education spending in Spain was cut by 17%, as the number of students enrolled increased.⁹⁸ This cut was partially offset by an increase in private household spending and, therefore, resulted in more regressive total education spending [Fig.28].⁹⁹ The risk is that a similar phenomenon will occur in the coming years, which would further aggravate existing educational inequalities [see chapter 8].¹⁰⁰





Source: Authors' own, based on OECD and Department of Education and Vocational Trainingg data.¹⁰¹

The measures implemented by national and regional governments in recent months, and the implementation of European recovery funds,¹⁰² under which education and knowledge are a priority, could help to reduce the adverse effects of this scenario.

The medium and long term: an educational revolution is possible

In the coming decades, **digitalisation will transform the way we consume, process and use information.** The widespread use of technologies such as advanced sensors and artificial intelligence will reduce the importance of memorised details and will mean a re-evaluation of social, emotional, and creative skills.¹⁰³ It is these that will guarantee better performance in an increasingly complex and specialist world [see chapter 7]. Students will have to learn to work with machines rather than compete against them.¹⁰⁴ This will require greater knowledge in science, technology, engineering and mathematics (STEM), as well as better cognitive skills (such as creativity and deductive reasoning), social skills (such as communication, teamwork, leadership, and negotiation) and emotional skills.¹⁰⁵ These are skills in which humans are better than machines.¹⁰⁶ This transformation, together with the acceleration of technological change, will increase the competitive advantage of educational systems that are more versatile and more focused on the acquisition of skills than on memorising content.

In this future scenario, the modernisation of our country's education system will be more necessary more than ever. If they are not tackled, the shortcomings outlined above will continue to grow and take their toll on our society and economy. Between now and 2050, 3.4 million pupils could be held back a year in Spain and around 2 million could drop out of school early.¹⁰⁷ This is something that, in most cases, would lead them to a precarious working life and significantly increase their chances of falling into poverty and social exclusion. Similarly, without measures being implemented, learning levels will stagnate and Spain could be surpassed in educational quality by countries that have lower incomes, but a strong commitment to education - such as Portugal, Hungary and Latvia. This would pose an immense challenge to the long-term growth of our economy as well as the professional development of our young people who, due to remote working, will increasingly have to compete in a globalised labour market.

The good news is that these prognoses, which are based on a linear projection of trends recorded in recent decades, do not necessarily hold true. The challenges facing the Spanish education system are remarkable. However, there is nothing to suggest that we cannot overcome them and lead an educational revolution during the coming decades, as we did at the end of the last century. We have the institutions and the talent we need. What we now need to do is design an ambitious plan for the future and generate the right social and political consensus to implement it.

Doing so will bring immense benefits to society as a whole. For example, **if we manage to reduce the percentage of 15-year-old pupils who have retaken school years at least once from the current 28% to 10%**, Spain would gain learning that is equivalent to almost 6 months of additional schooling.¹⁰⁸ We would also save about 900 million euros per year (equivalent to 3-4% of the budget for primary and secondary schooling).¹⁰⁹ This money could be used to fund other policies and significantly close the social education gap, as 49% of 15-year-old pupils who have ever retaken a year come from vulnerable socio-economic backgrounds.¹¹⁰ Reducing the percentage of pupils retaking years by 18 percentage points will not be easy, but it is **perfectly feasible** - not least because our high rates of retakes have nothing to do with the ability of our young people but rather with the design of our assessment system and the insufficient support that pupils from the most disadvantaged backgrounds receive. These two issues can be quickly tackled.¹¹¹ In fact, there are currently 13 EU countries with retake rates of below 10%.¹¹²

Similarly, if we were to reduce the percentage of school dropouts from the current 17% to 10% in 2030 (the EU target for 2020)¹¹³ and get all of them to complete at least post-compulsory secondary education, we could cut our structural unemployment rate by 4 tenths of a percentage point and increase labour productivity by 1.7% [Fig. 29].



Fig. 29. Potential effect of reducing the early school drop-out rate to 10% in Spain

Source: Authors' own, based on Serrano et al¹¹⁴

A 7 percentage point reduction in the drop-out rate in ten years may seem like a lot. But it is worth noting that, so far this century, several European countries (including our own) have achieved greater or similar progress [Fig. 30].

Fig. 30. Countries that have reduced their dropout rates in recent decades

Country	Progress made	Reduction in percentage points	Years required
Spain	31% in 2009 - 17% in 2019	14	10
Greece	14% in 2009 - 4% in 2019	10	10
Portugal	31% in 2009 - 11% in 2019	20	10
United Kingdom	20% in 1999 - 11% in 2015	9	17
Netherlands	18% in 1996 - 10% in 2010	8	14

There are 10 countries in the EU with a drop-out rate below 10%: Austria, Croatia, Slovenia, Finland, Ireland, Lithuania, Netherlands, Poland, Czech Rep. and Sweden

Source: Authors' own, based on Eurostat data.115

The same sense of possibility can be seen in the challenge of learning. **If we succeed in increasing our PISA scores by 20 points for the main skills (mathematics, reading and science) to levels of 500 points (the EU-8 average) by 2050, Spain's GDP could grow by an additional 0.5 percentage points per year in the following decades. Furthermore,**¹¹⁶ the competitiveness of our workforce and businesses would increase considerably and the economic and social well-being of citizens would improve.¹¹⁷ **Is it possible to improve our PISA scores by 20 points in 30 years?** Yes, it is. In fact, so far this century, countries like Poland, Portugal, Latvia and Italy have achieved a similar improvement [Fig. 31].





Moving from a score of 480 to 500 takes more effort than going from 460 to 480. However, it is also true that **Spain still has easy to implement improvements pending which have a great potential impact in terms of learning.** For example, it is estimated that simply reducing the rate of pupils retaking years to OECD average levels could translate into an increase of 12 points in terms of PISA.¹¹⁹

Source: Author's own based on data from the OECD.118

It should also be borne in mind that over the coming decades there will be a series of demographic and technological changes that, if well exploited, will make it even more feasible to achieve the improvements we need.¹²⁰ In 2050, Spain will have 800,000 fewer students aged between 3 and 15.¹²¹ This is equivalent to having about 33,000 fewer classrooms of 24 students than in 2019.¹²² This sharp contraction in the student population will force the closure of several schools (especially in rural Spain) and the downsizing of many others. However, if well managed, it will also open the door to a number of extensive improvements in the system. To start with, **our country** will be able to double its spending per pupil on infant, primary and secondary education, from the current 4,880 euros to around 9,640 euros in 2050 (Denmark's current level)¹²³ with hardly any increase in public spending.¹²⁴ This injection of resources will help promote practices such as co-teaching, increase tutoring support for pupils who are lagging behind, and improve conditions for teaching staff.¹²⁵ Any facilities that are no longer needed can be reconverted and used for other types of learning, such as pre-school education from 0 to 3 years or adult re-qualification, for which demand will grow in the future [see chapter 3].

The greater availability of economic resources will also enable us to promote digitalisation in our education system - which has already begun with the injection of European funds. In the coming decades, **the spread of new technologies will change the way students learn, and are taught, assessed and tutored in our schools.** Artificial intelligence will enable us to drive forward a more personalised and deeper learning, aligned with the pace and individual features of each student. For example, there are already systems capable of analysing translations done by students in foreign language classes and helping them reinforce their knowledge based on their mistakes.¹²⁶ In the near future, these technologies will be applied to all subjects and will allow teachers to correct and analyse their pupils' exams and assignments more frequently and in greater detail, thus allowing for a more personalised monitoring of pupils' progress. These same systems will make it possible to identify loss of interest or learning issues, pick up early on risks of retakes or dropout, ¹²⁷ and provide students with additional in-person or online assistance.¹²⁸ These systems will also facilitate early diagnosis of a range of learning disabilities (such as dyslexia,¹²⁹ autism,¹³⁰ and attention deficit hyperactivity disorder)¹³¹ as well as expand learning opportunities for people with disabilities.¹³²

The digitalisation of classrooms will also enable schools to exchange data and share skills and knowledge between teaching teams online, which could lead to a reduction in inequality between schools as well as crucial support for rural schools and a significant improvement in learning outcomes.

Naturally, in order for these changes to take place, profound reforms in our system will be needed: a commitment to educational R&D, the digitalisation of data and knowledge management systems, the modernising of infrastructures, and retraining much of the teaching staff. We will also have to learn to deal with the potential negative effects that using digital devices may have on pupils' concentration, learning and well-being.¹³³ However, there is nothing to suggest that we cannot succeed in integrating digital technology into our education system.

In summary, **Spain must make a drastic commitment to education as one of the main ways of ensuring the well-being and prosperity of future generations.** The trajectory of recent decades and the changes that are beginning to appear in the near future suggest there is reason for optimism. If **Spain commits itself to this, it can become a leader in education by 2050.**

How can this be achieved? Some measures are suggested on the following pages.

WHAT NEEDS TO BE DONE TO ENSURE PROGRESS IN EDUCATION

Between now and 2050, **Spain will have to become an educational leader** if it wants to remain a prosperous and inclusive country, capable of competing and collaborating on equal terms with the world's most advanced economies. **Doing so will mean drastically reducing our dropout and retake rates; increasing the proportion of people who access post-compulsory education; and improving learning levels and equity across the system**.

It is difficult to attain that which cannot be measured. It is therefore essential that, in the coming years, our country uses social dialogue to reach a **consensus on a table of quantifiable indicators and a list of specific objectives** that will enable us to monitor the progress made and guide the ambition of our reforms. Here are some suggestions following the principles outlined in the Introduction to this *Strategy*:

Goal 7. Reduce the percentage of students who, at the age of 15, have been held back a year at least once, from the current percentage of 29% to 5% by the middle of the century.

Goal 8. Reduce the school dropout rate from the current 17% to 3% by 2050.

Goal 9. Ensure that 93% of the population aged 25 to 34 has an education level higher than compulsory secondary education by 2050 (compared to the current 70%). In order to achieve this objective, the period between 16 and 18 years of age should be considered as a formative stage.

Goal 10. Improve the equity of the system, especially by increasing opportunities for those who come from the most disadvantaged backgrounds. This implies reducing the significance of social background in regard to school access, being held back a year and dropping out in order to reach the EU-8 average by 2050.

Goal 11. Improve national learning outcomes, by reducing the proportion of 15-year-olds who perform below the EU target of 15% by 2050 in reading, maths and science (below level 2) in PISA (or other national diagnostic) assessment.¹³⁴

Goal 12. Encourage excellence within the education system by doubling the current proportion of 15-year-old pupils with high performance in PISA (or other national diagnostic assessment) in reading, maths and science (level 5 or above) to converge with the EU-8 average by 2050.

Goal 13. Progressively increase public spending on education to 5.5% of GDP by the middle of the century, ensuring a similar improvement in spending per student. This increase in funding must be accompanied by significant improvements in the efficiency and composition of spending.

Table of indicators and targets

	Indicators		Place	Average 2015-2019 or latest		Targets	
				data available*	2030	2040	2050
7	7 Percentage of pupils who have repeated at least one		Spain	29%*	18%	10%	5%
,			EU-27	12%*	-	-	_
	grade at age of .	15133	EU-8	14%*	-	-	_
			Spain	17%*	10% ¹³⁷	6%	3%
8	8 Early school dropout rate ¹³⁶		EU-27	10%*	-	-	_
			EU-8	8%*	-	-	-
0	9 Population aged 25-34 with more than lower secondary education ¹³⁸		Spain	70%*	78%	86%	93%
9			EU-27	85%*	-	-	_
			EU-8	87%*	-	-	-
10	10 Importance of socio-eco-		Spain	3.9*	3	2	1
	probability of re equal skills leve	petition at ls ¹³⁹	EU-22	2.0*	_	_	_
			EU-8	1.5*	-	-	-
		Reading	Spain	20%	18%	15%	<15%
		Mathematics		23%	20%	18%	<15%
11	Percentage of	Science		20%	18%	15%	<15%
	15 year olds with low	Reading		20%	-	-	_
	performance	Mathematics	EU-22	21%	-	-	_
	level 2) ¹⁴⁰	Science		20%	-	-	_
		Reading	EU-8	19%	_	_	_
		Mathematics		18%	_	_	_
		Science		19%	_	_	_
		Reading		5%	6%	8%	10%
		Mathematics	Spain	7%	10%	13%	16%
12	Percentage of	Science		5%	6%	8%	10%
	15-year-olds with high	Reading		8%	-	-	_
	performance	Mathematics	EU-22	11%	-	-	_
	5 or above) ¹⁴¹	Science		7%	-	-	_
		Reading		10%	-	-	_
	Mathematics	EU-8	13%	-	-	_	
	Science		9%	-	-	_	
	13 Public expenditure on education (% of GDP) ¹⁴²		Spain	4.3%	5.1%	5.3%	5.5% ¹⁴³
13			EU-27	5.0%	-	-	-
			EU-8	6.1%	-	-	-

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To achieve these objectives, our country will have to undertake **far-reaching reforms and implement significant initiatives** on several fronts. Here are a few suggestions:

Front 1: Redesign the curriculum

We must change the way in which the curriculum taught in our schools is conceived, designed and implemented. To this end, we propose the following:

- Promote an open construction of the curriculum that allows us to identify what are the essential knowledge and skills at each educational stage. The process should be participatory and consensual, with the collaboration of the academic, teaching and research community as well as families and students themselves. Some experiences in this field that can be referred to are the curricular reforms carried out by Croatia, Chile and Portugal.¹⁴⁴
- Develop a curriculum, focused on acquiring and assessing skills, that is comprehensive, interdisciplinary, and global without being encyclopaedic, and which emphasises the practice of "learning to learn" ¹⁴⁵ and which thereby creates more motivating, deep and challenging learning in accordance with age and cognitive evolution. This curriculum should broaden the learning experience beyond simply acquiring knowledge, be based on the key competences identified by the European Commission,¹⁴⁶ and develop, among other things:
 - STEM disciplines, which will have to be included in all training cycles.¹⁴⁷ To this end, the population's mathematical skills need to improve. If abstract thinking is not mastered, it is difficult to understand many of the concepts contained in different software packages;
 - the skills necessary to develop critical thinking, creativity and forward thinking, as well as articulating them through oral and written expression;¹⁴⁸
 - the technical skills of our time, such as multilingualism, programming and financial literacy;
 - the overall skills that enable students to analyse, question and propose solutions to the major challenges of the 21st century, such as climate change [see chapter 4],¹⁴⁹ inequality, and demographic pressure; managing multiple identities and build bonds of loyalty and solidarity, based on civic commitment and a respect for diversity, that are necessary for life in society;¹⁵⁰
 - skills aimed at improving students' physical and mental health [see chapter 9];
 - socio-emotional, humanistic and spiritual skills that help this population deal with the potential effects of digital devices (on concentration, privacy and rest)¹⁵¹ and with psychosocial phenomena such as failure, success, pain, depression or anxiety, thus

achieving greater life satisfaction [see chapter 9].

- Complete the process of decentralising the curriculum in schools. We need to provide
 education centres with a greater capacity for specific curriculum development, which will
 allow them to provide a more tailored response to the actual situation in their environment.
 Ultimately, the new curriculum would have three skills-related parts:
 - a basic national part, which ensures a minimum level of learning for pupils and coherence between the Spanish system with the European Union framework;
 - a part stipulated by the autonomous communities;
 - a part designed by the school itself.

In addition, under teachers' guidance, the pupils' capacity for choice should be increased, so that they can shape part of their curriculum in line with their expectations and concerns.

- Ensure flexibility and continuous updating of the curriculum, with regular reviews every 8 to 10 years.¹⁵² This is the policy pursued by Finland since the 1980s that puts it at the forefront of teaching techniques and the changing demand for skills and competences. The recent announcement of the creation of an Institute for Curriculum Development is a positive step in this direction¹⁵³
- Apply a forward-looking vision in all curriculum design.¹⁵⁴ The children coming into our education system today will take 20 to 30 years to enter the world of work. To avoid them being totally out of date by the time they do so, it is essential to keep an eye to the future and anticipate some of the needs that will arise tomorrow [see chapter 3].

Front 2: Make progress towards greater professionalisation in the teaching profession.

The quality of an education system depends on its teachers' ability and motivation. If Spain wants to achieve excellence, it will need to considerably improve the selection, training, professional development, working conditions, and social recognition of teaching staff, and position them as key players in the knowledge society. To do this, the following changes are recommended:¹⁵⁵

- Strengthen teachers' selection and initial training.
 - Reform education faculties: update curricula, re-balance the excessive proportion of didactic teaching towards interdisciplinary fields, and introduce the latest advances in educational research.
 - Develop new specialist areas that fit the teaching profiles sought by schools.
 - Encourage primary and secondary school teachers to pass on their experience to bachelor's and master's degree students in teacher training, respectively.
 - Improve systems for selection and accessing the teaching profession after bachelor's and master's degrees, so that entry requirements are raised and examination processes are adapted, so that these recognise skills that education in the 21st century really

needs (motivation, communication and social-emotional skills, managing diversity and classroom situations, leadership) and not simply the ability to memorise syllabuses.¹⁵⁶

- Implement an effective induction process.
 - Induction could consist of a period of continuous paid work experience, for example, for two school years in an educational establishment. This process would allow teachers to progressively acquire the necessary skills.
 - New teachers should join a collaborative team with fully qualified teachers with whom they will share lessons and who will oversee the coordination of their daily work. Systems for more experienced teachers to provide mentoring should also be put in place to prepare new teachers to successfully deal with the complexities of teaching.¹⁵⁷
 - A network of specialist training centres should be created to combine educational work with training new teachers in a range of social contexts.
- Promote and require continuous learning and training throughout teaching careers. Ambitious retraining programmes will have to be implemented nationwide along with regular evaluation mechanisms. The fact that, in 2030, around 40% of Spanish teaching staff could be over 50 years old makes the creation of these programmes particularly relevant.¹⁵⁸
- Institutionalise routes for professional growth within the teaching profession. Two could be established: a horizontal option, in which professional advances would not imply a change of stage or teaching responsibility; and a vertical option, which would imply a change of stage and an evolution from teaching activity to other types of functions. Both routes would be capable of being assessed and progress in the vertical option would be associated with management, training and educational innovation functions.
- Encourage men to pursue a career in teaching. In order to move towards gender equality in society, we would need to encourage men to work in the early stages of education. Currently, there is a clear majority of female teachers, especially at infant (98%) and primary (81%) stages. This contrasts with changes in society ¹⁵⁹ and could contribute to the perpetuation of gender stereotypes such as the one that associates education and care exclusively with women.
- Encourage knowledge transfer between schools, vocational training centres and universities, making it easier for university and vocational training teachers and researchers to be involved in primary, secondary and baccalaureate teaching, and vice versa.
- Involve the best teachers in less favourable socio-economic contexts and in educational innovation and research, for example, by linking professional development and remuneration to greater involvement in these projects. This is what other countries such as Australia and France have done.¹⁶⁰

 Advance professional development in the early childhood education stage (0- 3 years), by promoting both ongoing training and the improvement of teachers' working conditions, and the evaluation of teaching processes and performance.

Front 3: Improve the governance of the education system

- Strengthen horizontal cooperation between autonomous communities to promote the exchange of data, knowledge and experiences between them. To achieve this, we suggest five priority actions:
 - Strengthen National Cooperation Programmes.¹⁶¹ These should be diversified both in terms of content and the stakeholders with which they work (autonomous communities, provincial councils, town councils).
 - Leverage digital technologies to expand and integrate the various available databases, making them a key tool for policy and programme monitoring, evaluation and design.
 - Standardise the use of experimentation as a working method, to identify what works and what doesn't, following principles such as the smart state and systems that learn.¹⁶²
 - Strengthen the Sectoral Conference allowing greater deliberation and advice on matters of joint governance.
 - Set a strategy with shared objectives, indicators and targets for improving quality and equality, aligning them with the realities and aspirations of each autonomous community, following the example of the European and Spanish 2010 Goals and the Education and Training Strategy 2020.¹⁶³ This strategy should be in line with the European framework for the period 2021-30.¹⁶⁴
- Improve the professional and international development of political positions and midlevel technical staff of the autonomous communities and the Department of Education and Vocational Training, with continuous training programmes and exacting evaluation systems.
- Extend schools' autonomy and organisational capacity, following the European experience. The idea is that schools can better adapt classroom work to the reality and needs of their environment - something that is essential to achieving greater equity and better learning outcomes.¹⁶⁵
- Establish admission rules and control mechanisms to ensure a balanced schooling: without segregation, free of charge, and that encourages co-responsibility between public and private government-dependent networks.¹⁶⁶
- Promote greater accountability of schools to the educational community and the administration, based on information from diagnostic assessments and other robust

reporting tools, with the aim of developing improvement plans and systematising their innovations.

- Modernise educational inspection, strengthening its ongoing support role to schools and as a coordinating mechanism for sharing improvements between them.
- Make schools more open to other stakeholders who have a commitment to the common and public aspects of education. Schools should become nodal points within an ecosystem of connected learning in the community, with an active role played by museums, libraries, cultural industries, businesses and community organisations as networked educational agents.

Front 4: Promote an effective evaluation system, supported by a culture of transparency and accountability

- Introduce a model of skills-based certification of learning at the end of compulsory secondary education, to replace the current system of qualifications. The aim should be to achieve greater flexibility in access to training opportunities after compulsory education ends, and tailor learning pathways for each pupil. The objectives of the University entrance exam (EBAU) should also be redesigned in order to move towards skills-based assessment.
- Strengthen and adapt diagnostic assessments.¹⁶⁷ Make assessments at national level (with common items) and regional level (with items specific to each autonomous community) compatible with the aim of identifying progress, designing improvement plans and sharing best practice between schools and administrations.¹⁶⁸ These assessments should be recurrent over time, and the resulting data should be made available to the academic and research community, so that it can also help with monitoring and improving educational policies.
- Promote continuous assessment aimed at improving each teacher and the institutional development of each school, and implement a professional evaluation portfolio based on teaching performance indicators and a peer evaluation system.
- Develop the National System of Indicators, deepening the themed areas (for example, equality and longitudinal analysis of results), coverage (available for all autonomous communities), disaggregation by student profile and agility of updating (in real time using automatic learning algorithms). This would allow a better use of information by teaching teams, the educational community and families and would help strengthen their decision-making
- Create an independent institution that connects scientific evidence with educational policy and practice, inspired by models such as the Education Endowment Foundation¹⁶⁹(UK), the Best Evidence Synthesis¹⁷⁰ (New Zealand) and the What Works Clearinghouse¹⁷¹ (USA). The initial areas of activity could be: systematically evaluating the benefits of generally applying the "split school day" on academic results compared to the "no lunch break school day",¹⁷² and study the suitability of changing the mechanism for assigning schools to students.¹⁷³

Front 5: Improve funding

Without increased and better allocated funding, it will be impossible to achieve the goals set out above.¹⁷⁴ It is therefore essential to progressively **increase the financial resources devoted to education to reach the current EU-8 average** [Figs. 23 and 24]. **The goal is to be able to**:

- Finance the proposed policies on modernising the curriculum, professionalising teaching, improving governance instruments and creating an effective evaluation system.
- Finance the expansion and improved quality of the public network of centres for early childhood education, upbringing and care, in order to ensure universal, free, high-quality early childhood education (from 0 to 3 years). Although our school enrolment rate at these ages is higher than the EU-8 and EU-27 averages, in Spain there are still many children aged 0-3 who are not in school. This is especially true of children from the most vulnerable settings. Studies show that training at this early age is, in fact, one of the most effective ways to improve educational results and the quality of human capital, especially in countries such as ours that has a high number of children in vulnerable situations and with a training stage that is strongly impacted by the precarious employment of a large proportion of the population [see chapter 7].¹⁷⁵
- Finance a plan of infrastructures and educational equipment for the purposes of digitalisation and aligning with the environmental transition (for example, efficient air conditioning and insulation, trees in playgrounds for thermal regulation, supporting the installation of mini-solar power plants that help with sustainable development).
- Increase funding for educational innovation and transformation, as well as for research resulting from increased access to and transparency of educational indicators.
- Finance additional measures aimed at reducing inequalities (of opportunity and results) experienced by students and which originate in differences between schools, regions, skills and their families' socio-economic circumstances. This will require several measures:
 - Develop equitable funding of schools based on socio-educational complexity. To this end, underfunded schools should be identified internally, and then special allocations should be made available to eliminate the funding gap.¹⁷⁶
 - Establish a floor for investment for students in all autonomous communities, so that it never falls 90% of the national average.
 - Expand the coverage and number of scholarships. For example, with new packages that help promote return to the education system or encourage groups at risk of dropping out to stay in school.
 - Institutionalise reinforcement plans for vulnerable students (compulsory for autonomous communities).
 - Strengthen progress among pupils with learning difficulties, increasing the provision in the areas of guidance, psychological care and extracurricular activities.

- Address the funding gap of privately-owned state-funded schools, quantifying the actual cost of ordinary operation and focusing on diversity (which do not cost anything), with the aim of improving access opportunities and reducing school segregation.¹⁷⁷
- Fund children's right to food through breakfast grants and lunchtime services.
- Ensure the availability of transport and meal service, in order to facilitate early schooling, especially in rural areas.

Front 6: Expand and diversify post-compulsory education options

A significant part of the high school drop out rates and educational deficiencies among our population comes from the lack of flexibility in accessing educational opportunities after compulsory schooling. Spain will need to develop an open, multi-modal system that: provides **tailored training options for students**, **leads to post-compulsory schooling qualifications** for the majority of students (adapting and strengthening the vocational training model), and **ensures that all students graduate with the ability to continue learning and training for life[see chapter 3]**.

If these measures are taken, Spain can be at the forefront of education by 2050.



Challenge #3

IMPROVE THE TRAINING AND REQUALIFICATION OF OUR POPULATION

EXECUTIVE SUMMARY

- Over recent decades, levels of training in the Spanish population has improved drastically, at a pace only comparable in Europe to Finland. The advances in basic education, the modernisation of vocational training and the expansion of the university system have allowed for the average number of years in education for our population to double; the percentage of adults with no formal education has fallen from 10% to less than 2%, and the proportion of the population with a tertiary level qualification has risen from 16% (born in the 40s) to 47% (born in the 80s). Through these and other advances, Spain has been able to correct decades of delay and approach the human capital levels of the EU-27 average.
- This does not mean, however, that Spain can or should stop there. Despite the advances made, Spain's population remains less trained than the most advanced countries in the EU. In the future, as the knowledge economy grows, technology will transform the productive network, our working age population will shrink, international competition will increase, and threats like climate change will intensify. A well educated and skilled workforce will become even more important.
- In order to avoid being left behind in this emerging scenario, Spain must reduce the proportion of the population with only compulsory secondary-level studies by half, increase the proportion with tertiary level studies (university or higher VT), and put an integrated requalification system in place that allows at least one million workers (employed and unemployed) to update their skills. This is the only way we can make the increases in productivity we need, develop a pattern of competitive economic growth on a global scale, deliver on the green transition and ensure the sustainability of our welfare state over the long term.
- The demographic change and proliferation of digital technologies that will take place over the coming decades will help us achieve this. Between now and 2050, the Spanish population aged between 16 and 24 will fall by 200,000 people compared to 2019. This means that the state will be in a position to double spending on post-compulsory education without incurring an exorbitant increase in public spending, and may reach the percentages of graduates of the most advanced countries in the EU with the infrastructure and human resources already available. The use of technologies like Artificial Intelligence and sensors in our centres will make this progress even more feasible.
- The implementation of an efficient and truly integrated requalification system will require regulatory and cultural changes for employees and employers, and significant increase in funding and a better coordination between educational and cultural institutions of the public and private sector. There's no reason to think we cannot achieve this. Spain was able to create 2 million training places in higher VT and universities between 1980 and 2020, and may create a million places for much shorter training programmes between now and 2050.

THE PAST: PROGRESS MADE

On 15 June 1977, the Spanish population participated in democratic elections for the first time in forty years. The 18 million men and women who went to the polls that day were a young population, working and full of hope, but less educated than most contemporary European societies, the result of an archaic education system that saw Spain fail to record improvements in human capital for four decades.¹ In 1977, 10% of the Spanish adult population were unable to read or write, 74% had no education beyond primary schooling and fewer than 6% had any higher education qualification.²

The Parliament formed as a result of those elections designed a modern and progressive Spanish Constitution that recognised "everyone [citizens] has the right to education" and contained a commitment to "a policy guaranteeing vocational training and requalification" for all workers.³ And so began one of the most spectacular training revolutions in 20th century Europe, with Spain making up for much of the time lost and reaching the EU average human capital levels.

In addition to the achievements in levels of primary and secondary education [see chapter 2], there were other equally notable achievements in the adult population. One of those was **root and branch reform of Vocational Training (VT)**. From the 1990s on in particular, vocational training became part of the education system. Human resources were extended, access routes were diversified and the curriculum was updated, progressively adapting to the skills demanded by the productive network. Thanks to this, VT ceased to be an educational path with poor implementation and poor social perception, and became a modern and competitive option for entering the world of employment. Since then, the number of people registering for VT courses has risen from 7,300 to 887,000 [Fig. 1] and the levels of employability, salary and job satisfaction for the VT graduates have improved drastically to reach, and in some cases exceed, those for university degrees holders.⁴



Fig. 1. Number of students registered for Vocational Training in Spain

Source: Authors' own, based on data from the OECD and the Department of Education and Vocational Training.⁵

At university level, progress has been equally significant. Over the last four decades, Spain has been able to modernise and grow its university system, reaching the levels of the most advanced countries on the Continent [Fig. 2].⁶ The change began with huge increase in the number of universities, from 30 in 1980 to more than 80 today,⁷ many of them home to researchers of the highest quality and cutting-edge infrastructures. A decentralised model was developed that prioritises equal opportunities over the creation of centres of excellence, in contrast to the approach taken, for example, in the United States. As a result, today Spain has no university in the world "top 100" but has 40 (half of the total) among the top 1,000. In fact, Spain has one of the highest ratios of cutting-edge universities per million inhabitants in the world⁸ [Fig. 3].

Position	Country	Score
1	United States	100
2	United Kingdom	98.6
3	Australia	93.8
4	Germany	93.4
5	Canada	90.4
6	France	86.8
7	Netherlands	84.9
8	China	84.5
9	South Korea	83.5
10	Japan	82.1
11	Italy	77.8
12	Spain	75.7

Fig. 2. The 12 best university systems in the world according to the *QS ranking*, 2018

Fig. 3. Universities in the world top 1,000 per 10 million inhabitants

Position	Country	No.
1	Luxembourg	16.2
2	Austria	15.8
3	Finland	14.4
4	Sweden	13.6
5	Cyprus	11.4
6	Denmark	10.3
7	Ireland	10.1
8	United Kingdom	9.7
9	Spain	8.5

Below Spain are 4 EU-8 countries (Netherlands, Belgium, Germany and France) and countries such as the US, South Korea, China and Japan.

Below Spain are 5 EU-8 countries⁹: Sweden, Belgium, Finland, Denmark and Austria.

Source: Drafted by the authors based on the QS RANKING¹⁰

Source: Drafted based on the Academic Ranking of World Universities, Eurostat and the World Bank.¹¹

These universities are also distributed throughout the country, all autonomous communities have at least one public university and all provinces have at least one centre for higher education. There are inconveniences to this geographic dispersal (e.g. difficulty taking advantage of economies of scale) but there are also enormous advantages. Among others, it has served to boost economic and social activity throughout the country,¹² and to reduce the private cost of university studies (e.g. housing rental). This, combined with the spectacular increase in grants (the percentage of university students receiving grants has risen from 19% in 1996 to 38% in 2017),¹³ has tripled the proportion of people studying at university in Spain each year and has helped to expand the educational and, therefore, professional opportunities for millions of women [Fig. 4].¹⁴ Thus, Spanish universities have gone from being an elitist institution to a pluralist one open to citizens, which, in addition to training competent professionals,¹⁵ acts as one of the principal mechanisms for social mobility and gender equality in the country.



Fig. 4. Percentage of university graduates (25-29 years old) by gender in Spain

Source: Drafted by the authors based on data from Bentolila et al.16

Advances in the area of training and requalification for the working population have been equally important. In 1992, the government, companies and trade unions signed the first *National Agreement on Continuous Training*,¹⁷ in which the mechanisms were created to finance, coordinate and guarantee instruction and upskilling for those in employment. This agreement was followed by others, the fruit of collective partnership and growing interest of companies in human capital. Thus, Spain has developed, in just two decades, a broad and dynamic training system for workers, which, although far from the country's needs,¹⁸ is already comparable to that of many European countries. The data reflect the scale and velocity of these changes. Between the 1990s and today, **the resources allocated to active training policies have increased**,¹⁹ **the number of workers who participate in these requalification programmes has risen from 198,000 to 4.7 million** [Fig. 5] and **the number of training hours has increased from 19 million to reach 75 million in 2019.**²⁰





Source: Drafted by the authors based on data from FUNDAE.21

Advances in training for unemployed people have been substantially more modest, although there have been significant improvements. Joining the EU in 1986 allowed Spain to access the European Social Fund and launch the *Plan FIP (National Training and Employment Plan),* which constituted the start of active employment policies in Spain and the reform of the vocational training system. Since then, the capacities of the National Employment System have been improved, consolidating allocations to finance training and develop a mechanism to detect training needs.²²

Overall, the advances described have allowed for the average number of years training of the population to double between 1977 and 2010,²³ the percentage of adults without education has fallen from 10% to less than 2%,²⁴ and **the proportion of people with tertiary level qualifications** (university or higher VT) **has increased from 16% of the population born in the 1940s to 47% of those born in the 1980s** [Fig. 6]. Thanks to this, **the basic skills and professional knowledge of the Spanish population have improved drastically,** at a pace only comparable in Europe over the same period with Finland [Fig. 7].





Source: By the authors based on data from the INE (National Statistics Institute of Spain).²⁵





Source: Author's own based on data from the OECD.²⁶

In this way, the country has been able to correct decades of delay and **converge, in most indicators,** with the EU-27 in human capital [Fig. 8].



Source: Authors' own, based on World Bank data.²⁷

THE PRESENT: UNFINISHED BUSINESS

The progress made in human capital in Spain in recent decades has been more than remarkable. This does not mean, however, that our country can or should stop there. In the future, as the knowledge economy grows, technology will transform the productive network, our working age population will shrink, international competition will increase and threats like climate change will intensify. A well trained and up-to-date workforce will become even more important.

For this reason it is important for Spain to continue to improve the quality of its human capital, resolving the pending issues to **become one of the most advanced countries in Europe on this front**. Only in this way can we make the productivity gains we need, develop a pattern of competitive economic growth on a global scale, deliver on the green transition and ensure the sustainability of our welfare state over the long term.

What are the unresolved issues? Here are three which stand out.

Firstly, **the high proportion of the Spanish population whose education does not go beyond compulsory secondary education**. While the population aged 25 to 64 with higher education (university, higher VT or equivalent) in the country is similar to that of the most advanced countries in Europe (reflected here under "EU-8"), the proportion of people who have an upper secondary qualification (Baccalaureate, intermediate vocational training or other equivalent qualifications) is lower than that of our European neighbours (23% compared to 42% among the EU-22 or 41% of the EU-8) [Fig. 9].





Source: Author's own based on data from the OECD.28

This shortcoming is not just a situation inherited from previous generations, but a chronic problem that is reproduced across the youngest generations and comes from elevated school dropout rates and the rigidity of our training models.²⁹ As a result, **in Spain today, there are more than 10 million adults** (48% of the population aged between 25 and 64) **who hold no formal professional qualification** (VT or university);³⁰ that is, they have no professional skills, or if they do have them they are not accredited.³¹

The second unresolved issue of our human capital is the improvement of their skills. In Spain, the adult population has a lower command of basic skills like reading comprehension and mathematics than its European partners. This problem is found at all training levels. For example, a person with a third-level qualification in Spain has a lower level of reading comprehension and mathematics than a Baccalaureate graduate in the Netherlands [Fig. 10].



Fig. 10. Differences in score for reading comprehension and mathematics in the adult population aged between 25 and 65 by education levels, 2012 and 2015

The same can be observed with other key skills. **The Spanish population falls below the European average in fundamental areas like knowledge of foreign languages,**³³ **digital skills,**³⁴ **and financial training;**³⁵ **and in the command of soft skills** such as critical thinking, creativity and curiosity [Fig. 11], which are expected to increasingly gain in importance for personal and professional development.³⁶





Source: Authors' own, based on World Economic Forum data.³⁷

Source: Author's own based on data from the OECD.32

Inevitably, **these shortcomings are reflected in our labour market.** Surveys indicate that in Spain, at least 2 in 10 workers do not have the necessary skills to adequately perform their work,³⁸ that 3 in 10 entrepreneurs have a low level of studies,³⁹ and that 2 in 10 employers cannot find adequate profiles for vacant positions, a proportion that has almost tripled in recent years.⁴⁰

The third unresolved issue for Spain is the promotion of lifelong learning. Evidence shows that the participation of the adult population in requalification processes is linked strongly to higher productivity (between 5% and 30%),⁴¹ greater employment opportunities,⁴² and higher salaries.⁴³ For this reason, promoting lifelong learning has become an shared goal for the most developed countries in the world.

In Spain, however, progress has so far been limited on this front.⁴⁴ The Spanish population is one of the most predisposed to continuous learning of the OECD [Fig. 12]. However, the lack of opportunities to do so and the fact that most of the funds of the State and companies reserved for this purpose are not used, has led to a situation where only 4 in 10 adults participate in regulated or unregulated training and requalification programmes every year. This positions us at around the EU-27 average, but below the EU-8 [Fig. 13]. ⁴⁵



Fig. 12. Predisposition to continue learning, adults (25 - 64 years), 2015

Source: Author's own based on data from the OECD.46

Fig. 13. Percentage of adults (aged 25 - 64) who say they have participated in training activities in the last 12 months, 2016



Source: Authors' own, based on Eurostat data.47

The highlighted shortcomings are having a negative effect on our economy and our society. There is ample empirical evidence that demonstrates that the skills deficiency in Spain is linked to lower productivity,⁴⁸ less innovation,⁴⁹ higher rates of unemployment,⁵⁰ and greater income inequality between citizens [see chapter 1].⁵¹ The skills deficiency is also linked to lower levels of health,⁵² citizen security, civic participation,⁵³ and environmental awareness.⁵⁴ From now to 2050, this association will only become stronger as the world shifts towards a more knowledge-based economy and less intensive use of the physical factors of production. Human capital will form the basis of economic prosperity. Spain must therefore resolve these pending issues and converge with the EU-8 countries in terms of the population's level of training.

Although the challenge is considerable, there is no reason to think we cannot overcome it. Over recent decades, we have managed to provide the country with the institutes, universities, VT centres and requalification bodies necessary for the working population and the unemployed. What we have to do over the coming decades is correct the inefficiencies and expand the strengths of these mechanisms in order to take full advantage of their potential.

The channels of improvement

I. Minimise inherited shortcomings in the pre-school, primary, and secondary education stages

As we saw in the previous chapter, the number of students in Spain that are held back a year or drop out in primary and secondary school is too high, and there is a low level of learning compared to the EU-8. These problems build up and become fossilised in the active population and, in part, explain the shortcomings of our human capital. Over the coming years, it will be necessary to correct them and ensure that every student realises their potential [see chapter 2].

II. Consolidate Vocational Training as one of the principal channels for training and requalification in Spain

Spanish VT has improved considerably in recent decades, both in terms of coverage and quality.⁵⁵ Even so, this training option still does not have the same level of implementation as in other European countries, especially those with a higher level of economic development. This is due to two phenomena. Firstly, a significant proportion of students in Spain, even though they would be interested in pursuing VT, leave school before reaching that level of education [Fig. 14]. This is one of the consequences of the country's high dropout rate, and one of the keys to understanding the shortage of qualified professionals.



Fig. 14. Percentage of the population aged 18- 24 who drop out of education

Source: Authors' own, based on Eurostat data.56

Secondly, the majority of pupils who completed compulsory secondary education are more attracted to studying baccalaureate than VT as an access route to university (perceived as the goal in education for most students) or as an option for professional training. In 2018, only 36% who completed compulsory secondary education opted for VT, compared to 64% who preferred baccalaureate studies, a proportion that differs slightly from what we find in the EU-8 where VT is the predominant option [Fig. 15].

Fig. 15. Percentage of student population enrolled in baccalaureate and intermediate VT, 2018



Source: Authors' own, based on Eurostat data.57

Various factors explain this bias in the selection of education programme:

- the lack of social recognition of VT in Spain among parents, teachers, guidance counsellors, and students;⁵⁸
- the shortcomings still present in the design and implementation of this training option,⁵⁹
- the persistence of old stereotypes, meaning that 80% of women are concentrated in four very specific professional categories (health and social care, administration, public services, and hair and beauty) and remain under-represented in technical-industrial qualifications, which have the highest demand;⁶⁰
- the nature of the Spanish productive network, with an abundance of jobs that do not require a high level of technical skills;⁶¹ and
- the limited implementation of dual VT⁶² in the country, with only 1% of students enrolled in this format, compared to 18% for the OECD and 19% for the EU-8.⁶³

Over the coming years, we have to tackle these factors and **consolidate VT as one of the principal training and requalification routes for our population**, following the model of the most advanced countries in the EU.

III. Boost the contribution of the university system to the training and requalification of the workforce

As we have seen, Spain has an advanced university system that stands out for its educational accessibility and its equal distribution across the length and breadth of the country. **University** has been one of the key elements responsible for the improvement in Spain's human capital in recent decades.

Even so, our university system still has a number of aspects that prevent it from reaching its full educational potential. To start with, **there is a wide and growing gap between what is taught at Spanish universities and what the productive network demands**.⁶⁴ This gap impacts both qualifications (obsolete curricula, poorly connected with reality) and the skills acquired therein, and is a significantly limits the employability of graduates and the country's productivity. It is clear that universities should not be oriented towards satisfying the immediate needs of the labour market. But it is also true that they cannot turn their back on it completely. Unlike other country's universities, Spain's public universities have little connection with the business world and receive funding primarily on the basis of the number of students enrolled, with little weight placed on the percentage who find employment and develop a satisfactory career once they graduate.

There is also a considerable imbalance between the qualifications most demanded by students and those most sought by employers.⁶⁵ This is the case in practically all countries in Europe, although it takes a different shape in different countries. In Spain, the degrees most demanded are those in engineering, industry and construction, accounting for almost 25% of the total job offers. However, only 15% of the graduate population pursue these degrees. On the contrary, almost 25% of people pursue studies in education, arts and humanities, which account for only 3% of job offers [Fig. 16].



Fig. 16. Distribution of employment offers of population enrolled in university degrees in 2013- 2014 by professional categories in Spain

Source: Drafted by the authors based on data from the CES.66

Another problem is the low levels of learning. It is often said that Spain has an "overqualification" problem. This is partly true. In 2019, 35% of employment contracts signed by Spanish university graduates were for low-skilled jobs,⁶⁷ something that has a damaging effect on workers and on companies,⁶⁸ and which should be tackled in the future through a modernisation of the productive network and a change in the hiring culture [see chapters 1 and 7]. However, we must not lose sight of the fact that, what underlies this data is often not a problem of "overqualification" as such, but rather "overtitling", as in many cases individuals who, although they hold a higher education title, only possess intermediate or low skills. The aforementioned results of the *Programme for the International Assessment of Adult Competencies* (PIAAC) illustrate this fact. In Spain, only 12% of the adult population (25 to 64 years old) who are university graduates present a high level of reading comprehension, compared to 30% or more in countries like Finland, Netherlands and Sweden.⁶⁹ When the skills of the youngest sector of the population are analysed (20 to 34 years old) we encounter similar results.⁷⁰Other standardised tests support this reading: in Spanish universities the majority of students graduate with a command of basic skills (reading, mathematics and science) that is considerably lower than neighbouring countries.⁷¹

The reasons behind this phenomenon are more complex and can mainly be linked to the shortcomings of the primary and secondary education, but also with the way in which academic degrees are designed and the way in which universities operates. The accreditation system and Spanish five-year teaching periods place importance on quantity over quality of teaching, disincentivising improvements to learning and weakening the role of the university as an instructor in the professional profiles required by the productive network. An important element of financing for public universities depends on the number of students, disincentivizing a more demanding approach to admission and evaluation processes. At the same time, the regulatory rigidity and the internal governance methods make it difficult for universities to improve their educational options with the flexibility needed. Today, it is the teachers themselves who must decide what changes are made to undergraduate and postgraduate programmes and take on the work to amend them, something that is barely recognised or compensated by the system. When, nonetheless, they decide to do so, centres face slow and dysfunctional bureaucracy for accreditation. As a result, most of the content comprising the curriculum is not modified and much of the material that is changed is already obsolete by the time it is launched.⁷²

Finally, it is worth highlighting **the poor service Spanish universities have provided, and still provide, for the requalification of the working population**.⁷³ Most training options remain in the hands of postgraduate schools, business schools, academies and other training centres (generally private) whose options are limited themselves and not always accessible to citizens. **Spanish universities under-exploit their training potential in this regard**. Universities that offer short courses for working professionals who want to up-skill are in the minority. This today constitutes a limitation, but also presents **an immense opportunity for future development**. As we shall see later, professional requalification can become the principal channel of growth for universities over the coming decades, as demographic change sees the numbers of 18 to 25-year-olds in the country fall.

IV. Build an integrated education and requalification system for the active working population.

The time when learning was confined to the first two decades of one's life is over. At present, rapid change in the productive network is pushing workers towards constant requalification, the frequency and extent of which will only increase in the future.

To provide the working population with this training, Spain has, to date, had **an integrated education and requalification system composed of three pillars**: 1) In-company training developed by companies for their employees (often referred to as "training on demand" in Spanish literature); 2) "supply-side training" provided by the State and the Autonomous Communities; and 3) training pursued by persons on an individual basis through regulated or unregulated programmes (e.g. an online course). We shall examine below the situation for each of these.

In-company training has improved considerably in Spain. The number of companies offering training to employees has multiplied fourfold over the last two decades,⁷⁴ expanding in all levels of the productive network [Fig. 17]. It remains, however, a low proportion in comparison to the most advanced countries in the EU, due, primarily, to the predominance of small and medium-sized enterprises in our productive structure⁷⁵ [Fig. 18].



Fig. 17. Percentage of companies who train their employees by size of company in Spain

Source: Drafted by the authors based on data from FUNDAE.76

Fig. 18. Weight of working population trained and not trained as a total of the salaried population in the private sector, by type of company in Spain



Source: Drafted by the authors based on data from FUNDAE and the Department of Industry, Commerce and Tourism.⁷⁷

The number of employees who participate in training programmes has grown considerably,

rising from 494,468 in 2004 (3% of the total) to more than 2.9 million in 2019 (15% of the total).⁷⁸ Nevertheless, it is once again a small proportion in comparison to other European countries,⁷⁹ and also present considerable imbalance in terms of gender, age, education and professional sector.⁸⁰

We must also take into account that **the duration of training is falling**, which in many cases leads to a reduction in the knowledge and skills acquired. If, in 2007, the average duration was 22 hours in large companies and 29 in medium-sized companies, in 2019 those figures were 11 and 13 respectively.⁸¹ The explanation for this appears to lie in the fact that many companies are expanding their training options to more members of staff, but reducing the duration and, in all probability, the quality.

These factors, together with low funding and the high numbers of temporary and precarious contracts typical of the Spanish labour market, mean that *in-company* training in Spain is generally insufficient, and that **workers learn less when employed than their EU-8 counterparts** [Fig. 19].



Fig. 19. Percentage of workers whose skills have declined, stagnated, or improved since the time they joined their current job, 2014

Source: Authors' own, based on CEDEFOP data.82

In terms of supply-side training provided by public institutions, the lack of reliable and unified data prevents us from getting a clear picture of what is happening at the national level. In any case, stagnation or even decline over the last few years is discernible. The number of employed participants in public requalification programmes peaked in 2008, with 1,066,165 participants⁸³ falling thereafter to 116,317 in 2019,⁸⁴ while also replicating the same biases as in-company training.⁸⁵ There are several factors explaining this situation. The lack of qualified teaching staff, restrictions on employed persons undertaking face-to-face training⁸⁶ and the erratic and insufficient nature of funding⁸⁷ are just some of these.

Finally, it is worth mentioning **the training that individuals undertake on an individual basis through generally short and non-regulated programmes** that are either face-to-face or online, taking place in academies, training centres and on digital platforms. This form of education is known to have grown significantly in recent years, although it remains a marginal training pathway in Europe.

Reinventing our training system for unemployed people

There is ample empirical evidence that **participation in quality requalification programmes significantly increases unemployed people's chances of finding a job and of improving their earnings and working conditions relative to their previous position.**⁸⁸ As such, requalification systems for the unemployed are considered a key part of any country's economic and social policies.

In Spain, however, the public system of training and requalification for the unemployed has had severe deficiencies in its design, operation and supervision for decades. Rather than increase, **the proportion of unemployed people participating in training programmes coordinated by the public sector has more than halved over the last two decades** [Fig. 20], as has the number of hours dedicated to their requalification.⁸⁹

In total, it is estimated that, **in 2016, 36% of unemployed people participated in some training activity (formal or informal) in Spain**, a proportion 11 percentage points lower than that recorded in the EU-8 [Fig. 21].


who have received training from the State or the

Autonomous Communities





OECD.90



Part of the problem is insufficient and unstable funding. Spain devotes only 0.11% of its GDP to the training and requalification its active population, notably unemployed, compared to 0.14% for the EU-22 and 0.25% for the EU-8 [Fig. 22]. In terms of spending on training per unemployed person, this equates to approximately 350 euros per person in Spain compared to an average of 3,000 euros in the EU-8.92





Furthermore, the level of this funding is highly conditioned by the economic cycle, since a very significant part of funding (around half) depends directly on companies' social security contributions per worker, which tend to be reduced during recessions. This means that all too often resources for training are cut just when they are most needed.

Source: Drafted by the authors based on data from the OECD.93

In addition to the lack of funding, there are other problems, such as those arising from the institutional framework which up until now has been the backbone of active employment policies. In Spain, management powers in the area of training for the unemployed are transferred to the Autonomous Communities, **without an efficient national coordination mechanism** to allow the efforts of the different administrations to be aligned, as is the case for other public policies. This has prevented the development of some key elements designed to organise, promote and streamline the functioning of the system, such as the *Pluriannual Scenario* provided for in Article 5 of Law 30/2015, which regulates the Vocational Training system for employment in the labour sphere.⁹⁴ It has also prevented the creation of a comprehensive database that would help to **adjust training options in real time to meet the changing needs of the productive network**, following in the wake of the *Report on Prospecting and Detection of Training Needs*.⁹⁵

To this we must add, finally, **the absence of effective evaluation mechanisms** to distinguish courses that are fit for purpose from those that are not, in order to scale and replicate them; and **the significant shortcomings of our State Public Employment Service (SEPE, by its acronym in Spanish)**, an institution that has not been able to adapt to the changes that have taken place in Spanish society and the labour market in recent decades.

The result of all of the above are **training options of insufficient quality that are not fit for purpose, which, moreover, are poorly valued and are in low demand by both the unemployed and potential employers**. If we want to reduce our unemployment levels in the future and raise the country's labour productivity to EU-8 levels, these shortcomings must be addressed [see Chapters 1 and 7].

VI. Taking greater advantage of the synergies of the system

Spain is a decentralised state. As such, the management, financing and supervision of training and requalification programmes is spread across a plethora of agencies (state, regional and municipal) and training and requalification centres (public and private). This decentralisation presents challenges, but it **also offers Spain important advantages**, as it allows the system to be adapted to the needs of each territory, to test different solutions simultaneously, and to exchange lessons learned and best practices across the country.

In order to make the most of these advantages, Spain needs to **improve information exchange and coordination** between public administrations, institutions, VT centres, universities and public employment services. It should also **strengthen the role of companies in education and training,** encouraging them to go beyond their own workforces and move towards the EU-8 model, where companies play a key role in the training and requalification of workers, providing quality courses (not only for the employed population), accrediting skills acquired on the job, and helping administrations to design curricula and optimise public training options.

All these improvements will require effort, but they are feasible. The bulk of the resources (human, financial and institutional) needed already exist. It is now a matter of modernising and optimising the various parts of the system. As we will see below, the coronavirus crisis and the technological changes that will take place in the coming years provide a good opportunity to do so.

THE FUTURE: THE TRAINING REVOLUTION OF THE ADULT POPULATION

The crisis triggered by coronavirus will lead to a profound transformation of the European productive network in at least two different ways. Firstly, it will accelerate trends of change that were already underway before the virus hit: digitalisation, decarbonisation and the transition from a linear to a circular economy. Secondly, it will lead to a reallocation of resources between sectors: part of the human and financial capital devoted to the activities most affected by the pandemic (such as hospitality and commerce) will be redistributed to other activities (such as care services and technological development).

Countries' future prosperity will be largely determined by their capacity to deliver these transformations, which in turn will depend on the quality of their human capital and their ability to adapt it to new productive needs. In this emerging scenario, **Spain is facing a dual challenge**. **Firstly, to improve their levels of coverage and learning in VT and university education cycles to converge with the EU-8. And secondly, to develop an integrated requalification system to keep the adult population trained and up-to-date over their lifetime**. Only by achieving both will we be able to guarantee Spain's development in the world that is to come.

I. VT and the university of the future

Over the last 30 years, the education of the European population has improved considerably. The average number of years of education has increased by 40%⁹⁶ and the percentage of people who hold higher education qualifications has almost tripled.⁹⁷ All indications are that in the near future this process of educational upgrading will continue. Life in society will increasingly demand more knowledge, the labour market will become more competitive, and jobs that today require an average education will require a higher degree and, in many cases, a postgraduate degree or equivalent [see chapter 7].

The *International Institute for Applied Systems Analysis* estimates that, if the trends of recent decades continue, by 2050, the percentage of people in the EU-22 and EU-8 with higher education qualifications will increase by 12 percentage points or more, while the proportion of people with less than upper secondary education will roughly halve [Fig. 23].

Fig. 23. Educational attainment of the population (25-64 years old) in 2018 and projections to 2050



Source: Drafted by the authors using data from the OECD, International Institute for Applied Systems Analysis and Lutz et al.98

If Spain wants to avoid falling behind in human capital, it will have to significantly improve its educational performance in terms of both coverage and learning outcomes. Fully converging with the EU-8 by 2050 is not feasible, given our starting point.⁹⁹ But what we can do is close the gap that separates us today until we are *on a par* with them in terms of the training of the new generations. The demographic contraction that Spain will experience in the coming decades will provide us with a unique opportunity to achieve this, without incurring an excessive increase in public spending.

There should be three priorities to this.

Firstly, to reduce the proportion of people leaving education without at least upper secondary qualification by a minimum of 25 points. To achieve this, we must tackle the shortcomings of the early childhood, primary, and secondary stages of education already analysed [see chapter 2], and make a firm commitment to intermediate VT, which is considered the most effective and realistic way to reduce school dropouts.

Secondly, Spain will have to increase the percentage of the population with a university degree from the current level of 26% to 38% in 2050 [Fig. 23]. If we take into account the demographic contraction that will affect the younger cohorts in the coming years, in absolute terms, this will mean going from the one million university students (16-24 years old) we have today to around 1,100,000 in 2030 and 900,000 in 2040 and 2050.¹⁰⁰ It is not true, therefore, that our country has a "surplus" of university students. The current number is adequate and will have to be kept relatively stable until the middle of the century [Fig. 24].





Department of Universities.¹⁰¹

The problem of "over-qualification" that exists today will need to be addressed. But the solution for the future should not be to reduce the number of people graduating from Spanish universities but to improve employment rates and generate higher quality jobs [see Chapters 1 and 7]. If Spain wants to one day have the levels of productivity, innovation, competitiveness and employment of Germany, Denmark or Sweden, it must also reach their levels of higher education qualifications.

What is not clear is what kind of institutions will best meet this demand for training. So far this century, Spain's public universities have barely grown and the private university sector has registered the greatest increase, both in the number of centres (from 4 universities in 1990 to 33 today)¹⁰² and in the number of students enrolled (in 1985, students enrolled in private universities represented 3% of the total, while in 2019 they represented 20%).¹⁰³ Whether or not this trend continues in the future will depend mainly on the ability of the public university to adapt its training options and teaching systems to the needs and desires of the new generations of students (both domestic and overseas). No less decisive will be the ability of these institutions to become requalification centres for the senior population, an issue we address in the next section.

Thirdly, Spain will have to almost double the percentage of people with a higher VT qualification, from 11% today to 17% in 2050 [Fig. 23]. The technological devices and organisational processes we use are becoming more and more complex, which means that in the future our country will need more educated technical, computer, chemical, and health personnel. Taking into account the demographic downturn and our starting position, achieving this target will mean moving from the 290,000 people currently enrolled in higher VT to around 260,000 by 2050. In other words,

Source: Drafted by the authors based on data from Eurostat, the Department of Education and Vocational Education and Training and

it will not be necessary to increase the available supply in terms of places, but it will be necessary to diversify and improve it.

Unlike in the past, in the future, higher education will not only be in the hands of VT institutions and universities. New competitors will emerge for both, especially in the online space. However, there is every reason to believe that they will maintain their hegemony in the educational space, except perhaps for a few short programmes and cutting-edge degrees (e.g. courses on new programming languages).

In addition to improving the levels of coverage in VT and university education, the levels of learning achieved in VT and university must be increased. To achieve this, it will be necessary to optimise education systems, afford centres greater autonomy and flexibility,¹⁰⁴ take advantage of new technologies for teaching and student tracking, and change the funding system so that the incentive for schools is not to have more graduates, but to have graduates with better skills. It will be equally important to strengthen pastoral care, modernise curricula and bring them closer to the real needs of the productive network. We do not know with certainty what these needs will be in the future. It seems clear that the demand for STEM (Science, Technology, Engineering and Mathematics) skills, soft skills (e.g. critical thinking, creativity, leadership) and social skills will grow, while the demand for simple and repetitive physical and cognitive skills that can be easily automated will decrease¹⁰⁵ [see chapter 7].

The rest are all unknowns. Although there are many studies and mathematical models that attempt to do so, the truth is that **it is impossible to accurately predict the type of skills that the labour market of the future will demand.**¹⁰⁶ The key, therefore, is to **develop flexible training models, capable of navigating this uncertainty and focused on increasing the adaptability of workers to new demands.** This means emphasising what Joseph Stiglitz calls "learning to learn, by learning",¹⁰⁷ also in secondary and tertiary level education; focusing on the acquisition of soft skills such as critical thinking and teamwork; encouraging qualifications related to those activities that will grow in the coming decades (e.g. care, the green transition, technology); developing predictive tools that allow us to improve our capacity to anticipate and provide individuals and institutions with greater guidance with respect to the future;¹⁰⁸ and, as we will see below, implementing requalification systems that can detect and respond quickly to the changing needs of the market.

The task ahead is enormous. The good news is that, contrary to what might appear to be the case, **the crisis brought about by the pandemic provides an opportunity** to set it in motion by aligning opportunities and incentives for all stakeholders (citizens, businesses, governments). The fall in the supply of low-skilled jobs resulting from the adjustment of sectors such as the hotel and catering industry will encourage many young people to continue studying and will foreseeably lead to higher graduation rates in compulsory secondary education, baccalaureate, VT and university studies, as seen during the Great Recession of 2008.¹⁰⁹ If the deficiencies already pointed out are corrected, this situation could help significantly increase the proportion of young people who go on to pursue post-compulsory secondary education and put us in a good position to begin **to reduce the gap between us and the EU-8 when it comes to vocational training**.

Even more decisive will be the opportunity created by demographic contraction. By 2050, Spain's population aged 16-24 will fall by 200,000 from its level in 2019.¹¹⁰ This means that Spain could double its spending per student on post-compulsory education (from 6,953 euros today to 13,462 euros in Denmark)¹¹¹ by moderately increasing its public spending.¹¹² This injection of financial resources, together with greater efficiency in their use, will enable us to more than pay for the improvements set out in this *Strategy* and thus reap the gains in coverage and learning that the country needs to catch up with the most advanced EU states.

Digitalisation will also provide key support. There are already higher education institutions that use Artificial Intelligence systems to track students' progress, detecting potential drop-outs months in advance and applying the necessary support measures to prevent them from dropping out. This raises important ethical dilemmas, but also opens the door to significant improvements in outcomes.¹¹³ Likewise, there are countries that are beginning to use *big data* to monitor labour market needs in real time and design the best training itineraries for their students¹¹⁴ In Spain, one of the keys will be to commit to online or blended learning (combining face-to-face and remote learning), a format that is still underused in Spain¹¹⁵ and which, if properly used, should allow us to increase the quality, quantity, and flexibility of teaching without incurring large expenses.

II. The challenge of requalifying the active population

The second great challenge the country must overcome in relation to human capital is to implement an integrated and efficient requalification system for the adult population. Between now and 2050, most of the jobs that exist in Spain will change significantly as a result of digitalisation, the energy transition and social and cultural transformations [see Chapters 1 and 7] As a result, skills obsolescence will increase; knowledge acquired in youth will expire

Fig. 25. Countries where the need for requalification is more or less urgent



Source: Drafted by the authors based on data from OECD.¹¹⁶

The crisis caused by coronavirus could be a good opportunity to set up this system of requalification and to promote the culture of lifelong learning that is demanded in these new times. After all, for many workers and companies, the acquisition of new skills and a change of activity will be a *sine qua non* condition for recovery. The equation is simple: if, instead of cutting funding (public and private), we increase it, and adapt the training offer to the real needs of people and companies, the current crisis could turn from being an obstacle into a catalyst for improving human capital, helping us to lay the foundations for the integrated system of requalification that Spain requires.¹¹⁷

In this respect, we seem to have learned from the mistakes of 2008.¹¹⁸ The fact that most large companies have set the requalification of their staff as one of their main priorities by 2022,¹¹⁹ or that the government has made training one of the main pillar of the National Recovery, Transformation and Resilience Plan¹²⁰ is a good illustration of this and gives cause for optimism.

What exactly will it take? Three things: an environment that encourages people over the age of 25 to continue learning; a labour and cultural framework that ensures that employers (public and private), far from penalising, reward this desire among their staff; and work-life balance policies and a flexible training offer that allow this desire to be satisfied.

What scale are we talking about? What will Spain have to do to maintain an up-to-date workforce? The lack of data at European and national level prevents the development of accurate models to answer this question. The European Commission recently set the target of having at least 50% of the adult population (25-64 years old) participating in some form of learning activity (formal or informal) each year by 2025. According to the information available, in 2016, in Spain only 30% did so (compared to 37% in the EU-27 and 51% in the EU-8),¹²¹ the vast majority in informal programmes (private classes, courses, conferences, workshops, seminars) [Fig. 26], so achieving this goal will not be easy.

Fig. 26. Training reported by the adult population (25 – 64) in Spain, 2016.

Adults who participated in a formal activity	99	% ¹²²	Adults who participated in a formal activity	37	% ¹²³	
Employment status			Employment status			
Part-time	53	1%	Part-time	68	3%	
Full time	12	2%	Full time	11	L%	
Unemployed	20	0%	Unemployed	12%		
Other	17	7%	Other			
Type of activity carried out ¹²⁴			Activity provider			
Adult education	2	!%	Formal education institution (schools, colleges, universities)	14	1%	
Secondary education or High School	4	1%	Non-formal education and training institutions (e.g. academies)	13%		
VT	10	6%	Employers	27%		
Degree or equivalent	18	8%	Non-commercial institutions that do not have education and training as their main activity (e.g. museums)	9%		
Postgraduate (master's or doctorate)	10	6%	Non-profit association	6	%	
Official language school	2!	5%	Business organisations or chambers of commerce	5	%	
Others 19%		201	Trade unions	3%		
		9%	Others	19%		
Duration of the activity in hours			Duration of the activity in hours			
Less than 10h	4	1%	Less than 10h		33%	
Between 11h and 100h	24	4%	Between 11h and 100h	49%		
More than 100h	40	6%	More than 100h	10%		
Not applicable	27%		Not applicable	8%		
Modality			Modality			
On-site	69	9%	On-site	82%		
Distance learning	30	0%	Distance learning	17%		
Utility	Yes	No	Utility	Yes	No	
Helped you to find a job or change jobs	24%	74%	Helped you to find a job or change jobs	10%	89%	
It has helped him/her to improve his/her performance at work	42%	56%	It has helped him/her to 339		67%	

Source: Drafted by the authors based on data from the INE (Spanish National Statistics Institute). 125

It should be borne in mind, on the other hand, that **this target set by the European Commission is not entirely useful,** both because of the gap between the reality reported by respondents and that recorded in official state sources¹²⁶ and because of its imprecise nature, as it does not specify the nature, duration, the level of the training undertaken (which can range from a formal master's degree to a lecture) or the learning acquired (more than half of the people who participated in a formal or informal training activity in 2016 consider that it did not help them either to find a job or to improve their professional performance) [Fig. 26].

In reality, it is not the frequency of participation in training activities that is important, but the extent to which they serve to update the skills of the working population and keep it competitive. So, a more useful way of looking at this issue is to take the rate of self-reported skills obsolescence and project it into the future. In doing so, the data suggest that, **in Spain, more than one million people of working age will see their skills outdated annually.**¹²⁷ **If we are to maintain a competitive workforce, we will need to successfully retrain at least that number every year.** By way of reference, it should be noted that in the 2018/19 academic year there were 1.3 million undergraduate students enrolled in Spanish universities.¹²⁸

The **type of courses** that will be required is very varied. Some people will need additional training (upskilling) to update and expand their existing skills. Others will have to undertake reskilling courses to enable them to move into new sectors or related occupations. In terms of **duration**, this will range from a few days to weeks or months, depending on the sector, occupation, age, previous training, professional situation and aspirations of each individual.

These training opportunities will have to be made available at all levels and especially in thirdlevel education, where the bulk of the demand will be concentrated.¹²⁹ **The best way to meet this demand will be to extend the reach of our VT and university systems.** There is no point in continuing to separate the employed from the unemployed (something that objectifies and isolates the latter), nor in creating duplicate courses for both. **In the future, Spain's adult population (employed and unemployed) will update and broaden their skills by taking programmes offered by universities and VT institutions together**. This will help to improve their learning levels, encourage the return to work of those who are unemployed, and allow greater use to be made of the infrastructure, teaching staff and institutional mechanisms of the public system.

In order to contribute to this process, **VT institutions and universities will have to make a number of changes**. Firstly, to enable new, more flexible and targeted training options that allow adults to update their skills in line with the changing needs of the labour market, while continuing with their professional and personal lives. Secondly, new funding mechanisms, beyond the traditional ones associated with education allocations, must be put in place. Thirdly, to become attractive and welcoming spaces for all age groups.¹³⁰ If we do things right, **by 2050, Spanish professional and university campuses will have as many students over 25 as under.**

Naturally, businesses, public administrations and third sector organisations will also play a key role in the training revolution. It is not for nothing that 86% of Spanish workers believe that they could develop the skills they need for the future through their current employer.¹³¹

In the coming decades, *megatrends* like **digitalisation and the ecological transition will bring about profound changes in our productive network and will further increase the need for the requalification of the workforce, even for older members**. Think, for example, of a mechanic who repairs and services cars. Until now, their need for requalification has been dictated by the constant but marginal improvements that manufacturers have been introducing in new models. The next few years, however, will see the arrival of the electric car, whose mechanics are completely different. A significant proportion of today's mechanics will need to retrain to be able to work on such vehicles. The same will be true for all sectors and occupations that will be altered by automation or the green transition.¹³²

Demographic ageing will also add additional pressure to the challenge of requalification, and will do so in two ways. On the one hand, it will force companies to transform their human resources strategy. One of the ways in which many companies have dealt with skills obsolescence has been to replace their more senior employees with younger employees who command lower salaries and offer a more up-to-date range of skills. In the coming years, however, the young population (between 25 and 35 years of age) will shrink¹³³ and the competition between companies (domestic and foreign) for the most qualified profiles will increase. This will make it more difficult to find young replacements and will push companies to retrain their most senior employees, either through in-company programmes or by making it easier for them to participate in other training programmes. On the other hand, the ageing of the population will lead to an increased demand for care activities and the emergence of new jobs requiring the acquisition of new skills [see chapter 5].

The benefits of taking action

Improving our training and requalification mechanisms for the adult population will have very positive effects on our economy and labour market. For example, **if we were to reduce the percentage of young people leaving school early from the current level of 17% to 3% by 2050** and get everyone to complete at least upper secondary education, **Spain's structural unemployment rate could be reduced by between 1.4 and 1.9 points, and labour productivity could increase by 7.7% to 11.1%** [Fig. 27].



Fig. 27. Potential effect of reducing the early school dropout rate to 3% in Spain

Source: Authors' own, based on Serrano et al134

Similarly, if we manage to increase the participation of workers in requalification programmes, **the likelihood of their becoming unemployed will be reduced**,¹³⁵ and the likelihood that those who do lose their jobs will find a superior (better paid and more stable) job will increase considerably.¹³⁶

More broadly, **if we manage to improve the quality of our human capital**¹³⁷ to near EU-8 levels by 2050, **Spain could increase its GDP per capita growth by 2 tenths more per year** compared to a baseline scenario, without major reforms¹³⁸ [see chapter 1].

Improving training and requalification systems would also have a very positive impact on the health, civic participation, environmental awareness and life satisfaction of our population, thus becoming a key way of overcoming the other challenges addressed in this *Strategy*.

How can this be achieved? A number of measures are suggested on the following pages.

WHAT SHOULD BE DONE TO ENSURE A WELL-EDUCATED WORKFORCE

Between now and 2050, Spain must significantly increase the skills of its workforce if it is to reduce its structural unemployment, develop a competitive and sustainable pattern of economic growth, and converge with the most advanced countries in the EU. Doing so will involve, firstly, improving the levels of coverage and learning in VT and university education; and, secondly, implementing an integrated system of requalification that allows the adult population to remain trained and updated throughout their professional life.

It is difficult to achieve that which cannot be measured. It is therefore essential that, in the coming years, our country agrees, through social dialogue, on a **table of measurable indicators and a list of concrete targets** that will allow us to monitor progress and guide the ambitions of these reforms. Here are some suggestions, following the principles outlined in the Introduction to this *Strategy*:

Goal 9. Ensure 93% of the population aged 25-34 has an education beyond secondary school by 2050.

Goal 13. Progressively increase public spending on education to 5.5% of GDP by the middle of the century, ensuring a similar improvement in spending per student. This increase in funding must be accompanied by significant improvements in efficiency and in the composition of spending.

Goal 14. Close the gender gap in vocational training and university degrees, particularly in the STEM subjects.

Goal 15. Ensure the entire adult population has least basic digital skills.

Goal 16. Ensure 75% of the adult population speak at least one foreign language.

Goal 17. Achieve a societal understanding of education as a continuous process that should take place throughout life, from childhood to old age, so that by 2050, 90% of the adult population participates in some kind of requalification programme or activity each year. Particular efforts should be made to target those groups which are currently under-represented in this field.

Goal 18. Progressively increase the participation rate in requalification programmes among the unemployed to at least 70% by 2050.

Goal 19. Increase funding for active labour market policies dedicated to training to 0.25% of GDP by 2030 and 0.4% by 2050.

Goal 20. Substantially increase the percentage of companies (small, medium and large) that provide training for their employees.

	Indicators	Place	Average 2015-2019 or latest data available*	2030	Targets 2040	2050
9	Population aged 25-34 with more than lower secondary education ¹³⁹	Spain	70%*	78%	86%	93%
		EU-27	85%*	-	_	_
		EU-8	87%*	-	_	_
13	Public expenditure on education (% of GDP) ¹⁴⁰	Spain	4.3%	5.1%	5.3%	5.5% ¹⁴¹
		EU-27	5.0%	-	_	_
		EU-8	6.1%	-	_	_
14	Female students enrolled in tertiary education in the STEM field (% of total) ¹⁴²	Spain	28%	35%	42%	50%
		EU-27	31%	-	_	-
		EU-8	29%	-	_	-
15	Proportion of adult population (16-74 years old) with at least basic digital skills ¹⁴³	Spain	55%	70% ¹⁴⁴	100%	100%
		EU-27	55%	-	_	_
		EU-8	69%	-	_	-
16	Adult population (25-64 years old) who recognise that they do not speak any foreign languages (% of total) ¹⁴⁵	Spain	46%*	40%	30%	25%
		EU-27	32%*	-	_	-
		EU-8	16%*	-	_	-
17	Proportion of adult population (25-64 years old) who report having taken part in a retraining programme in the last year ¹⁴⁶	Spain	30%*	50% ¹⁴⁷	70%	90%
		EU-27	37%*	-	_	-
		EU-8	51%*	-	-	_
18	Proportion of unemployed population (25-64 years old) with recent learning experience ¹⁴⁸	Spain	32%*	35%	50%	70%
		EU-27	29%*	-	-	-
		EU-8	42%*	-	_	_

Scoreboard and targets

	Indicators	Place	Average 2015-2019 or latest	Targets		
			data available*	2030	2040	2050
 Active labour market devoted to training (% of GDP)¹⁴⁹ 	Active labour market policies	Spain	0.11%	0.25%	0.30%	0.40%
	devoted to training	EU-22	0.15%	-	-	-
	(% OT GDP)	EU-8	0.27%	-	_	-
 20 Percentage of enterprises that carry out training for their employees by size¹⁵⁰ Large (+250 employees) Medium (50-249) Small (10-49) 	Percentage of enterprises	Spain	92%	95%	100%	100%
	that carry out training for		82%	88%	92%	95%
	their employees by Size		51%	60%	70%	75%
	Large (+250 employees) Medium (50-249) Small (10-49)	EU-27	n.d.	-	_	-
		EU-8	n.d.	-	_	_

To achieve these goals, Spain will have to undertake **far-reaching reforms and launch ambitious initiatives** on several fronts. Here are some suggestions:

Front 1: Improve results in early childhood, primary and secondary education

Much of our labour force shortages stem from weaknesses in our education system at the levels prior to post-compulsory secondary level. Until these are corrected, our human capital cannot catch up with the EU-8. It is therefore essential to reduce rates of students who are held back a year or dropout, to increase the proportion of people who continue studying beyond the compulsory secondary level, and to improve learning levels in terms of both equality and excellence, following the recommendations set out in Chapter 2 of this *Strategy*.

Along the same lines, it will also be necessary to increase the participation of the adult population in initial and intermediate level studies, and to develop a national plan aimed at providing the adult population that left school prematurely with a mechanism for acquiring basic educational skills that does not necessarily imply a return to school, as is the case in most European countries.¹⁵¹

Front 2: Moving towards the creation of an integrated lifelong learning system

Spain needs to better coordinate the different parts that currently make up its training and requalification system in order to overcome the current compartmentalisation and exploit its full potential, and to make the notion of "lifelong learning" the backbone of the whole system. To achieve this, Spain must:

- Improve communication and collaboration between the different institutions (public and private) responsible for the design, implementation and evaluation of training and requalification in Spain, including state, regional and municipal administrations, companies, VT centres, universities, postgraduate schools, academies, and many more.
- Reform access and coordination systems to allow for a greater combination of training mechanisms. The boundaries that currently separate VT, universities and in-company training must be made more flexible, so that people can develop integrated programmes, combining courses from all types of training (e.g. a worker can take subjects from higher VT qualifications and university degrees of their choice, in order to update or broaden

their knowledge in their specific field of interest). This will make it possible to increase and diversify educational options, making them more versatile and increasing the degree of personalisation available.

- To create a technology-based system that allows us to define the present needs and anticipate the future needs of the productive network. To achieve this, it will be necessary to combine the strengths of existing mechanisms¹⁵² with the development of a new information system based on big data and Artificial Intelligence, capable of processing large amounts of data in real time and communicating, in a simple and transparent way: 1) all available information on the skills demanded by companies in the short, medium and long term; 2) the current VT catalogue for acquiring these skills; 3) and an impact assessment on the improvement of employability and professional careers. It is essential that this tool is unique and comprehensive, connecting the different training stakeholders (institutes, universities, VT centres, companies), administrations (national, regional and municipal), and territories (Spain and Europe). Similarly, it will be necessary to facilitate the use of this tool both for the guidance staff of the Public Employment Services and for citizens themselves, so that they can easily use it to identify individualised professional development itineraries that combine employment and training actions. The Skills Match platform,¹⁵³ created by the Australian Department of Education to facilitate the requalification of workers affected by the coronavirus crisis, may be a good example to follow.
- Create more effective and transparent evaluation tools for training and requalification policies to facilitate evidence-based decision-making. Every course funded with public money should be publicly evaluated, so that resources are directed to those that produce good results. The cross-checking and processing of statistical data on training and employment, as well as the analysis of the counterfactual alternative¹⁵⁴ should form the basis of such an evaluation. Furthermore, micro-data should be made available to the scientific community to help them better understand the needs of the Spanish labour market and training system.
- To completely reform the State Public Employment Service (SEPE), providing it with more human and material resources; rationalising and digitalising the management of benefits and its administrative processes; and reinventing its mechanisms for attending to citizens, in order to provide a much more personalised and efficient guidance and support service.

Front 3: Extend, modernise and disseminate lifelong learning mechanisms among the working population

- Recognise the right of all citizens to lifelong learning and the obligation of the state to provide the necessary opportunities for it, as recommended by the United Nations, the International Labour Organisation and many educational institutions. For reference, South Korea¹⁵⁵ and Uruguay can be used as examples.¹⁵⁶ In addition, a National Strategy for Lifelong Learning could be launched, as several countries around the world have already done¹⁵⁷ and a Council for Lifelong Learning could be created within the Department of

Education and Vocational Training, similar to the one in Finland,¹⁵⁸ with the mandate to coordinate such a strategy, promote measures and coordinate multi-sectoral efforts.

- Expand¹⁵⁹ and improve the training options offered by the public sector to the adult population. This should be done mainly through the creation of new degrees within the framework of VT and public universities. These new degrees will generally be shorter and more specific than undergraduate and postgraduate degrees, responding to the specific needs of the productive network and to those areas that will experience greater growth in the coming years. At the same time, it should be possible to split or combine training flexibly, facilitating work and family life. For the latter, a blended format (combining faceto-face and distance learning) will be essential.
- At the same time, the role of companies as training providers should be strengthened through incentives such as the possibility of accrediting their training and combining it with courses offered by universities and VT centres.
- Encourage the contribution of companies, trade unions, employers' organisations and other social partners in the design and development of the training programmes provided by the State and the Autonomous Communities, following the example of other European countries¹⁶⁰ or Autonomous Communities such as Catalonia.
- Increase funding for active employment policies and include a complementary funding item in the General State Budget to correct for variations in company quotas, so that workforce training is not so much at the mercy of the economic cycle and funds are not cut in times of recession, when they are most needed.
- Support the increase of continuous training among workers in micro-enterprises, small companies and the self-employed, through incentives and actions defined by sector and territory, with the support of both the social stakeholders and the integrated VT system centres.
- Modernise and expand the Spanish system for the assessment and accreditation of professional competences acquired through work experience and informal channels. This should be done referencing the guidelines established by the EU¹⁶¹ and following examples such as those of the Basque Country,¹⁶² France,¹⁶³ and Norway.¹⁶⁴
- Promote participation of the active working population in requalification programmes in response to personal concerns and strategic needs identified by companies and public administrations. To this end, mechanisms such as the Individual Training Permit (PIF) should be further developed and the creation of training incentives or vouchers should be explored, following successful models such as France's Compte personnel de formation or Singapore's SkillsFuture¹⁶⁵ Moreover, guidance systems should be strengthened, mechanisms should be included in employment legislation to provide incentives and

- Promote the participation in training of currently under-represented groups: women in sectors such as industry and technology, men in sectors such as care services, the over-55s in lifelong learning, and adults with medium-low qualifications and/or educational levels.
- Create a temporary mobility plan for workers that allows employees to complete professional exchanges in other parts of Spain, acquiring new skills and best practices and weaving inter-territorial collaboration networks. Two interesting European examples are the Eures¹⁶⁶ and Erasmus+ programmes.¹⁶⁷
- Launch campaigns to raise awareness to help the adult population understand the importance of lifelong learning and to provide information on the different options and tools available. Spain needs a "culture of lifelong learning".

Front 4: Adapting and strengthening the vocational training model

The government has launched an ambitious plan for the modernisation of VT that aims to correct many of the shortcomings detected.¹⁶⁸ In addition to the measures contemplated in this plan, we suggest the following:

- Adapt training options to better meet current and future needs, modernising curricula and incorporating formal qualifications, certifications and other accreditations associated with uncovered demands and emerging sectors [see chapter 1] such as the digitalisation of the economy, the green transition, or long-term care services.
- Promote the development of distance and blended VT courses (combining face-to-face and online training), paying special attention to the potential demand from rural areas.
- Improve the mechanisms of professional and vocational guidance, providing guidance counsellors with better tools and skills through training and specific courses, so that they can provide the support that job seekers deserve and require. It is important that this training helps mitigate existing gender biases and is well coordinated with the SEPE (State Public Employment Service) and the private sector.
- Establish a regulatory framework that encourages the development of dual VT projects. This will require encouraging SME participation by easing administrative requirements, supporting the business mentor/trainer, and providing tax incentives. Greater participation of the adult population in dual VT programmes should also be encouraged as a way of training and accrediting low-skilled people, following the model developed in countries such as Austria and Finland.¹⁶⁹

Front 5: Bringing the university closer to the productive fabric

- To reduce the gulf between the university degrees most in demand by students and those most in demand by employers, encouraging students to take those with the greatest employment opportunities, through grants and guidance programmes.
- Updating degree curricula to make them less academic and more oriented towards the development of the skills that graduates will require in their professional lives. In many cases, this will not mean seeking greater specialisation but, rather, the opposite: adopting a more generalist approach that encourages the acquisition of soft competences such as written comprehension, verbal communication or critical thinking, which help to develop more versatile profiles, mitigate obsolescence and increase people's employability¹⁷⁰.
- Incorporate employability¹⁷¹ rates into the universities' evaluation, funding and incentive system. When making this assessment, corrective factors such as the socio-economic background of the graduates (e.g. groups at risk of exclusion find it more difficult to find a job) and the quality and type of employment obtained should be taken into account.
- Strengthen the provision of adult education by universities. This means creating new qualifications and training formats, but also improving their accessibility, so that they can be made compatible with the work and family obligations of many adults.
- Establish closer links between universities and the productive network. These links must work both ways: universities must try to adapt their content to market demands, but business must also become more involved in the funding and co-governance of education institutions.

If Spain succeeds in these transformations, it will be in a position to maintain an up-to-date and competitive workforce and reap the productivity gains it needs to consolidate its position as one of the most advanced countries in Europe.



Challenge #4

BECOMING A CARBON-NEUTRAL, SUSTAINABLE AND CLIMATE-RESILIENT SOCIETY

EXECUTIVE SUMMARY

- Throughout the 20th century, most countries in the world adopted a pattern of economic growth based on the abusive and linear use of natural resources ("extract, produce, consume, and dispose"). This pattern has caused unprecedented environmental degradation and has precipitated a climate crisis that could have catastrophic effects in the near future.
- Spain has been part of this process. Since the mid-1960s, our ecological footprint has increased significantly: if all of humanity consumed as we do today, it would take two and a half planets to meet these needs. Factors behind this excess include our high dependence on fossil fuels in sectors such as transport and energy, our insufficient commitment to eco-innovation, our low levels of environmental taxation and the shift in our population's behaviour towards greater consumption of animal-based foods, electronic devices and fast fashion.
- The effects of past abuses will be felt in the future. The Spain of 2050 will be warmer, drier and more unpredictable than today. If we do not take decisive action quickly, droughts will affect a further 70% of our territory; fires and floods will become more frequent and destructive; sea levels and temperatures will rise; key industries such as agriculture and tourism will suffer severe damage; 27 million people will live in water-scarce areas; and 20,000 people will die each year from rising temperatures.
- Climate change is already inevitable, but there is still time to avoid its most destructive effects and prevent them from conditioning the well-being of present and future generations, while conserving the biodiversity of our territory. To achieve this, we will need to become a carbonneutral, resource-sustainable and resilient society by 2050. This will involve, among other things, radically changing the way we generate energy, move around, produce and consume goods and services, and how we relate to nature. We will need to harness all our wealth of renewable energy sources; reinvent value chains; improve water management; adapt our infrastructure and boost green taxation. All this must be done without leaving anyone behind and without widening social inequalities.
- The goal is ambitious, but it is also possible. Spain has the natural resources, capacities and institutions necessary to become the sustainable country it should be by the middle of this century. The ecological transition will pose challenges, but it will also be a unique opportunity to modernise our productive network, generate wealth and employment, and reduce our foreign energy dependence. At the end of the process, the balance will be overwhelmingly positive. The resulting Spain will be more sustainable, healthier and more competitive than it is today, and all citizens will benefit from this.

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THE PRESENT: WHERE WE ARE AND HOW WE GOT HERE

Over the course of the second half of the 20th century, humanity developed **a pattern of economic growth based on the intensive and linear use of natural resources and burning fossil fuels on a massive scale**.¹ This model has made it possible to generate more wealth than in any other period in our history and to improve the living conditions of millions of people. Since, 1950, the world's population has tripled,² GDP has increased 12-fold,³ life expectancy at birth has increased by 25 years,⁴ and the percentage of humanity living in extreme poverty has fallen from 63% to 10%.⁵

This spectacular growth has, however, come at a cost to the planet, through the drastic increase in the use of natural resources and the impact on the environment [Fig. 1]. Since 1970, global extraction of fossil fuels, minerals, metals and biomass has tripled,⁶ water use has increased by more than 60%,⁷ and carbon emissions have increased by a factor of 2.5.⁸ As a result, **it is estimated that humanity currently consumes resources and generates waste at a rate 60% higher than the Earth's capacity to regenerate them**.⁹ This has pushed us beyond some of the biophysical limits of the planet within which we can operate safely.¹⁰ If this situation continues, it will dramatically increase the risk of an unprecedented climate and environmental crisis that will force thousands of plant and animal species into extinction¹¹ and have catastrophic consequences for humans.¹²

Fig. 1. Global use of natural resources and environmental impact from 1950 to latest available year



Sources: Drafted by the authors based on data from Global Carbon Atlas, United Nations, Our World in Data and WU Vienna¹³

All regions of the world have contributed to this process, although the G20 countries have been primarily responsible for the increase in resource demand and the bulk of emissions ¹⁴ [Figs. 2 and 3]. In addition, there is the role of international transport, which in 2018 emitted as much carbon as the whole of South America.¹⁵



Source: Drafted by the authors based on data from Ritchie.16

Spain has also seen a significant increase in its ecological footprint,¹⁸ especially since the **1960s** [Fig. 4]. This increase is mainly due to an increase in the use of natural resources. Today's generations consume more water, minerals and fuels than past generations and waste a greater proportion of these resources and the goods we produce from them.¹⁹



Fig. 4. Ecological footprint in Spain

Source: Drafted by the authors based on data from the Global Footprint Network.²⁰

Source: Drafted by the authors based on data from Ritchie and Roser.¹⁷

One of the main consequences of this linear and abusive use of natural resources has been **the increase in greenhouse gas emissions**. In Spain, the **level of carbon emissions** per capita²¹ is relatively low compared to OECD countries, and lower than the EU-27 average [Fig. 5]. **This is not to say, however, that we have performed well, or that we do not have hard work ahead of us on this front.** Between 1990 and 2007, our country's greenhouse gas emissions increased by more than 50%.²² The downturn in economic activity caused by the crises of 2008 and 2011 led to a reduction in emissions in those years. However, as the economy recovered from 2013 onwards, emissions started to grow again and, although they grew at a slower rate than in the previous expansionary period,²³ this growth contrasts with the situation in the EU-27, where emissions fell by 4% on average [Fig. 6].

Fig. 5. Carbon emissions per capita, 2018







Source: Drafted by the authors based on data from the *Global Carbon* Atlas.²⁴



The factors behind the increase in our ecological footprint in recent decades are complex and numerous. **Here we highlight three.**

Firstly, the lack of ambition of public stakeholders who, for many years, showed a lower level of commitment to the climate and environmental agenda than other European administrations. This lower ambition resulted in the absence of a defined and comprehensive decarbonisation and resource use strategy; in the fact that legislative advances have mainly taken place through the adoption of European regulations;²⁶ and in the fact that, in many cases, certain activities have been indirectly promoted without considering their potential environmental impact. In addition, this reduced ambition was reflected in **greater fiscal laxity**.²⁷ Energy-environmental taxes are one of the main tools available to states to discourage unsustainable activities by incorporating their negative externalities into the price of goods and services.²⁸ Our country, however, has made limited use of them, partly in order not to harm the international competitiveness of certain economic sectors. This explains, for example, why the price of water in Spain is one of the lowest in Europe (despite the relative scarcity of this resource in the country),²⁹ or why **our country is well below the European average in terms of environmental tax revenue as a percentage of GDP** (in 2019, environmental tax revenue in Spain reached 1.8% of GDP compared to 2.4% in the EU-27 and 2.6% in the EU-8).³⁰

A second factor that explains the increase in our ecological footprint is the insufficient commitment to the adoption of environmentally sustainable solutions, whether domestic or imported. The use of new technologies is and will be key to decoupling economic activity from greenhouse gas generation, pollution and resource intensity. Today, Spain is slightly above the EU-27 average in terms of its performance in eco-innovation, but it is still far behind the leading European countries in this field.³¹ This is largely due to Spain's lower R&D efforts [see chapter 1], but also to a number of specific difficulties encountered by the eco-innovation sector, such as the uncertainty associated with the green transition, high investment costs, low market demand for environmentally sustainable technologies, the absence of a robust innovation ecosystem, and limited public and private funding.³² In 2019, our public energy R&D budget was €3.3 per capita, compared to €9.3 for the EU-27.³³

To the above factors we must add **a third, which is key and arises from the pattern of economic growth** observed in Spain over the last decades and the particular evolution of some of its main sectors [Figs. 7 and 8].³⁴

Fig. 7. Greenhouse gas emissions by sector in Spain Fig. 8. Spain's greenhouse gas emissions, per capita



Source: Drafted by the authors based on data from MITECO.35

One of these is **the transport of goods and persons**, in particular by road.³⁷ This is the sector that generates the most emissions, both in Spain³⁸ and in Europe.³⁹ Its high incidence is due, among other things, to the large-scale construction of motorways (to the detriment of railway lines), the dependence on private vehicles for interurban mobility, the increase in the average size and power of cars in recent years,⁴⁰ the low tax burden on transport,⁴¹ and the unequal population distribution of our territory [see chapter 6].

The evolution of total emissions has also been strongly influenced by the **electricity sector**. Spain has all the attributes to be a world power in clean energy production. Since the end of the 20th century, important measures have been put in place to achieve this.⁴² As a result, in the last

Source: Drafted by the authors based on data from Eurostat.³⁶

decade, our country has doubled the percentage of electricity generated with renewable energies.⁴³ Even so, the use of fossil fuels in our electricity system remains high, due to the presence of combined cycle plants, the high level of fossil-fuelled electricity generation on the islands, and the maintenance of some coal-fired plants (now in the process of closure). Between 2012 and 2017, moreover, the decarbonisation of the sector slowed as a result of the effects of the fall in electricity demand, regulatory uncertainty regarding the conditions of remuneration for renewable energy and regulations that were not favourable to self-consumption,⁴⁴ among other factors.

Similarly, one of the main reasons for the increase in emissions has been **the poor progress made in the industrial and agricultural sectors** which, in addition to registering a high level of greenhouse gas emissions (33% of the total in Spain in 2019),⁴⁵ make a very intensive use of natural resources (for example, agricultural uses account for 80% of the water consumed each year in our country).⁴⁶

The aforementioned structural factors are closely linked to other cultural factors related to changes in the consumption and priorities of the Spanish population. These include the progressive abandonment of the Mediterranean diet and increased consumption of products of animal origin [Fig. 9], responsible for 80% of the emissions associated with our food.⁴⁷ In fact, food consumption is today the main source of environmental impacts generated by EU inhabitants.⁴⁸

The effect of the more widespread dissemination of fast and low cost fashion is also significant. European countries now buy 40% more clothing than they did in 1996,⁴⁹ which has contributed to a drastic increase in the ecological footprint of the textile sector. At the same time, the generation of electrical and electronic waste per capita in Spain has more than doubled over the last decade, as a result of the increased consumption of these devices, whose useful life is increasingly shorter.⁵⁰



Fig. 9. Composition of current vs. Mediterranean diet, Spain

These changes in consumption patterns have also, in some cases, neutralised the efficiency gains in production processes generated by the scientific and technological advances of recent decades,⁵² resulting in greater use of resources and increased waste generation (known as the "rebound effect").⁵³ Consider, for example, the transformations that have taken place in the automotive sector. Efficiency gains in engines, components and fuels have, to some extent,

Source: Drafted by the authors based on data from Blas et al.⁵¹

been "cancelled out" by a growing presence of ever more powerful, larger and heavier cars, often exceeding the daily needs of the population.⁵⁴ Similarly, the modernisation of irrigation systems has paradoxically led to an increase in water use in some regions of the country. This is due, among other factors, to the introduction of crops with a larger water footprint, the possibility of doubling harvests and the increase of the cultivated area.⁵⁵ Thus, water demand at national level has remained more or less stable over recent decades, despite the efficiency improvements achieved in the use of this resource.⁵⁶

As a result of all of the above, in Spain, much like in the rest of the world, a linear economic model based a pattern of "extract, produce, consume, and dispose" has become the norm. Not only has this model already had severe impacts on the health of our ecosystems and our citizens, but it is also completely unsustainable for the future. If the whole of humanity were to consume as much as Spanish society does, it would take two and a half planets to satisfy our needs.⁵⁷

The impact the climate and environmental crisis is already having on our lives

Climate change is not only a threat for the coming decades; it is also a present reality that is already transforming Spain and the lives of at least two thirds of the population.⁵⁸ Its extensive maritime coastline, its geographical location, and its socio-economic and environmental particularities make our country particularly vulnerable to climate change, and it suffers its negative consequences more severely than other parts of Europe.⁵⁹

Over the last four decades, **the average temperature in Spain has increased by around 1.8°C**,⁶⁰ with significant peaks in some areas and years [Fig. 10]. The thermal summer is now five weeks longer,⁶¹ the number of heatwave days per year has doubled,⁶² and the temperature in 2020 was the highest on record.⁶³





Global warming has caused the surface water of the Mediterranean Sea to increase by 0.34°C every decade since the early 1980s.⁶⁵ Our glaciers have shrunk by 90% since the beginning of the 20th century,⁶⁶ and the semi-arid territories have increased in size by some 30,000 km², the equivalent of the total surface area of Galicia.⁶⁷ The Iberian Peninsula is also becoming **increasingly drier**. Although torrential rains have become more frequent and destructive, especially in the Mediterranean area,⁶⁸ average rainfall over the national territory has fallen⁶⁹ and droughts have increased in frequency and severity.⁷⁰

Source: Authors' own, based on AEMET data. $^{\rm 64}$

These trends, coupled with a use of natural resources that is not always efficient and sustainable, have led to **a significant decrease in the quantity and quality of available water resources.** Proof of this is that Spanish rivers carry less water today than they did 40 years ago⁷¹ and that several of the most water-stressed river basins in Europe are located in Spain.⁷² Another anomaly in the rivers is the change in the natural regime of some of them which, due to transformations such as the construction of reservoirs, have acquired more flow in summer than in winter.⁷³

The state of our groundwater is not much better. It is estimated that **36% of our aquifers are at risk of overexploitation and that more than half are highly polluted by nitrates**, mainly due to the use of synthetic fertilisers and liquid manure in agriculture.⁷⁴ The intensive use of pharmaceuticals (for humans and animals) is also an important source of contamination, with Spain being one of the countries in the world with the highest presence of pharmaceuticals detected in drinking water.⁷⁵ As a result, 40% of surface water bodies (rivers, lakes and coastal waters) and 45% of groundwater bodies are not, at present, in good condition.⁷⁶

This situation is particularly serious in our country because, for some decades now, there has been a very tight balance between available water and the water consumed by agriculture, livestock, industry and households.⁷⁷ Although significant progress has been made in increasing our desalination capacity,⁷⁸ modernising irrigation systems and changing consumption habits, **Spain still has one of the highest water exploitation indexes**⁷⁹ **in Europe** [Fig. 11]. This reality is still invisible to most citizens, but it should be known that some 22 million people in our country currently live in places where water consumption exceeds the amount available and that, among them, 3.3 million live in areas suffering from severe water scarcity.⁸⁰

Fig. 11. Water Exploitation Index (WEI+), 2017



Source: Drafted by the authors based on data from the European Environment Agency.81

Climate change and overexploitation of water bodies, pastures and forests have also aggravated the chronic problem of desertification, a process of degradation in dry lands that generates effects such as lower soil productivity or lower water quality.⁸² At present, more than two thirds of the Spanish territory is susceptible to desertification and 18% is at high risk.⁸³

The **risk of forest fires has** also **risen** due to higher temperatures and phenomena such as rural depopulation or inadequate forest management.⁸⁴ **In today's Spain, there are fewer fires than at the start of the century, but they are becoming increasingly devastating and difficult to control.**⁸⁵ A representative fact is that the European Mediterranean countries (Portugal, Spain, Italy, Greece and France) account for about 85% of the total burned area on the continent.⁸⁶ Increased potency of fires not only destroys natural resources, but it also has serious impacts on the economy and the health of the people affected.⁸⁷

Climate change has also severely impacted our seas, causing sea surface temperatures to rise by 0.2-0.7°C per decade,⁸⁸ increased acidification, altered storm and wave patterns, and an average sea level rise of 2-3 mm/year over the last century.⁸⁹ The rise in sea level has been particularly noticeable in the area of the Strait of Gibraltar, the Canary Islands, the Atlantic coast⁹⁰ and the Mediterranean arc. In the latter, increases of up to 10 mm/year have been observed since the mid-1990s.⁹¹

These effects have been aggravated by **the overexploitation of the coast and marine resources**, **both of which are essential for the development of the so-called "blue economy", of which Spain is the leading power in the EU**.⁹² The functioning of entire ecosystems, such as the Mar Menor, has been severely affected,⁹³ and coastal areas and dune systems such as the Doñana National Park or the Maspalomas dunes have been seriously damaged.⁹⁴ The construction of housing, infrastructure and paved areas has doubled in the last 30 years, so that the area occupied by these has increased by some 290,000 hectares, equivalent to five times the size of the city of Madrid.⁹⁵

All these impacts on terrestrial and marine ecosystems have severely damaged biodiversity, which in Spain is among the highest in Europe.⁹⁶ Spain is home to around 85,000 species of animals, fungi and plants (54% of the species that inhabit the continent), of which 10% are threatened with extinction.⁹⁷ In addition, climate change is altering the behaviour of many wild species and causing major disruptions to their biological rhythms.

Climate change and resource-intensive use have also impacted our health. Science has shown that one in four deaths worldwide is linked to the environment.⁹⁸ In Spain, the heat caused an excess mortality of 13,000 people in the first decade of the 21st century,⁹⁹ while increasing the spread of viruses borne by vectors like mosquitoes and ticks,¹⁰⁰ and gastrointestinal diseases caused by issues with water and food quality.¹⁰¹

Even more severe are the effects caused by air pollution. Despite the improvements in air quality achieved in recent years,¹⁰² it is estimated that **more than 90% of the Spanish population is exposed to air pollution levels that exceed the limits recommended by the World Health Organisation**.¹⁰³ In 2018 alone, over 23,000 people died prematurely in Spain from causes attributable to poor air quality,¹⁰⁴ which is associated with chronic respiratory, cardiac and neurodegenerative diseases, cancer, diabetes or problems during pregnancy and in cognitive development during childhood.¹⁰⁵

Finally, it is worth noting that our relationship with the environment is also behind the coronavirus pandemic. Zoonotic pandemics such as this one (caused by diseases transmissible between animals and humans) are the result of the way humans obtain and grow food, and trade and consume animals, altering natural ecosystems, reducing biodiversity and facilitating the spread of pathogens.¹⁰⁶ Advances in climate change, demand for animal protein, and overexploitation of wildlife have increased the likelihood of such pandemics, which now account for 75% of emerging infectious diseases.¹⁰⁷ It is estimated that there are as many as 850,000 unknown viruses with the capacity to infect people, highlighting **the urgency of radically transforming the relationship between humans and nature**. Otherwise, pandemics will become increasingly frequent and devastating.¹⁰⁸

Change is necessary, but it is also possible

The impacts of climate change and environmental degradation have not gone unnoticed in our country. In fact, they **have generated considerable concern among citizens** (higher than the European average)¹⁰⁹ **and have generated changes in public and private institutions** which, although in many cases insufficient, show that the country is capable of delivering major change when it sets its mind to it.

Over the last four decades, Spain has signed up to all the major international environmental agreements, from the 1981 Montreal Protocol to protect the ozone layer to the 2015 Paris Agreement.¹¹⁰ At present, and at EU level, Spain is part of the European Green Pact¹¹¹ and observes more than 500 EU directives¹¹² and regulations on issues such as air and water quality, waste management and polluting products or the protection of biodiversity, and is a pioneer in some areas.¹¹³ It also has a strong and ambitious strategic framework at national level¹¹⁴ to ensure transformation into a carbon neutral, sustainable and climate resilient society.

In addition, Spain is currently holding the first position in the UNESCO world ranking for the number of Biosphere Reserves,¹¹⁵ and is one of the European states that contributes the most surface area to the EU's Natura 2000 Network.¹¹⁶ Since the 1990s, Spain has significantly expanded its protected areas to cover a third of the total land area,¹¹⁷ and has created pioneering marine reserves, such as the one that protects 650 square kilometres of Posidonia marina in the waters of the Balearic Islands,¹¹⁸ or the Mediterranean Cetacean Migration Corridor, which covers an area of 46,385 square kilometres.¹¹⁹ This has helped preserve thousands of species of flora and fauna such as the Iberian lynx, which has gone from less than 100 specimens in 2002 to more than 800 today.¹²⁰

Advances in environmental legislation,¹²¹ together with technological improvements in sectors such as industry and transport, have also enabled the reduction of emissions of certain greenhouse gases, such as fluorinated gases,¹²² and others that are very harmful to health, such as sulphur oxides and nitrogen oxides [Fig. 12].



Fig. 12. Emissions of air pollutants

Source: Drafted by the authors based on data from Eurostat.¹²³

One of the areas where Spain is making significant progress is energy.¹²⁴ In 2019, Spain installed more onshore wind power than any other EU country,¹²⁵ led the growth of the PV sector at European level and ranked sixth globally.¹²⁶ As a result, Spain is today the fifth country in the world in terms of installed wind power capacity and the ninth in terms of solar energy ¹²⁷ [Figs. 13 and 14]. Electricity generation from renewable sources has exceeded 100,000 gigawatt hours, enough to supply more than half of the country's households.¹²⁸ This rapid increase in renewables has also been accompanied by a historic reduction in coal use, which in turn explains the sharp fall in emissions in the power sector in 2019.¹²⁹ It is estimated that by the end of 2021, Spain will have closed around 70% of existing coal-fired power plants by early 2019, a rate of decommissioning that has been seen in few other countries in the world and which has been carried out in an orderly manner and with limited social impact.¹³⁰



Source: Drafted by the authors based on data from the IRENA.¹³¹

Source: Drafted by the authors based on data from the IRENA.132

Our country has also seen improvements in **the use of resources and in waste management** over the last two decades. For example, Spain's per capita water consumption for urban public supply has been reduced by almost 20%¹³³ and water use efficiency has increased substantially¹³⁴ thanks to, among other things, improved irrigation systems, the modernisation of many industrial processes, the introduction of more efficient household appliances and increased public awareness.¹³⁵ Spain has also been a leader in water desalination, currently home to 60% of the EU's installed capacity.¹³⁶

On the other hand, **energy and material productivity** (biomass, fossil fuels, metallic and nonmetallic minerals) has increased by more than 25%¹³⁷ and 120% respectively, while net material consumption has almost halved.¹³⁸ The amount of municipal waste generated per inhabitant has also fallen, and is now below the EU-27 average [Fig. 15].¹³⁹ Recycling of municipal waste¹⁴⁰ and electronic waste has also increased [Fig. 16].¹⁴¹



Fig. 16. Electronic waste recycling rate



Developments in **organic farming have also been significant**, whose regulation and promotion began in the late 1980s.¹⁴⁴ Since then, the area under organic cultivation in Spain has grown by more than 30% [Fig. 17], making it the country with the largest surface area in the EU¹⁴⁵ and the fourth largest in the world.¹⁴⁶ Although to a lesser extent, organic livestock farming has also undergone significant growth.¹⁴⁷



Fig. 17. Percentage of organic agricultural production as a percentage of total cultivated area, Spain

Source: Authors' own, based on Eurostat data. $^{\rm 148}$

In addition to all these changes, **significant efforts have been made in the area of adaptation**. Spain was the second European country to adopt a strategy in this area (after Finland) when it approved the National Adaptation Plan in 2006. Over the last 15 years, our country has spent
hundreds of millions of euros modifying its infrastructure and production systems to make them more resilient to the impacts of climate change,¹⁴⁹ which has allowed us to minimise the negative effects of droughts on water supply and heat waves.¹⁵⁰ Today, adaptation is already present in different public policies, plans, and strategies on a national, regional and local level.¹⁵¹

In summary, over the **last three decades**, our country has undertaken significant reforms and initiatives that have reduced our environmental impact in many respects. As a result, Yale University's latest *Environmental Performance Index* ranks us as the 14th most sustainable country on the planet.¹⁵²

It is clear that what has been achieved so far still falls far short of what is needed. As we will see below, the changes that will be required over the next three decades will be of a complexity and scale unprecedented in our history. But when it comes to tackling them, it is important to remember that Spain is not starting from scratch. Valuable initiatives are already underway and, when we set our mind to it, we can deliver profound transformations in just a few decades.

THE FUTURE: POSSIBLE DESTINATIONS

The short term: the environmental crisis during the coronavirus pandemic

It is difficult to predict what effect the coronavirus pandemic will have on the global climate agenda. On the one hand, mobility restrictions and the contraction of economic activity have led to temporary improvements in air quality, and caused 2020 to close with a fall in greenhouse gas emissions and a reduction in the use of natural resources.¹⁵³ On the other hand, **history shows that such improvements associated with economic crises are short-lived** and that exits from crises are usually accompanied by an accelerated recovery, and even an increase in emissions and consumption ("rebound effect").¹⁵⁴ In fact, global greenhouse gas emissions during the first months of 2021 have already exceeded those recorded in the same period of the previous year.¹⁵⁵ Moreover, the economic downturn and the disruption of global supply chains are likely to hamper the fight against climate change in many countries (especially low-income countries), limiting the investment capacity of governments and businesses, hindering the acquisition of clean technologies, and diverting attention to the health and economic front.

In Europe, however, the coronavirus pandemic could serve to accelerate and reinforce the green transition. Instead of relegating it to the background, European governments have reinforced their environmental commitment, increasing the ambition of decarbonisation targets for 2030 and making the green transition one of the key pillars of the Recovery Plan.¹⁵⁶ The funds will allow states to carry out far-reaching reforms to reduce emissions and improve their use of resources, which, together with the aforementioned transformation of global value chains, will help limit the rebound effect and provide a perfect opportunity for many companies to adopt more circular and sustainable production formulas. Moreover, the pandemic will remind citizens that human beings are not immune to natural processes, that it is crucial to be guided by scientific knowledge, and that society can implement profound and coordinated changes in a very short time when determined to do so. In this light, the coronavirus pandemic is set to become the great catalyst for green transition in Europe and in Spain.

The medium and long term: the environmental crisis after the coronavirus

It is impossible to predict how climate change and environmental degradation will evolve between now and 2050. This will depend on the performance of the global economy, on technological developments in the near future, and on how countries react to the climate emergency, especially major polluters.¹⁵⁷ In recent years, 195 countries have committed to taking the necessary measures to limit the global average temperature increase this century to 2°C above pre-industrial levels, and to do everything possible to ensure that this increase does not exceed 1.5°C. Achieving this goal will not stop climate change from happening (it is already too late for that),¹⁵⁸ but it will help to avoid its most destructive and irreversible effects.

In any case, **uncertainty about compliance with the** *Paris Agreement* is very high.¹⁵⁹ Global greenhouse gas emissions continue to grow and it is difficult to know when they will peak. In fact at the current rate, by 2030 levels of CO_{2-eq} emissions into the atmosphere will be more than double what they should be¹⁶⁰ and the 1.5°C limit will be exceeded well before 2050.

What will happen then? It is difficult to know. To offer an approximate prognosis, we take as a reference here one of the most probable scenarios, although not the most desirable: one in which, although the Paris objectives are not fully met by all countries, root and branch reforms are implemented for a moderate reduction in the current rate of emissions, leading to a global temperature increase of around 2°C by 2050 and 2.5°C by the end of the century.¹⁶¹ In addition to this emissions pathway, there is also a growing trend in the use of natural resources, whose global demand could double in the coming decades,¹⁶² a 70% increase in waste generation¹⁶³ and an increase in the amount of plastics dumped into the oceans, which could almost triple by 2040.¹⁶⁴ The sum and interaction of these trends, strongly influenced by others such as global demographic dynamics, changes in lifestyles and technological advances,¹⁶⁵ gives us the future scenario for our country that we present below.

Spain's climate and environment in 2050

The Spain of 2050 will be much warmer, drier and more unpredictable than today.¹⁶⁶ Average temperatures will increase, especially in the interior of the peninsula and the Mediterranean arc. Madrid will have a climate similar to that of Marrakesh and Barcelona's will be similar to that of Tunis.¹⁶⁷ Precipitation will tend to decrease, especially in the southwest and in the archipelagos.¹⁶⁸ The summer will be longer and more intense and droughts will be more frequent and longer,¹⁶⁹ affecting 70% more of the territory than today. At the same time, torrential rainfall events and coastal flooding will increase, potentially affecting more than 50,000 Spaniards by 2050.¹⁷⁰

These climate changes will magnify the environmental problems of recent years, starting with one of the most pressing in our country: water stress. **Spain will be one of the countries in Europe whose freshwater availability will be most reduced in the coming decades**¹⁷¹ [Fig. 18]. Lower rainfall and increased droughts will be accompanied by a decrease in seasonal snow accumulation in mountain areas, in the average flows of our rivers and in the recharge of our aquifers.¹⁷² In addition, there will be a worsening of the quality of our water bodies due to salinisation processes (associated with rising sea levels) and the concentration of pollutants.¹⁷³ This reduced water availability will go hand in hand with increased demand due to rising temperatures,¹⁷⁴ and could lead to an **estimated 27 million people living in water-scarce areas of Spain by 2050** [Fig. 19].

Fig. 18. Projected change in water-scarce days under a 1.5, 2 and 3°C global temperature increase scenario, compared to the current situation



Source: Bisselink et al¹⁷⁵

Fig. 19. Population exposed to water scarcity in Spain due to climate change for different scenarios of temperature increase



Source: Drafted by the authors based on Bisselink et al. 176

This does not mean that the population will suffer water shortages in their homes, but it does mean that we will have to rethink the way in which we have managed this resource up to now. The development of alternative sources of supply, such as reuse or desalination with renewable energy, should be encouraged; reducing losses in the sewerage and supply network; and ensuring high standards of water quality. "Renewable water" together with more moderate consumption, can help alleviate the pressure on water resources in many parts of our country.

Reduced water availability and rising temperatures will also lead **to the transformation of our ecosystems**, altering some landscapes and destroying others. In 2050, there will be more arid, semi-arid and dry sub-humid areas in Spain, and the area at high risk of desertification will increase considerably [Fig. 20].¹⁷⁷ In the north, the Atlantic forests of Galicia, Asturias or Cantabria will begin to resemble those that exist today on the Mediterranean coast,¹⁷⁸ and Pyrenean tundra coverage will fall by 90%.¹⁷⁹

Fig. 20. Increase in the area of land classified in the highest aridity categories



Fires may become more frequent and destructive¹⁸¹ as a result of increased dryness, lack of rainfall and depopulation of rural areas.¹⁸² In fact, **Spain will be one of the EU countries with the highest number of days per year with extreme-high fire danger** [Fig. 21]. This increase in fires, coupled with an increase in other threats (such as pests or windstorms), will seriously endanger our forest ecosystems, threatening human and other species' lives and limiting the important role that forests play in carbon sequestration, soil erosion control, water regulation or timber supply.¹⁸³

Fig. 21. Number of additional days per year with extreme-high fire danger compared to the current situation





Climate changes will also **severely affect our agro-ecosystems**, leading to productivity losses in livestock farms¹⁸⁵ and crop fields.¹⁸⁶ These impacts will be particularly important to us, because Spain is the leading exporter of fresh fruit and vegetable products in the EU.¹⁸⁷ In the case of grapes, for example, their quality will be compromised and some varieties will likely no longer be suitable for the areas where they are currently grown.¹⁸⁸ Citrus production, which is of growing value to our economy, could suffer as it is concentrated, above all, in areas that suffer high water stress.¹⁸⁹ In addition, many local species will be lost and new invasive species will emerge.¹⁹⁰ The adoption of various adaptation measures, such as changing the species cultivated, modifying the sowing date, developing more efficient irrigation techniques, or using biotechnological advances will help us to deal with these threats.¹⁹¹ In some cases, however, these solutions may not be sufficient to avoid the negative impacts mentioned above.

Climate change will also alter much of our country's coastal and marine ecosystems. The rise in sea level (which will be around 17-25 cm by 2050)¹⁹² could lead to the loss of low-lying areas, which will be permanently flooded; the salinisation of numerous aquifers and agricultural soils; and the destruction of wetlands, marshes and estuaries, including some of great ecological value, such as the Ebro Delta and Doñana National Park. Spain will also see many of its beaches affected, not so much directly by the rising sea levels as by the increased frequency of extreme events and coastal erosion that will make it unviable to replenish the sand on many of them.¹⁹³ Spanish ports will, in turn, be threatened by strong winds, storm surges and flooding of quays and warehouse areas.¹⁹⁴

Rising sea levels will be accompanied by **a significant increase in sea surface temperature** along the Spanish coastline, which will be higher along the Mediterranean coast and in the Balearic islands.¹⁹⁵ This increase, coupled with the direct impact of human activity and the progressive acidification of the oceans associated with greenhouse gas emissions, will have severe consequences for fish stocks and marine ecosystems.¹⁹⁶ Over the coming decades, the distribution of many marine species will change and key ecosystems will shrink, like seagrass meadows, which provide food and shelter for millions of fish, reduce coastal erosion and sequester carbon from the atmosphere.¹⁹⁷

All these environmental changes will have an **immense impact on the Spanish economy and society,** mainly due to the increase in mortality, droughts and coastal flooding,¹⁹⁸ and labour productivity losses, which could be as high as 5% by 2050.¹⁹⁹ All sectors will suffer the consequences, although tourism,²⁰⁰ agribusiness and, in general, those particularly dependent on environmental conditions and natural resources, will be the most vulnerable.

As a result, the **differences that currently exist between regions specialising in agriculture and industry and those with a greater emphasis on the service sector could widen.**²⁰¹ Territorial tensions over water management and access to other natural resources; migration (internal and external);²⁰² and levels of inequality and poverty could also increase, as the negative impacts of climate change will hit the most disadvantaged and vulnerable people the hardest.²⁰³

The repercussions on our health will be equally severe. Rising temperatures and heatwaves are expected to kill an estimated 20,000 people per year in Spain in 2050,²⁰⁴ but this does not mean that cold-attributable mortality will disappear.²⁰⁵ They will also facilitate the spread of food-borne and animal-borne diseases such as mosquitoes, and make viruses such as dengue, Zika and the Nile virus increasingly common in our territory.²⁰⁶ Higher temperatures and lower precipitation could also aggravate air pollution, causing harmful elements to stay in the air longer, enhancing the formation of other pollutants (like tropospheric ozone),²⁰⁷ or increasing the frequency of phenomena such as mega-fires and desert dust storms.²⁰⁸ In this context, neurodegenerative,²⁰⁹ water- and food-borne diseases²¹⁰ will worsen and the number of people susceptible to pollen allergy will increase significantly.²¹¹ Extreme events and climate change will also have a negative impact on mental health.²¹²

In addition to all these harmful effects caused by climate change, there will be further adverse effects from the intensive use of resources. For example, excessive use of drugs in humans, animals and plants will contribute to **antibiotic resistance**,²¹³ which could cause around 40,000 deaths per year in Spain alone by 2050.²¹⁴ In fact, on a global scale, antibiotic-resistant diseases could overtake cancer as the leading cause of death.²¹⁵ Other health risks will come from the **overuse of pesticides** and other chemicals,²¹⁶ and from the presence in air and water of **microplastics and other emerging pollutants**, the harmful effects of which we are only just beginning to see.²¹⁷

The green transition that Spain will undergo in the coming decades

The impacts described so far correspond, as mentioned above, to a likely scenario of moderate mitigation in which, albeit short of meeting the Paris targets in full in all countries, the global temperature increase will be limited to around 2°C in 2050 and 2.5°C in 2100. Achieving this moderate increase will, in any case, not be easy and will be strongly conditioned by the evolution of the world economy, social changes, and technological advances in the coming decades. **In fact, if only current targets and policies are met, global temperature at the end of the century would reach a value close to 3°C above that of the pre-industrial period [Fig. 22].**



Fig. 22. Projected scenarios for global greenhouse gas emissions and associated temperature increase range

Source: Drafted by the authors based on data from the Climate Action Tracker Project.²¹⁸

In a room, 0.5°C more or 0.5°C less is practically imperceptible and innocuous. But on a planetary scale and on a sustained basis, **an increase of 0.5° or so could make a crucial difference in the severity and irreversibility of climate impacts**.²¹⁹ For southern European countries, limiting the temperature increase to 2°C would halve welfare losses in comparison to a scenario of a 3°C warming. If the increase in temperature can be limited to 1.5°C, it would reduce them by almost 75%.²²⁰

Time is of the essence. It is therefore essential that all countries of the world take urgent and decisive action to reduce their emissions, to make a more sensible and sustainable use of natural resources and to adapt to a changing climate. This should be done, in any case, with respect for the principles of fairness and the different degrees of responsibility of each party.²²¹ International cooperation and technology transfer to lower income countries will be essential to achieve this common goal.²²²

Spain is on the right track. Thanks to the efforts (public and private) made in recent years and the recent boost from European recovery funds, our country is likely to achieve the emission reduction targets set for 2030,²²³ even in scenarios that are not particularly favourable in terms of technological innovation and economic growth.²²⁴ We cannot afford, however, to rest on our laurels. Achieving the goal of climate neutrality by 2050 is a much bigger challenge, going beyond the adoption of new technologies, and will require a structural transformation of our economy and social patterns towards low-emission and resource-efficient patterns of living, production and consumption. Moreover, the uncertainty about what climate scenario we will face in the future makes it clear that we need to dramatically increase efforts to improve our resilience to climate change.²²⁵

Thus, **four major transformations** are on the horizon, which must be implemented as soon as possible:

I. The way we generate, store and consume energy will change

By 2050, many of the devices that we power today with fossil fuels (radiators, kitchens, and cars) will run exclusively on electricity from renewable sources. In fact, it is estimated that, by the middle of the century, the ratio of electricity consumption to final energy will double in the EU,²²⁶ and that, in Spain, 100% of electricity will come from renewable sources.²²⁷ This change will not be immediate, nor will it be easy. Spain will have to close its last coal-fired power plants,²²⁸ bring about a change in consumption habits among citizens and greatly improve energy efficiency in all sectors. It will also be necessary to adapt infrastructures and develop a smart, digitalised and flexible electricity grid throughout the territory; develop energy storage;²²⁹ strengthen the value chain of batteries, ensuring that they are efficient, recyclable and affordable;²³⁰ install recharging points to boost electromobility, and deliver the large-scale roll-out of renewable energy sources.²³¹

In this respect, **photovoltaic solar energy** is set to play an essential role over the coming years. Spain is one of the countries in the world with the highest installed solar capacity and among the European countries that receive the most hours of sunshine per year. However, only 6% of the electricity generated in our country comes from photovoltaic solar energy,²³² a proportion that has doubled in the last year but is still lower than in other neighbouring countries (e.g. Germany).²³³ One of the avenues for expansion could be the creation of local energy communities²³⁴ and the popularisation of distributed generation through self-consumption photovoltaic installations on rooftops,²³⁵ which would bring numerous benefits for the country as a whole: greater efficiency associated with electricity generation close to consumption, diversification of the players in the electricity sector, awareness of the users of these installations, mobilisation of additional resources for investment in renewables, new jobs, and reduction of the impact of renewable production on the territory [see chapter 6].

Increased investments, advances in innovation and the increase in demand itself have led to a sharp reduction in the costs of renewable energy generation over the last decade. All indications are that this trend will continue in the future, greatly facilitating the energy transition.²³⁶

Another transformation vector that can play a key role in the decarbonisation of our energy system is the use of **renewable hydrogen**²³⁷ in sectors such as industry and heavy transport, both of which are difficult to electrify.²³⁸ Hydrogen could also be used to store energy from renewable sources to help secure supply when it dominates our energy system. It can be developed through, among other channels, the deployment of electrolysers that convert water into hydrogen using renewable energies, recharging stations for transport vehicles and the construction of the necessary facilities for its use in industry.²³⁹

There is no doubt that the energy transition will be a major challenge for Spain. Among many other things, it will be necessary to mobilise the necessary financing, transform companies and households, change the vehicle fleet, reduce total energy use, modify our consumption patterns, develop technological solutions, minimise the territorial and environmental impact of photovoltaic and wind installations, and articulate conversion plans to cushion the impact of decarbonisation in certain areas of our country.²⁴⁰ All this in a context of reduced water availability for hydropower production and more frequent extreme events, which will affect energy systems.²⁴¹

However, the opportunities that the energy transition will bring are enormous: we have a high photovoltaic and wind potential, we have leading companies in the field of renewable energies,²⁴² and several ambitious strategies in place that set the roadmap for the decarbonisation process in the medium and long term. Well executed and accompanied by the modernisation of our productive network [see chapter 1], the transition could generate significant gains in employment and activity, and substantial savings on Spain's annual bill for the import of fossil fuels. The Department for Ecological Transition and the Demographic Challenge has calculated that, with the implementation of the National Integrated Energy and Climate Plan 2021-2030 (PNIEC) until 2030 and the Long Term Decarbonisation Strategy 2050 (ELP), there would be a net increase in employment of around 250,000 people, on average per year, and an increase in GDP of close to 2% compared to a baseline scenario in 2050.²⁴³ Reducing our dependence on foreign energy is another major anticipated benefit.²⁴⁴ By replacing fossil fuels, Spain could save more than 340 billion euros in imports over the next three decades,²⁴⁵ the equivalent of seven years' worth of public spending on education. In fact, the complete electrification of our current car fleet alone by 2050 would already generate savings of almost 18 billion euros in imports compared to the total volume in 2019.246

II. The way we move and transport goods will change

In 2050, there will be **fewer private cars and more car sharing, more bicycles and more public transport** [see chapter 6]. Mobility will be transformed by the massification of the **electric car**, which will become increasingly economical and competitive, and will make up the bulk of the Spanish vehicle fleet by the middle of the century.²⁴⁷ It is likely that, by then, internal combustion vehicles will still exist, especially in the heavy-duty and long-distance transport sectors. But they will be much more efficient and use less polluting fuels than today.²⁴⁸

The advent of the **autonomous vehicle** will only encourage this trend, helping to reduce emissions and traffic, and free up public space in our cities [see chapter 6]. This technology still has several years of development (technical and regulatory) to go, so it is not clear when it will become widespread in Europe, but it is likely that this will start to happen before 2050, at least in certain mobility segments.²⁴⁹

The future of road freight transport will depend both on the evolution of production chains and on potential technological developments, the penetration of new fuels and electrification. In road transport, **the lorry** will continue to play a predominant role, at least in the short term, given the advantages it still has over rail (a large and competitive lorry fleet, with an extensive road network, compared to a rail network with few loading bays and terminals and, therefore, little capillarity in the country). In any case, in the medium and long term, **rail** should become more and more competitive, as it is the best way to transport passengers and freight over long distances with lower emissions.²⁵⁰

Passenger air transport will also have to undergo a profound transformation.²⁵¹ It will have to become much more rational and efficient,²⁵² with cleaner aircraft that are already being tested.²⁵³

For **shipping**, which is essential for international trade, non-pollutant technological alternatives have yet to be developed. The International Maritime Organisation estimates that, under a business-as-usual scenario, global emissions from this sector could increase by up to 50% by 2050 compared to 2018 levels.²⁵⁴ To avoid this, more efficient ships, electric and hybrid ferries, and the widespread use of fuels such as renewable hydrogen, ammonia, biofuels or wind-assisted propulsion will need to be developed.²⁵⁵ In addition, low-emission zones for shipping will have to be further developed to limit air pollution from ships in coastal areas and port cities.²⁵⁶

Given the high degree of uncertainty about the technological future of many alternatives, it is essential to take into account the potential negative costs of committing to the wrong technology.²⁵⁷ It will also be important to adapt taxation to the new reality of transport in order to correct its negative externalities²⁵⁸ and establish unequivocal signals that guarantee its decarbonisation in the longterm.

III. The way we produce goods and services will change

To combat and adapt to climate change, our country will also have to change the way it produces goods and services. This change will be twofold. Firstly, we will move from a model of linear economy, such as we have now, to a circular one, in which the value of products, materials and resources is maintained for as long as possible, minimising the generation of waste and making the most of those that cannot be avoided.²⁵⁹ Secondly, we will redesign our economy so that more and more services are sold instead of goods.²⁶⁰

In the Spain of 2050, **no municipal waste will be sent to landfill**.²⁶¹ This is not an impossible goal. In countries like Switzerland, all municipal waste is recycled or used to produce energy.²⁶² Virtually all organic products, packaging, household appliances, furniture, clothing and other items will be recyclable and recycled. This will reduce greenhouse gas emissions and pressure on our ecosystems, generating new business and employment opportunities.²⁶³ It will also increase the autonomy and resilience of our production chains by reducing dependence on raw materials sourced from abroad or potentially vulnerable to climate risks. Furthermore, **achieving greater efficiency in the use of materials is essential to preventing the future digital and ecological transition**, which will require greater use of raw materials such as lithium, graphite, cobalt or nickel, **from leading to greater environmental impacts**,²⁶⁴ and to ensure the country does not replace its foreign dependence for foreign fossil fuels with another foreign dependence for these resources.²⁶⁵

Achieving this circularity will take decades and will require the coordinated efforts of businesses, public administrations and households. New manufacturing processes and products that are more durable and rely on secondary raw materials will have to be designed, recycling circuits will have to be highly sophisticated, and the right regulations and tax incentives must be put in place.²⁶⁶ Innovation ecosystems will be key to these transformations, not only in terms of technology, but also in terms of social innovation, aimed at building alternatives to traditional consumption and production models.²⁶⁷

All sectors of our economy will have to adapt. The tourism sector will have to drastically reduce its negative externalities,²⁶⁸ implementing measures to save energy, reduce emissions, protect the environment and contain its consumption of natural resources such as water, especially in those areas where there is a significant concentration of tourists in certain months of the year (bearing in mind that the average water consumption of tourists visiting Spain is between two and six times higher than that of a resident).²⁶⁹ The sector itself will also have to reformulate its offer to respond to the effects of climate change on the distribution of tourist flows, both in terms of time and territory. Some destinations, such as the north of the peninsula and mountainous areas, could benefit from the new conditions, while others, such as the interior of the peninsula, will be less attractive in certain months of the year, and could experience significant decreases flow of visitors they are accustomed to seeing.²⁷⁰ In addition, some natural resources that sustain the sector, such as snow, beaches, coastal ecosystems and forests, will see their conditions significantly altered, forcing leisure and tourism companies to innovate in their service provision.

Industry will also have to make major changes, both to reorient itself towards the emerging sectors arising from the green transition, and to reduce its emissions and achieve greater circularity in its processes. The levers that will accelerate the transition will be energy efficiency improvements and the implementation of renewable energy in strategic sub-sectors. The challenge will be particularly great in certain activities that are difficult to decarbonise, such as energy-intensive industries (cement, steel or chemical manufacturing), where the development

of alternative products,²⁷¹ less polluting manufacturing processes, offsetting emissions through natural carbon sinks, or the use of technological devices to capture, store and use carbon dioxide will be essential.²⁷²

The **construction sector** should focus less on the creation of new buildings and more on the rehabilitation, restoration and regeneration of existing ones.²⁷³ Environmental criteria will be key, promoting durability, the reuse and recycling of materials,²⁷⁴ the use of alternative materials that reduce the carbon footprint, greater presence of green infrastructure (such as roofs or green walls), improved energy efficiency, the installation of systems that allow for better use of resources (such as rainwater harvesting systems), and the promotion of zero-emission housing construction [see chapter 6].

The agri-food sector will also undergo a profound transformation in the coming decades. Meeting climate commitments requires drastic changes in food consumption and the food production system, a major source of global emissions that has received little attention to date.²⁷⁵ Among other things, it will be necessary to adjust the use of fertilisers to the needs of crops; the progressive replacement of traditional synthetic fertilisers with improved fertilisers and animal manures, which promote the circularity of livestock systems;²⁷⁶ the spread of new production systems (e.g. hydroponic crops and vertical farms); the renewal of agricultural machinery (today mostly fossil), and the introduction of new technologies such as drones, autonomous vehicles, sensors or Artificial Intelligence systems to optimise the use of resources in production systems.²⁷⁷ This increased technification will be accompanied by a strong re-skilling of agricultural workers and a greater commitment to R&D, but also by a greater role for agro-ecological systems based on traditional knowledge and innovation aimed at offering fair production and consumption alternatives. It will also be essential to improve the use of water resources to ensure greater efficiency and real water savings for rivers and aquifers, through the modernisation of irrigation systems, wastewater treatment and the development of alternative sources of supply, such as water reuse or desalination through renewable energies,²⁷⁸ an option that could be key for the countryside of the Mediterranean arc.²⁷⁹ At the same time, the fight against deforestation related to agricultural production²⁸⁰ and the promotion of the absorption capacity of croplands and pastures should be promoted, which, in addition to contributing to carbon neutrality, will facilitate the regeneration and structuring of the landscape and the protection of biodiversity.²⁸¹

Finally, we must also mention the major transformation that will take place in the **financial sector**.²⁸² In the coming years, financial institutions will become one of the main catalysts of the climate and environmental agenda, encouraging more responsible and circular practices among their customers, creating incentives for risk prevention and helping to mobilise the more than 200 billion euros in investments that Spain will need to finance the energy transition over the next decade.²⁸³ In addition, climate criteria will be incorporated into the supervision to which these institutions are subject. Change, however, will not come overnight. In this process of adapting the financial business to the sustainability paradigm, institutions will have to find a subtle balance between, on the one hand, reducing their exposure to carbon-intensive activities, which may affect the value of their own investments or the payment capacity of companies operating in these sectors; and, on the other hand, progressively promoting more sustainable businesses, with longer-term maturity processes. In the future, the issuance of green bonds may become a important source of financing for many companies in Spain.²⁸⁴ In this respect, it will be key to provide more and better information on the greening of financial investments, an area in which the EU is already taking important steps.²⁸⁵

IV. The way we consume goods and services will change

For Spain to become a carbon-neutral, climate-resilient, and resource-sustainable society, it will not be enough to merely transform the way we produce goods and transport them; we must also change the way we consume them. As we have seen, humanity has already exceeded several of the planet's biophysical limits and, if it remains on its current course, will eventually cause an unprecedented environmental catastrophe.

The transition to a circular economy and technological advances in the future will help to avoid this collapse. However, they will not be enough on their own.²⁸⁶ **It will also be necessary to reduce the consumption of certain raw materials and products.** This means that, in the coming decades, Spaniards will have to reduce their intake of animal-based foods, the amount of clothing they buy, or the number of new digital devices and household appliances they purchase every year. They will also have to become more restrained in the extent to which they travel (especially when using highly pollutant forms of transport), and keep an eye on the carbon footprint of their consumption beyond national borders.²⁸⁷

This reduction in certain forms of consumption will not lead to a worsening of the living conditions or welfare of citizens. In fact, it will probably help to improve them. Numerous studies show that the Spanish population's meat consumption is between two and five times higher than recommended,²⁸⁸ that 55% change their mobile phone when the previous one is still working,²⁸⁹ and that energy consumption is much higher than necessary.²⁹⁰ On a broader level, there is literature showing that higher spending on food, housing, cars or other services is not directly related to a higher level of life satisfaction²⁹¹ [see chapter 9].

Nor does this change in consumption patterns necessarily have a negative impact on our activity and employment levels. Less consumption of certain products does not necessarily imply less demand, as the money we no longer spend on certain things (e.g. new clothes) will be spent on others (e.g. sustainable leisure). It should also be borne in mind that virtually all business activities can adapt to survive and even thrive in this new paradigm of sustainability. In 2050, we will eat less animal and ultra-processed products, but we will consume more local, organic and seasonal products. We will buy fewer new appliances and digital devices, but we will use manufacturers' repair and upgrade services more. We will buy fewer new clothes, but will be more involved in buying and selling second-hand clothes, and will require more customised tailoring services. In addition, the clothes we buy will be much more durable than they are now, and will be made from secondary raw materials, such as plastic from packaging or natural fibres extracted from plant waste.²⁹² In short, the circular and sustainable economy need not be less dynamic and prosperous than the linear and unsustainable one; guite the contrary. The key is for our companies (including small ones) to invest in transforming their production systems and business models to an emission-neutral and highly circular scheme as soon as possible, and for consumers to adapt their demand patterns to it.

An unavoidable, urgent transition for all people

All the changes described here will have to take place because without them, the future of the planet will be at risk. We need to prosper in a more balanced way, meeting people's needs within the planetary boundaries.²⁹³ The green transition is an unavoidable obligation that will have to be carried out in an accelerated and, at the same, socially just manner²⁹⁴ that addresses and seeks

to correct the vulnerabilities and inequalities that exist today among the Spanish population [see chapter 8]. In this context, the training of qualified professionals [see chapters 3 and 7] and a strong commitment to innovation [see chapter 1] will serve as catalysts and will be essential for the impacts achieved to be sustained in the long term.²⁹⁵

How can this be achieved? The following pages suggest a number of key measures to move in the right direction.

WHAT NEED TO BE DONE TO RESPOND TO THE CLIMATE EMERGENCY

In the coming decades, **Spain will have to** carry out **profound transformations in order to become a carbon neutral and resource efficient country, with conscious and responsible consumption and production patterns**. The incorporation of the notion of planetary boundaries and broad indicators of well-being into the design, implementation and evaluation of all public policies will be essential for moving in this direction. At the same time, we will need to increase our resilience **to climate change and protect our biodiversity, adapting to emerging risks and changing the way we relate to the natural environment**.²⁹⁶ This is the only way to minimise the damage caused by environmental degradation and to make the most of the opportunities that emerge from the ecological transition.

For these transformations to materialise, the path set by international agreements and the EU will have to be followed. Spain already has in place an extensive network of institutions, plans and strategies (public and private) that map the path and provide the necessary tools to do so.²⁹⁷ It is therefore essential that, over the coming years, our country agrees, through a social partnership process, on a **table of measurable indicators and a list of concrete targets** that will allow us to monitor progress and guide the ambition of these reforms.

Here are some suggestions, following the principles outlined in the Introduction to this Strategy:

Goal 21. Reduce our greenhouse gas emissions by 90% by 2050, meeting our commitment to achieve climate neutrality by the middle of the century (the remaining 10% will come from the absorption of carbon sinks).

Goal 22. Drive the water transition as an essential pathway for adaptation to climate change, achieving a reduction in total water demand of 5% by 2030 and 15% by 2050.²⁹⁸

Goal 23. Reduce primary energy intensity by 36% by 2030 and 63% by 2050 compared to 2015 values, in line with the targets set in the PNIEC (National Integrated Energy and Climate Plan) and the ELP.

Goal 24. All electricity to be generated from renewable sources by 2050, with this percentage reaching 74% by 2030, in line with the targets set in the PNIEC and the ELP.²⁹⁹

Goal 25. Strengthen the role of environmental taxation, incorporating criteria that promote a just ecological transition into its design and application. Spain should reach the current average of European countries by 2030, and increase its ambition over the following two decades, in order to ensure that decarbonisation is completed and the circular economy and environmental protection are strongly promoted.

Goal 26. Increase the area of organic agricultural production to 25% by 2030, in line with the EU's *Farm to Fork* initiative,³⁰⁰ and to 60% by 2050.

Goal 27. Increase wooded forest areas in order to protect biodiversity, improve ecosystem resilience and increase the capacity of carbon sinks, essential to achieving climate neutrality by 2050. Spain should adopt an average reforestation rate of 20,000 hectares per year during the period 2021-2050 (in line with the ELP targets), compared to the current 15,000 hectares.

In	dicators	Place	Average 2015-2019 or latest data available*	2030	Targets 2040	2050
	GHG emissions (thousands of tonnes of $\rm CO_{2-eq})^{301}$	Spain	330,640	223,000 ³⁰² (-23%)	126,000 (-57%)	29,000 ³⁰³ (-90%)
21 GH of t		EU-27	n.d.	-	_	-
		EU-8	n.d.	-	-	-
22 14/2	Water demand (hm³/year) ³⁰⁴	Spain	30,983*	29,434 ³⁰⁵ (-5%)	27,885 (-10%)	26,335 (-15%)
22 Wa (hr		EU-27	n.d.	_	_	_
		EU-8	n.d.	-	_	-
23 Pri	Primary energy intensity (kilograms of oil equivalent/ thousands of euros) ³⁰⁶	Spain	115	73 ³⁰⁷ (-36%)	56 (-51%)	42 ³⁰⁸ (-63%)
(kil		EU-27	125	-	-	-
LIIC		EU-8	122	-	_	-
24 Ele	Electricity generated by renewable energy sources (% of total) ³⁰⁹	Spain	36%	74%310	87%	100%311
ren		EU-27	31%	-	-	-
(%		EU-8	40%	-	-	-
	Environmental tax (% of GDP) ³¹²	Spain	1.8%	2.6%	4.0%	5.0%313
25 Env (%		EU-27	2.4%	-	_	-
		EU-8	2.6%	-	_	-
26 Or	Organic farming area (% of total cultivated area) ³¹⁴	Spain	10%*	25% ³¹⁵	43%	60%
(%		EU-27	8%*	-	-	-
are		EU-8	12%*	-	_	-
	Annual reforestation rate (hectares/year) ³¹⁶	Spain	15,103	20,000317	20,000	20,000
27 An (he		EU-27	n.d.	-	_	-
		EU-8	n.d.	-	-	-

Scoreboard of indicators and targets

To achieve these goals, **Spain will have to undertake far-reaching reforms and launch ambitious initiatives on a number of fronts.** The following suggestions are intended to complement and reinforce national or Community plans and strategies already in place:

Front 1: Consolidate a comprehensive vision of the green transition that, in addition to driving decarbonisation and the circular economy, better exploits the synergies between them

A zero-emissions economy will never be viable without a reduction in the use of energy, materials and products. It is therefore desirable:

- To establish increasingly specific and detailed decarbonisation and resource use reduction pathways for each sector, with defined time horizons.³¹⁸ The aim is to provide the country with a detailed transformation plan to guide the actions of the public sector, to protect sectors undergoing conversion and to provide some security for private sector investments.³¹⁹
- To establish a quota obliging companies to achieve a minimum percentage of recycled materials and to reduce the use of resources in their production processes, following EU guidelines.³²⁰
- To create production standards that oblige producers to comply with certain requirements on the shelf life of their products and a minimum duration of guarantees in line with European regulations in this respect.
- To simplify materials from the design phase, so as to encourage the marketing of those products with the longest useful life and whose waste has a recovery channel for reuse or recycling. This will help to increase the availability and ease of use of secondary materials in manufacturing processes.
- To implement "pay-as-you-throw" waste as a consumer responsibility measure, which will also be extended to manufacturers, who will be responsible for waste management and bear the full costs associated with it, thus relieving municipalities of this burden. This will make it more feasible to meet the target of reducing the percentage of waste going to landfill [See chapter 6].
- To encourage the urban green transition, reducing the consumption of resources in cities and improving their management. Possible measures include the promotion of energy efficiency in housing, the use of renewable energy, the promotion of sustainable water management systems and the reduction of municipal waste generation [see chapter 6].

Front 2: Pay greater attention to the interplay between climate change, environmental degradation and people's health

It is proposed to **incorporate the** *One Health* **concept**,³²¹ which emphasises the close relationship between the health of people, animals and ecosystems, into the design of public policies. Taking this holistic view of planetary well-being helps to better understand the pros and cons of each decision and to adopt more coherent, holistic and resilient policies over time.³²²

Front 3: Create a framework of fiscal incentives and instruments to ensure an efficient and socially just green transition

The design of environmental taxation should aim at correcting negative externalities in the environment (both emissions and excessive use of resources), so as to increase the competitiveness of sustainable products and services, while limiting their potential regressive social impact. Over the next decade, Spain should align its environmental revenue collection with the European average, adjusting it thereafter in line with the progress made in the green transition and new externalities that arise along the way.

In addition to implementing the tax measures detailed on the other fronts, it will be necessary:

- To progressively strengthen environmental taxation to reflect the full social cost of carbon³²³ by the middle of the century. Taxes on energy and transport will be particularly important, given the considerably lower weight of these taxes in Spain compared to neighbouring European countries.³²⁴
- To promote an accelerated rate of reduction in emissions allowances traded in the EU Emissions Trading Scheme (EU ETS), with the aim of ensuring an ambitious fall in emissions over the next decade.
- To promote measures, at national and European level, to ensure that all sectors take into account the negative externalities of carbon emissions. In the various sectors (e.g. transport, agri-business, household or service sectors), currently outside the carbon market, a taxation scheme will be promoted to ensure their timely decarbonisation. Support should also be given to the implementation of mechanisms that incentivise reductions in emissions beyond the borders of each country, for example with the establishment of the carbon border adjustment mechanism.³²⁵
- To establish compensatory measures to mitigate the potential regressive effects of higher environmental taxation or higher carbon prices. Among the options available, climate rent is one that could be explored, a mechanism designed to return part of the proceeds from green taxes to the population.³²⁶ That rent would help mitigate asymmetries in transition costs, facilitate the acceptance of higher environmental taxation, and correct the inequality-generating effects of these taxes. Another option is the creation of a Climate Justice Resilience Fund, complementary to Just Transition funding sources,³²⁷ to protect and assist those people, communities and sectors that could be most affected by both the ecological transition and the direct effects of climate change.

Front 4: Foster innovation in the energy and ecological transition

- Substantially increase R&D funding for decarbonisation and sustainability, following the principles set out in Chapter 1 of the Strategy. Key areas to be prioritised include electrification of production and transport, circular economy processes (in particular water management), renewable energy storage technologies, development of hydrogen and other low-carbon fuels, nature-based solutions and social innovation. It will also be necessary to incorporate a more comprehensive and longer-term vision that provides working with longer investment and review cycles, and to increase the tolerance for failure, which is particularly relevant for innovations in the climate and energy fields.³²⁸ In this respect, new institutions with a more risk-taking culture, such as the US Advanced Research Projects Agency-Energy (ARPA-E), could be envisaged.³²⁹
- Support eco-innovation in SMEs, given their relative importance in our productive network.³³⁰

Front 5: Transform mobility, reducing emissions from the Spanish transport sector to 2Mt³³¹ by 2050

It will be essential to pay particular attention to inter-urban road freight and passenger transport, the main contributors to emissions in this sector.³³²

- Stimulate a shift in transport usage, favouring alternatives to private car use such as active transport and public transport.³³³
- Ensure the replacement of internal combustion vehicles (petrol and diesel) with zero direct CO, emission vehicles. To this end, it would be advisable to:
 - Develop a cross-sector strategy that facilitates the creation of the ecosystem required by the electric car, promoting the domestic manufacture of this type of vehicle; promoting the production, reuse and recycling of batteries; increasing the number of fast charging points and promoting the purchase of these vehicles, taking into account the possible distributive implications of these types of subsidies.³³⁴
 - Progressively raise tax rates on diesel and petrol until both are equal to the average petrol tax rate in the EU-8.³³⁵
- Adjust road transport taxation to the actual use of the vehicle, addressing all negative impacts generated and ensuring greater consistency between the type of vehicle purchased and the needs of the service. To this end, it is proposed to move from the current purchase, circulation, and fuel taxes to a tax on the actual measured use of the vehicle, taking into account its characteristics: weight, power and emissions of atmospheric pollutants and greenhouse gases.

- Improve the rail network for freight and passenger transport. For freight, it is necessary to extend the electrification of the rail network, to use hybrid trains with renewable hydrogen for non-electrified sections, to increase the efficiency of inter-modal terminals, and to incorporate rail at those ports and airports that do not currently have connections. In terms of passenger transport, it is necessary to extend existing suburban networks,³³⁶ modernise non-high-speed lines, relaunch night train services, update and finalise cross-border connections³³⁷ and promote demand by applying a fair fare system that takes into account the lower environmental and health impact of rail compared to other means of transport.
- Reduce the environmental impact of air transport by introducing a frequent flyer tax or by taxing air fares according to the proximity of the destination. This will help to limit negative externalities and bring taxation of the sector into line with other modes of transport.³³⁸ It is also recommended that flights be banned on journeys that can be made by train in less than 2.5 hours.
- Transform urban and metropolitan mobility, in line with the measures outlined in chapter 6.

Front 6: Manage water resources adequately, preparing the system for a future where there is less water availability

By 2050, Spain should have overcome the threat of water stress. To achieve this, Spain should adopt an integrated water management strategy that, in addition to the measures contained in the already approved state plans,³³⁹ delivers the following:

- Encourages water reuse and desalination until the price of water is competitive, i.e. similar to the price of water from traditional sources (e.g. dams).
- Improves the efficiency of urban supply, agricultural irrigation and drinking water and wastewater treatment systems by modernising infrastructures and introducing new technologies such as sensors and big data, which make it possible to detect leaks and abuses almost immediately, monitors the water needs of crops in real time, controls the use of fertilisers and pesticides, and measures water quality.
- Reorganises agricultural uses and crops, acting on the current concession regime and prioritising sustainable and socially just agriculture.
- Modifies the economic and financial regime of the Water Law, based on the "polluter pays" principle. The aim should be to increase the level of recovery of public investments, to introduce taxes on certain water uses that generate pressures on the environment, and to integrate the risks to water availability caused by climate change, so that the cost of the service can cover the costs arising from the adaptation and modernisation of the infrastructure that will have to be delivered over the coming decade.

- Increases the resilience of agricultural holdings so that they can better adapt to climate change and water deficits, and recover more quickly from adverse situations such as droughts. This means promoting the transformation of crops and production systems, improving farm management training, and creating appropriate financial and governance mechanisms.
- Implements an ambitious strategy for the restoration of rivers, aquifers and other inland aquatic ecosystems, and strengthen the network of river reserves and other protected areas. Measures must also be introduced to ensure that water is returned to watercourses with a level of quality equal to or even batter than when it was collected.

Front 7: Move towards sustainable and healthy agri-food systems

- Make sustainable livestock production systems linked to the territory universal, such as extensive meadow and pastoral systems.
- Promote a national programme to promote healthy and sustainable eating habits in line with WHO guidelines and the recommendations of the scientific community.³⁴⁰
- Develop a National Plan for the reduction of food waste following the path set out in the Spanish Strategy 2017-2020. More food, less waste,³⁴¹ with the aim of reducing the amount of food wasted in Spain by 50% by 2050. Such a plan should build on the previous initiatives of the National Environmental Education Centre³⁴² and involve all stakeholders in the agri-food chain, from production to consumption, distribution, and sales.
- Establish mandatory food labelling with information on environmental impact, as France³⁴³ and the UK³⁴⁴ have already done, so that citizens can easily find information on the carbon footprint, nitrogen footprint, water and energy use of the products they consume, including the impacts produced outside our country.
- Reduce the environmental impact of the meals offered in public institutions, incorporating the sustainability and health criteria recommended by international organisations such as the WHO, the FAO and the IPCC into tender specifications for catering companies and encouraging the incorporation of vegetarian and vegan options on a daily basis.

Front 8: Reduce the risk of forest fires and improve the adaptive and sustainable management of our forests³⁴⁵

- Reduce the volume and connectivity of forest fuel through measures that incentivise good management through economic incentives or the promotion of agricultural and forestry insurance. The maintenance of agricultural areas adjacent to rural populations should also be developed for their protective role against fire, and extensive grazing and agro-forestry landscapes should be promoted as a management tool in high-risk areas, using, for example, programmes for the settlement of young people in rural environments.
- Encourage the development of the forestry economy, adapting the regulation of forest exploitation and offering commercial outlets for forestry products and other complementary products such as wild mushrooms, honey, vegetable fibres and aromatic and medicinal plants. To this end, it would be advisable to expand sustainable forest certification programmes and to promote the exchange of plots of land or abandoned land banks, already in use in some autonomous communities.³⁴⁶
- Improve training in controlled burning for agriculture and forest management in order to regulate and limit the use of fire under strict conditions, reducing the risk and severity of fires, and improving ecological parameters such as the quality of wildlife habitat or the promotion of plant species suitable for the pasture.³⁴⁷
- Use the restoration of burned forests to promote fire and climate change resilient landscapes, encouraging post-fire recovery measures focused on reducing erosion of the burned area, preserving water quality, and preventing the spread of invasive species.
- Introduce fire risk as a criterion in urban planning and construction design in Forestry-Urban Interface (IUF) areas, taking into account the compulsory creation and maintenance of safety perimeters in housing developments and homes surrounded by, or very close to, forest areas, establishing contingency plans for the defence and/or evacuation of these areas, and providing training courses for technical staff and rural inhabitants on how to respond in the event of fire.

Front 9: Manage our coasts and marine areas adequately to make them more sustainable and resilient to climate change

 Promote the development of a "blue economy" based on the sustainable use of coastal and marine resources. Among the many opportunities in our country are the generation of marine-based renewable energy (from waves and currents, off-shore wind and hydrogen production), the development of genetic and biotechnological products, and foodstuffs in growing demand, such as seaweed.

- Decisively and forcefully tackle the transformation of sectors such as fisheries, aquaculture, maritime transport, and tourism, in order to reduce their high environmental impact and achieve greater sustainability in these sectors.
- Increase the resilience of our coastal and marine infrastructures and human settlements located on the coast, using infrastructures, new technologies and naturebased solutions, such as the regeneration or restoration of salt marshes, posidonia meadows, dune systems and beaches.
- Promote regulatory measures aimed at reducing societal action on the coast and in the marine environment. Among others, it is proposed to expand marine reserve areas and to stimulate the restoration of ecological connectivity in degraded areas.

Front 10: Improve the environmental education of citizens

None of the above-mentioned measures will work if Spanish citizens do not know, understand or accept the challenges that climate change will bring and the imperative need to adapt our society to a low-emission, resource-sustainable and resilient model. For this reason, it will be essential to **promote environmental education for people throughout the life cycle**, following the lines of work set out in the *Environmental Education for Sustainability Action Plan*³⁴⁸ drawn up by the Department for Ecological Transition and the Demographic Challenge and the example of countries such as Finland [see chapter 2].

Front 11: Strengthen public institutions so that they can continue to develop effective, comprehensive and ambitious policies, and foster partnerships between the public sector, the private sector and civil society

The green transition is a systemic process that can only be completed with the leadership of the public sector and EU and international bodies. It is therefore essential to **further strengthen the capacity of our public institutions**, so that they can expand their legislative and research activity, establish increasingly concrete and smart adaptation, decarbonisation and resource use reduction pathways, and promote transformations through their own mechanisms, such as innovative and sustainable public procurement [see chapter 1], auctions, co-financing, and fiscal incentives.

In this regard, it is recommended to strengthen the role of **the Spanish Climate Change Office or, alternatively, to consider the creation of an Environment and Climate Agency**, following the model of the UK's Environment Agency or France's *Agence de la transition écologique*.³⁴⁹ Coordination between the different levels of public administration should be reinforced, public-private partnerships should be strengthened, and the availability and quality of statistical information should be improved.



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EXECUTIVE SUMMARY

- Over the last four decades, Spain has successfully achieved one of the major aspirations of any country: to increase the life expectancy of its citizens to unprecedented levels in history. At the start of the 20th century, the Spanish population had a life expectancy at birth of just 35 years. Today, it is over 83 and is the third highest in the world, surpassed only by Switzerland and Japan.
- This dramatic increase in longevity has been accompanied by a marked increase in healthy life expectancy. Not only do we live longer, but we also do so in better health and with a greater degree of autonomy than before. This is due to improvements in diet and hygiene, healthier lifestyle habits, and the development of a extensive and modern welfare state that has allowed biomedical progress to be transferred to most of society.
- Over the next three decades, the life expectancy of the Spanish population will continue to increase (potentially by more than 3 years), which will lead to strong degree of ageing within our demographic pyramid. In 2050, one in three Spaniards will be 65 or older, and for every person in this age group there will be only 1.7 people between the ages of 16 and 64 (today, there are 3.4). Potential possible improvements in the birth rate and an increase in immigration will not be able to completely reverse this scenario.
- An ageing population will bring significant social and economic opportunities for the country, but also a significant challenges to the sustainability of our welfare state. By the middle of the century, public spending on pensions could increase by up to 5 GDP points; healthcare spending could rise by more than 1 GDP point; and the number of people over 65 benefiting from care benefits could double.
- To weather this change, our country will need to improve the efficiency of its public services and, above all, ensure that older people play an increasingly active role in economic and social life. This will mean overcoming outdated stereotypes about age, adapting many jobs to the expectations and abilities of older workers, and making it easier to reconcile pensions and employment. If we are able to match the activity rates of our over-55s to those of countries like Sweden or Denmark, Spain will add 1.6 million people to the active population between now and 2050 - something that will help enormously to mitigate the negative impacts of the fall in the labour force, whilst improving the welfare of millions of households.
- At the same time, we will have to ensure that public pensions provide enough and are sustainable, whilst ensuring solidarity across generations; strengthening and reforming our National Health System; and improving our public long-term care network. This may lead to increased spending, but it will also bring new jobs and firms that could end up being an important part of our future economy and a key part of the sustainability of the system.

THE PAST: ACHIEVEMENTS

Over the last four decades, Spain has successfully achieved one of the great aspirations of any country: to increase the life expectancy of its citizens to unprecedented levels in history. At the start of the 20th century, the Spanish population had a life expectancy at birth of just 35 years.¹ Today, it is over 83. **Spain is the country with the highest life expectancy in the EU and the third highest in the world, behind only Switzerland and Japan** [Fig. 1].



Source: Author's own based on OECD data.²

This spectacular increase in life expectancy is the result of several factors:³ improved hygiene and nutrition, the adoption of healthier lifestyles, advances in education [see chapters 2 and 3] and, **the development of a extensive and modern welfare state** which has enabled, among other things, the progress of biomedical knowledge to be transferred to the bulk of society.⁴ As result of these factors, Spain has been able to reduce mortality rates - first, among the infant population and then among the older population; and to increase life expectancy at the age of 65 from 10 years in 1920 to more than 21 years in 2019 [Fig. 2]. It is important to note, however, that this improvement in survival has not been the same for all population groups.⁵



Fig. 2. Life expectancy at the age of 65 in Spain

Source: Authors own, based on INE and Human Mortality Database data.6

The democratic Spain that was created in 1977 inherited a fragile and obsolete health system⁷ that was less well developed than that of its northern European neighbours. From the 1980s onwards, however, central and regional governments implemented a series of far-reaching reforms aimed at bringing into reality the right to universal, high-quality public health care, which had been enshrined in the Spanish Constitution shortly beforehand.⁸ With the General Health Act of 1986.9 which led to the National Health System and the progressive transfer of health competences to the autonomous communities, primary care was promoted, an extensive network of health centres was built, distributed across the country, and health professional training was drastically expanded.¹⁰ Our public health system has not only improved in terms of coverage - to the point where it is now universal - but also in terms of quality. In the last four decades, public spending on health increased by 1.7 percentage points of GDP;¹¹ the number of doctors per inhabitant doubled;¹² the catalogue of benefits expanded enormously; and healthcare cover was extended to people without sufficient financial resources¹³ as well as to administratively unregulated groups.¹⁴ As a result of these efforts, Spain has successfully created one of the most advanced healthcare systems in the world, in terms both of the quality and accessibility of its services and its efficiency.15

Mortality rates associated with preventable and treatable causes are lower in Spain than in most EU countries. Among other things, this indicates the effectiveness of our health system in treating different pathologies (for example, ischemic heart disease, cerebrovascular diseases and certain cancers).¹⁶ Our country has a modern hospital network, first-class healthcare professionals and highly respected biomedical research centres of excellence. According to the EU-SILC survey, unmet medical care needs (relating to cost, distance or waiting times) are very low in Spain, having been reported by only 0.2% of the population in 2019.¹⁷ In addition, there is almost no difference between people in the highest and lowest income quintiles [Fig. 3], which reflects **the fairness within the National Health System**. We have also been **world leaders in terms of organ donation** for the past 28 years,¹⁸ both in regard to the number of donors [Fig. 4] as well as the effectiveness of the system, which is considered a model by the World Health Organisation.¹⁹ In 2019, Spain accounted for 20% of organ donations in the EU and 6% of those registered in the world, despite the fact that the country barely represents 9.1% of the European population and 0.6% of the world's population.²⁰



Fig. 3. Percentage of population reporting unmet medical needs by income level, 2019

Source: Authors' own, based on Eurostat data.²¹



Fig. 4. Organ donors per million population, 2019

Source: Authors' own based on GODT data.22

The development of the National Health System was accompanied by two other key transformations. The first of these has been **the universal application of the public pension system**, thanks to the creation of non-contributory pensions.²³ Furthermore, this has been in a context in which the average amount of contributory retirement pensions²⁴ doubled in real terms [Fig. 5].



Fig. 5. Average amount of the contributory retirement pension in Spain

Source: Authors' own, based on AMECO and MITES data. $^{\scriptscriptstyle 25}$

The other key transformation has been **the development of the social services system and, within this, care for dependent persons along with encouraging their autonomy** - something now known as the "fourth pillar" of the welfare state. What for decades was considered to be the sole responsibility of families and those who need care themselves, has been progressively taken over by the State, through a series of reforms resulting from the agreement between political forces and social stakeholders that has culminated in the creation of the Autonomy and Dependent Care System. While there is still a long way to go, Spain already has an extensive network of assisted living facilities and day centres, home help and telecare services, support programmes for informal carers, and health services specialising in gerontology and geriatrics, benefitting more than a million people.²⁶

The creation of this vast network of social services and benefits has transformed the life of our country and its people. **It is not just that we live longer, but that we do so in better health and with a greater degree of autonomy in later life**, thanks to better control over the most serious effects of many diseases. In fact, the majority of the Spanish population up to the age of 74 considers their state of health to be "good or very good" [Fig. 6]. Thus, life expectancy in "good health"²⁷ at the age of 65 ²⁸ has increased from 9.7 years in 2004 to 11.4 years in 2018, and is now the fifth highest in the EU (although there are significant inequalities between groups).²⁹



Fig. 6. Distribution of perceived health status by gender and age group in Spain, 2017

Source: Source: Author's own based on INE data.30

THE PRESENT: THE CHALLENGES AHEAD

It is clear that the increasing life expectancy and good health in older ages that we have seen in recent decades is a success story. In fact, it should be considered **one of the great achievements of the Spanish welfare state**. However, as we will see below, it is undeniable that this historical transformation has brought with it **new challenges** that could severely strain the very welfare state that made it possible.

This is due, in part, to the fact that the increase in longevity has been accompanied by **two other processes that are equally important for our demographics: the reduction in the fertility rate and the increase in immigration.**

Along with Italy, Spain is today ranked number 2 in the OECD in terms of the lowest number of children per woman of childbearing age.³¹ In 1975, the fertility rate in Spain was 2.8 children per woman. By 2019, it had fallen to 1.2.³² Spain has gone from a model of "many children and short lives" to one of "few children and long lives".³³ In addition, there has been a significant increase in the average age at childbearing and in the percentage of women without children, which could be as high as 25% among women born in 1975.³⁴ The causes behind this low fertility rate include economic restrictions (lack of employment, job insecurity, problems of access to housing), difficulties in balancing family and professional life, and the desire not to be a mother.³⁵

With regard to **immigration**, the arrival of foreign people has been continuous (apart from the period of financial crisis from 2009 to 2014),³⁶ has far exceeded the flow of people leaving our country.³⁷ This favourable migratory balance has allowed Spain to maintain a positive population growth and by the end of 2019 had a population of over 47 million.³⁸ However, **it has not been enough to cushion the progressive demographic ageing** [Fig. 7]. At the end of the 20th century, people aged 65 and over accounted for 13% of the Spanish population. Today they account for almost 20%. As a result, our dependency ratio (defined as the ratio of the proportion of the 65+ population compared to the working-age population³⁹) has risen from 20% to 30% [Fig. 8], which means that we have gone from having 4.9 people of working age for every person of retirement age, to having only 3.4.





Source: Source: Author 's own based on INE data.40





Source: Authors' own, based on Eurostat data.41

This dependency rate is still lower than that of other European countries such as Italy (36%) or Finland (35%), but this is due to the fact that Spain's baby boom occurred later. It will be during the next three decades when the effects of demographic ageing will become more pronounced, **leading to a series of social and economic challenges that our country will have to face**. These include four that we address here: 1) Changing standard working ages to align with increasing longevity; 2) increased public spending on pensions; 3) the adequacy of health services; and 4) the need to provide long-term care services for an already considerable and growing part of the population.

I. Aligning standard working ages with increasing longevity

Spain's retirement age of 65 was set in 1967. At that time, much of the population reached retirement age in poor health, after a life of deprivation, strenuous physical labour and very limited access to medical services. Today, the situation is very different. **The development of the welfare state and medical advances have greatly improved our health in older age, meaning that most people reach 65 in good shape, and extending the average life in retirement from 12 to 24 years [Fig. 9].**



Fig. 9. Expected number of years in retirement

Despite this biological revolution and the regulatory changes introduced in recent decades, in **Spain, 65 continues to mark the transition from working life to retirement**. Proof of this is the strong reduction in activity rates as the population approaches this age [Fig. 10].





Source: Source: Authors ' own, based on INE data.42

Source: Source: Author 's own based on INE data.43

This abrupt transition between working life and retirement does not align with a time when most people reach that age in good physical and mental condition. The view of old age as a time of uniform decline, dominated by illness and inactivity, is becoming less and less valid, and means that the diversity of profiles, needs and behaviours of people at this stage of their life need to be recognised. A new paradigm is therefore beginning to take shape - one that is more flexible and personalised and that takes account of the different social, economic and health circumstances of each individual and their preferences, regardless of their age.

The keystone of this new paradigm is the concept of "active ageing" which is understood as the process of optimising people's opportunities for health, participation and security as they age, in order to improve their quality of life and well-being.⁴⁴ Applied to the field of work, active ageing implies that each person should be able to decide whether or not to continue working after the legal retirement age, and to establish the mechanisms and conditions necessary for them to be able to do so in a favourable situation. This is the case, for example, in Scandinavian countries, where a significant proportion of older people combine their retirement with some form of work, often associated with leadership positions, advisory work, or filling in for younger workers' leave and absences. [Fig. 11].⁴⁵



Fig. 11. People aged 60-69 who work and receive a pension, 2014-15

If well executed, **active ageing produces a win-win situation**. Citizens are able to stay active and influential in the economic and social life of their country, along with all the gains in autonomy and health that this brings. It is worth noting that, according to several regional studies, **more than a third of retired people in Spain would have liked to continue working after retirement.**⁴⁷

Countries also benefit, as they retain a valuable and experienced working population, reduce public spending on pensions, and increase their labour force (or, in the case of Spain, mitigate its future contraction), as the evidence generally suggests that **older people's increased participation in labour market is not detrimental to young people finding employment**, as the jobs performed by both are complementary rather than substitutes for each other.⁴⁸

Source: Source: Authors ' own , based on OECD data.46

For these and other reasons, **prolonging working life is now a declared policy aim in all developed countries and supported by the main international organisations.**

Spain has also pursued this goal, although with results that are still lower than those of the leading countries in this area. Despite recent improvements, especially among women, the activity rate between the ages of 55 and 74 in our country is still lower than the EU and OECD average, and is far from that of countries such as Sweden, Denmark and the UK [Fig. 12]. The difference is especially notable among those who are working at 70 to 74, where Spain has the second lowest activity rate in the EU.⁴⁹ This is remarkable if we take into account that, with some differences by groups, life expectancy and living in good health in Spain is higher than that of our European neighbours.



Fig. 12. Activity rate by age group, 2019

The lower rate of participation in labour market by older workers in Spain is due to several factors.⁵¹ First: legislative and institutional factors. There are currently **very few incentives to continue working beyond retirement age**, and existing mechanisms for reconciling pensions and work such as active retirement (which is mostly taken up by the self-employed)⁵² are used by only a minority.⁵³ Secondly, there are factors associated with employment law in Spain, such as collective agreements that include mandatory retirement at the age of 65.⁵⁴ Finally, there are factors arising from **our productive structure and the formation of our human capital**. Although the impact of physically demanding activities has been reduced, the smaller size of knowledge-intensive sectors,⁵⁵ the predominance of small businesses⁵⁶ and the low rates of adults participating in training and requalification programmes⁵⁷ [see chapters 1 and 3], have limited the increase in activity rates among older people.

This lower level of older people in the job market has strongly negative effects for the country: it reduces our capacity to generate wealth, hinders the sustainability of public accounts, and reduces the welfare of the entire population (not just that of older people).

Source: Author's own based on data from the OECD.50

II. Increased public spending on pensions

One of the main challenges arising from an ageing population is the potential increase in expenditure on pensions. The Spanish public system provides pensions for three contingencies: permanent disability, death (orphan's, widow's, widower's and family members' pensions) and retirement. There are also two types of pensions: contributory pensions (for those who have contributed sufficiently during their working life, or for their survivors) and non-contributory pensions (designed to guarantee a minimum income for those who cannot access the former). The bulk of the pension system relates to contributory pensions, of which more than 60% are retirement pensions. These are mainly financed by contributions made by companies and workers,⁵⁸ meaning that, to ensure they are sustainable, **the balance between revenues and expenditure needs to be maintained over time**.

For several decades, the difference between revenues from social security contributions and expenditure on contributory pensions was positive,⁵⁹ which enabled a reserve fund to be built up to cover possible contingencies. However, from 2008 onwards, demographic ageing, early retirement due to the financial crisis ⁶⁰and the progressive increase in the ratio between the average pension and the average wage ⁶¹ meant that public spending on this item rose from 7.6% of GDP to 10.8% in 2019.⁶² This, together with the reduction in social contributions caused by the 2008 and 2011 crises, resulted in a deterioration in the position of the Social Security system.⁶³

The current level of pension expenditure does not, *in itself*, place a disproportionate burden on the system. The percentage of GDP that Spain devotes today to the payment of total public pensions is similar to that of the EU-27 average and is lower than that of EU-8 countries such as Austria or France.⁶⁴ However, the projected increase over the next three decades, when the more populous baby boom cohorts reach retirement age, constitutes a major challenge. And it will have to be tackled through social dialogue, a redesign of public policies and a review of the material and intangible realities around retirement.

Spain has already taken important steps in this direction. With the 2011 reform, some relevant measures were established with the aim to contain the increase in expenditure, including the progressive increase in the retirement age to 67 in 2027 and the increase in the contribution period required to receive 100% of the pension from 35 to 37 years.⁶⁵ However, **in certain areas**, **there is still some way to go.** Here, we highlight three of the main issues around which the debate is currently focused.

The first relates to the retirement age. Most analyses agree that practices such as reducing early retirement and increasing older people's participation in labour market are needed to bring the effective retirement age closer to the legal age. There are, however, disagreements as to whether or not the legal retirement age (beyond age 67 set for 2027) will have to be further delayed as life expectancy continues to increase.

The second refers to the evolution of the replacement rate, defined as the percentage that pensions represent out of income received before retirement. There is an intense debate being held about this issue in Spain. On the one hand, there are those who emphasise the fact that Spain has one of the highest replacement rates in the EU [Fig. 13], and argue that retirees receive, on average, more than they contributed.⁶⁶ On the other hand, there are those who emphasise the
considerable variety and inequality that exists behind the average;⁶⁷ the important economic support that the Spanish retired population provides to their families (especially in periods of crisis and high unemployment); ⁶⁸ and the fact that the risk of poverty or social exclusion among the over 65s in Spain is higher than in other European countries.⁶⁹ The key lies in ensuring that the replacement rate properly relates to the relationship that needs to exist between a public pension system that provides enough and is also sustainable, as well as intergenerational equity, which the system should aim for.





The third - and final - issue is that of financing. In Spain, almost all retirement pensions are financed by the state, as there is no widespread system of supplementary social security pensions.⁷¹ Conversely, in other advanced countries, there are mixed systems that complement the public pension with private pensions (essentially, these are private employment plans) that are mandatory, quasi-mandatory (as in Denmark, the Netherlands and Sweden, where they have almost universal coverage⁷²), or voluntary but very widespread (as in Canada, Ireland and the UK) [Fig. 13]. Many claim that Spain will need to progressively adopt one of these hybrid models. Others suggest that it will also be necessary to raise contributions, finance a larger part of pensions through taxes,⁷³ and/or reformulate the expenditure covered by social security contributions, so that all of it is used to pay contributory pensions, in line with the latest recommendations under the Toledo Pact.⁷⁴ Currently, these contributions also cover, for example, employment incentive policies and family support policies. Covering these non-contributory expenses from the General National Budget, instead of via social security contributions, could help to balance the Social Security system funds.⁷⁵

All these options have their advantages and disadvantages,⁷⁶ so it will be up to the country as a whole to use social dialogue and the framework of the Toledo Pact, **to reach a consensus as to which is/are the most appropriate to achieve the triple goals of of strengthening financial sustainability, providing adequate retirement income, and ensuring intergenerational equity.**

Source: Author's own based on data from the OECD.70

III. Adequacy of the health system

Over the last 40 years, healthcare spending in Spain has increased by almost 3.2 percentage points to 8.1% of GDP [Fig. 14]. Part of this increase has been due to the ageing of our population, given that the elderly require more services of this nature. So much so that, in 2005, the average per-capita expenditure for people aged 65 to 74 was double the average expenditure of the total population. For over 75s, it was almost triple.⁷⁷



Fig. 14. Health spending in Spain

Nevertheless, **it would be a mistake to think that the increase in longevity is the main determining factor behind the increase in health spending, or that both phenomena are mechanically linked**. Numerous studies have shown that, although age is positively related to the use of health services, proximity to death is a much more relevant variable.⁷⁹ This is because, in reality, it is not the number of years a person has lived that determines resource use, **but the level of health the person enjoys**. Adopting healthier behaviours and habits, implementing therapeutic innovations, and reducing the time it takes to diagnose certain chronic conditions, mean that better health can be maintained in later life. These are therefore fundamental for the evolution of health spending.⁸⁰

This proven fact has profound implications for a country like ours. In Spain, **health spending will continue to increase in the coming decades**. This is inevitable and also necessary to be able to provide a quality universal service, as since the financial crisis of 2008, public health expenditure has remained practically stagnant [Fig. 14] and is currently at lower levels than many other European countries [Fig. 15].⁸¹

Source: Authors' own, based on OECD data.78

Fig. 15. Health spending, 2018



Source: Authors' own, based on Eurostat data.82

Part of this increase in expenditure will be determined by ageing of the population which means it is unavoidable. However, another important part will depend on the **health situation of the older population** and the way in which the health services offered to them and the rest of the population are structured. **In these two areas, efficiency gains can and should be sought to avoid excessive growth of health spending**. Among other things, primary care will need to be strengthened seeing as it has lost out relatively over the last decade.⁸³ Access to new treatments and technologies will need to be enabled along with better coordination between health and dependency care services, and prevention and health promotion policies,⁸⁴ as these help to delay or reduce the prevalence of chronic diseases and multimorbidity⁸⁵ among older cohorts.

IV. Coverage of long-term care services

The increased longevity of the population is associated with a **growing need for long-term care**, **due to the relationship between age and dependency**.⁸⁶ The provision of this care is an essential part of the system of inter-generational cohesion that binds any country together. It is also a common need that we may all end up calling on at some point in our lives.

In Spain, as in the rest of Europe, care is implemented in a hybrid space that involves families, the public sector and the private sector.⁸⁷ **Informal (family) care plays the greatest role in our system**.⁸⁸ 57% of people aged 65+ who need care are cared for in a purely informal setting,⁸⁹ compared to 14% in the Netherlands and 24% in France[Fig. 16]. In fact, it is estimated that the theoretical economic value of informal care in Spain is much higher than current public spending on long-term care.⁹⁰

Fig. 16. Forms of long-term care for people aged 65+ (% of cases)

Country	Informal care	Mixed care	Formal home care	Residences
Netherlands	14	28	17	42
Sweden	27	27	11	35
Denmark	21	37	15	27
Belgium	20	35	14	31
France	24	42	14	20
Germany	36	35	7	21
Austria	36	38	12	15
Spain	57	26	8	8
Italy	62	22	8	7

Source: Authors' own based on Barczyk and Kredler data.91

This peculiarity is the result of a range of social, economic and cultural factors. One of the main ones is **the preference to be cared for at home and the high importance that people attach to family.**⁹² This informal care is mostly provided by **female relatives**, who tend to devote a lot of time to these tasks, as care is concentrated among people with a high degree of dependency.⁹³ These women often receive **little social support and recognition** and pay a high professional and personal price for their service.⁹⁴ Although there are emotional benefits from these tasks, the negative effects on caregivers' quality of life are not insignificant,⁹⁵ and are an important factor behind gender inequality in Spain.⁹⁶ In Spain, 42% of inactive women do not participate in the labour market due to care responsibilities (both for adults and children), compared to 6% of men. The equivalent percentages for the EU-27 are 32% and 5%, respectively.⁹⁷ In recent years, we have witnessed a **progressive change in the profile of caregivers**, due to the increase in the demand for care and the decrease in the number of potential family caregivers, as a result of demographic change and women's greater participation in work.⁹⁸ In particular, there has been an increase in the age of caregivers along with a greater participation of men.⁹⁹

Formal care continues to be a minority in Spain, despite the strong growth experienced in recent years.¹⁰⁰ Generally, formal care is characterised by a low degree of professional development and a continued high level of job insecurity.¹⁰¹ This contrasts with the model for Scandinavian and central European countries.¹⁰² As regards similar residential care and care homes, only 8% of the over-65s in need of care are provided in this way, compared with 20% in France and 42% in the Netherlands.¹⁰³

One of the main issues to be resolved within our care system is to improve its financing - in order to increase what it can cover as well as the quality of services and employment in the sector. Although public spending on long-term care has increased over the last decade - and stood at 0.8% of GDP in 2018 - it still lags behind that of most of Europe's more developed countries [Fig. 17].



Fig. 17. Public expenditure on long-term care, 2018

Source: Authors' own, based on Eurostat data.104

The *Promotion of Personal Autonomy and Care for Dependent Persons Act* of 2006,¹⁰⁵ which was passed in order to correct this situation, represented a **crucial regulatory advance in the area of social rights, and gave rise to a mixed system of public protection that combines economic benefits and services**. Although its deployment was limited by the budgetary constraints caused by the economic crises of 2008 and 2011, today there are more than 1.1 million people who recieve benefits or services through this,¹⁰⁶ 72% of whom are aged 65 or over [Fig. 18].







This law has achieved very positive results, including improving the mental health of caregivers¹⁰⁸ and reducing the number of hospitalisations associated with the roll-out of long-term care services.¹⁰⁹ However, there are still important issues to be resolved, such as promoting autonomy (which is one of the priority goals of the law and the development of which has been very limited so far), reducing waiting lists, and variable coverage between autonomous communities¹¹⁰ as well as among degrees of dependency and socio-economic groups.¹¹¹ Furthermore, a significant proportion of public funding has been directed towards monetary benefits associated with family care and,¹¹² although it may have increased the welfare of the most needy households,¹¹³ it has to some extent distorted the initial philosophy behind the law (prioritising benefits in services). It has also caused a series of inefficiencies in the system that need to be corrected.¹¹⁴

THE FUTURE: THE CHANGES THAT WILL LEAVE US AS A LONGER-LIVING SOCIETY

The short term: Spanish demographics in the time of coronavirus

The coronavirus pandemic has precipitated the death of thousands of our country's citizens, and has hit the elderly population particularly hard. They have been especially vulnerable to Covid-19 as a result of age,¹¹⁵ comorbidities¹¹⁶ and the deficiencies recorded in many care institutions.¹¹⁷

According to preliminary estimates by the INE, **the excess mortality generated in 2020 could reduce life expectancy in our country by almost a year**.¹¹⁸ This increase in mortality, together with the sharp fall in migratory flows and the reduction in births,¹¹⁹ could lead to a fall in Spain's population in the short term.¹²⁰ It is still too early to conclude that, on this occasion, the fall in income and employment will translate into a **reduction in the fertility rate** in Spain in the medium term,¹²¹ as occurred with the 2008 and 2011 crises.¹²² The duration of the pandemic itself and the related recession will determine whether the sum of higher mortality, lower migration and lower births will ultimately prolong the demographic effects of Covid-19 beyond 2020-21.

The impact of the current economic situation on the population's health condition will be key. History tells us that **economic downturns have negative effects on health**, and that these tend to be distributed asymmetrically, with the most vulnerable groups (including the elderly) being most severely affected.¹²³ This shows the importance of improving people's resilience through healthier lifestyles and a greater promotion of autonomy and personal development.

The medium and long term: the challenges and opportunities of the demographic change to come

Be that as it may, everything suggests that the disruptive effect of the pandemic on life expectancy in Spain will be temporary and that **life expectancy will continue to increase over the coming decades** without showing signs of stagnation. The introduction of health innovations and further improvements in lifestyle habits will further delay the traditional causes of death and mean that people in Spain live even longer. Thus, it is estimated that **life expectancy at birth will increase by 3.8 years for men and 3.1 years for women between** now and 2050, reaching almost 85 and 90 years, respectively.¹²⁴

This increase in life expectancy will exacerbate the process of demographic ageing during this century, whilst the other two forces that determine it (fertility and migration) will be unable to reverse it.

The demographic projections set out in this *Strategy*¹²⁵ assume **an increase in the fertility rate** in the future, from 1.2 children per woman today to 1.4 in 2050. It seems unlikely, however, that this rate will increase much further and, in any case, not enough to reach the population replacement rate.¹²⁶ Nor is an aggregate increase in the birth rate expected. Among other things, this is due to the fact that:

- The cohorts of women of childbearing age will shrink considerably,¹²⁷ such that the aggregate effect of potentially higher fertility will be smaller.
- Not all impediments to becoming a mother are financial.¹²⁸ In Spain, 24% of women who have not had children at the end of their childbearing years say they did not want to be mothers. 22% say that the most important reason is not having found the right partner. 7% highlight impediments to work-life balance. And only 5% refer financial reasons as the most significant factor in their decision.¹²⁹
- Immigration will not solve low fertility either. Although it is true that women of immigrant origin have more children in our country than native women, we must consider that the female migratory contingents are not always made up of women of childbearing age ¹³⁰ and that, very often, the women who arrive in our country have already had the children they wanted to have in their country of origin.¹³¹ Furthermore, it should be borne in mind that, although the fertility rate of women of foreign origin is higher than that of native women, the former tend to adopt the reproductive patterns of native Spanish women quickly.¹³²

As far as **immigration** is concerned, this *Strategy* assumes that **Spain will continue to welcome and integrate hundreds of thousands of immigrants**.¹³³ Specifically, a migration balance of about 191,000 people per year is projected between now and 2050, slightly higher than the average between 1990 and 2019.¹³⁴ This influx of people will partially help to mitigate the demographic challenge in the short and medium term. However, in the long term, it will not solve it on its own, as the immigrant population also ages and tends to align with national fertility patterns.¹³⁵

With this, it is reasonable to assume that in 2050, **1 in 3 people in Spain will be 65 or over**, and that our dependency ratio will rise to 60% [Fig. 19], surpassed in the EU only by Portugal, Greece and Italy. From the middle of the century onwards, this trend will stabilise as the more numerous *baby boomer* cohorts reduce. Until then, however, change will come at an accelerated pace.



Source: Authors' own, based on Eurostat data.216

In this context, the challenges associated with increasing longevity, as identified above, will intensify markedly. However, valuable opportunities will also arise if we are able to anticipate and adapt our society to the new demographic reality.

I. The need to accelerate the process of aligning standard working ages with increased life expectancy

Demographic change will mean a **significant decline in our working population**. It is estimated that, over the next three decades, Spain will lose 3.7 million people of working age (ie those aged 16-64), a fall of 12% compared to the current situation. This will mainly happen from 2030 onwards.¹³⁶ In the absence of a significant increase in the employment rate and productivity, **this decline in the working-age population will translate into a reduction in Spain's economic growth and per-capita income** [see chapter 1].¹³⁷

Our country has several options available to it if it wants to neutralise this demographic effect.

The first involves correcting the structural deficiencies in our labour market, in the interest of raising the aggregate employment rate to the levels of Europe's most advanced countries. In particular, this will entail improving the employment rates of getting young people and women, and reducing the high levels of temporary and insecure jobs [see chapter 7]. With regard to this, it should be kept in mind that the lower rate of people aged 55-64 working also hides an issue of significant long-term unemployment.¹³⁸

The second option entails driving up labour productivity through a firm commitment to lifelong education and training, innovation and technological take-up across the production sector. Improving the efficiency with which we operate is particularly important in a context where demographic ageing itself may cause additional difficulties to productivity growth [see chapter 1].

The third option, which is closely linked to the above, entails a better alignment of standard working ages and changing life expectancy, and making more and better use of the knowledge and skills of the older population.¹³⁹ Although there are variations between different groups, most research indicates that **life expectancy in good health will also continue to increase in the coming decades**.¹⁴⁰ This will make many of the stereotypes currently associated with age (lack of productiveness, isolation, dependence) more obsolete, and people will be able to develop and continue to contribute their talent and experience for longer and become key social and economic stakeholders for the future of our society.

At this level, two major changes can be seen. On the one hand, everything points to the fact that the standard working ages will change - in a flexible, non-consistent way - to adapt to the increase in life expectancy. This will bring significant benefits both for our ageing population (improved health and well-being) as well as for the country as a whole (retention of valuable and experienced skills, increase in the available labour force and greater wealth generation).¹⁴¹ Spain has already set out a progressive increase in the legal retirement age to 67 in 2027.¹⁴² Whilst this is not a low threshold in the European context,¹⁴³ it is a static limit that may become obsolete as life expectancy increases.¹⁴⁴ An alternative option - that is perhaps more in line with the differences that exist in people's ability to prolong their working lives - is to act on the effective retirement age, offering incentives to encourage people to remain in the labour market beyond the normal age.

On the other hand, it is more likely that there will be a progressive increase in participation in the labour market among older cohorts [see chapter 7]. This second change has great potential for Spain, given that, as we have seen, the level of participation in work among over-55s is much lower than that of countries like Sweden, Denmark (belonging to the EU-8) and the UK. If we succeed in raising working activity rates among 55-74 year-olds to the levels seen in these countries (an average increase of almost 6 percentage points compared with 2019), Spain would add 1.6 million active people,¹⁴⁵ which would greatly help to mitigate the future negative impacts from the decline in the size of the labour force in intermediate ages on economic growth. It will also help sustain our welfare state [Fig. 20].¹⁴⁶



Fig. 20. Alternative scenarios for Spain's active population in later life

Sources: Authors' own, based on Eurostat and OECD data.147

If our country is to succeed in increasing the over-55s' participation in work, we will need to undertake profound transformations involving all social stakeholders. It will need people who are able and willing to work longer, and for companies and public institutions that are willing and have incentives to hire them.¹⁴⁸ To do this, we will need to:

— Match future jobs to the skills and interests of older workers, so that the option of staying in work is viable and appealing to them. This will involve creating new jobs in companies and the public sector, and adapting existing jobs to the age of the people doing them, by implementing flexible options. Advancing age is often associated with deteriorating physical capacity and skills related to dealing with new technologies, but it also brings with it more experience and the development of essential skills in many areas.¹⁴⁹ The retention of experience, inter-generational cooperation and lifelong learning (especially in digital technology) should be promoted in order to avoid an increase in the risk of age-related exclusion from the labour market.¹⁵⁰ Similarly, working environments should be adapted to the diverse needs of the older working population as this will help to avoid early retirement due to health problems.¹⁵¹ The extension of teleworking could be extremely useful.¹⁵²

- Create fiscal and wage mechanisms that bring adaptation, more flexibility and greater participation of older cohorts in the labour market. In Spain there is a lack of effective incentives to continue working beyond the legal retirement age. This situation will need to be put right, with strong links being created between the job market and retirement, so that staying in work is appealing at any age. In doing so, careful consideration should be given to inequalities in healthy life expectancy.
- Breaking stereotypes, making those who work and those who employ understand that the physical situation and working capacities of 70-year-olds are not very different from those of 65-year-olds.

Naturally, **it won't all be about work.** Active ageing also implies that senior citizens are actively involved in society, and are found in a wide range of spaces beyond the labour market. These include volunteering, social participation, family care, study, and a long list of other areas. The "social participation" data of the *Active Ageing Index* show an upward trend in this type of activity among the Spanish population. In the long term, the aspiration should be to become similar to benchmark countries in this regard - such as Belgium and the Netherlands.¹⁵³

II. Aligning the pension system to new demographic and social realities

The future increase in longevity will accentuate the challenge of the sustainability of our public pension system. In 2050, there will be 1.7 people of working age for every person over the age of 64. This compares with 3.4 today.¹⁵⁴ The various simulation exercises carried out suggest that Spain's spending on contributory pensions will be between 15.2% and 16.9% of GDP in 2050,¹⁵⁵ compared with 10.8% in 2019.¹⁵⁶ This increase could be lower depending on the impact of the measures currently being discussed. However, as we have already noted, the key to the system's sustainability does not lie exclusively in expenditure, but in the necessary relationship between expenditure and revenues. It is here that the greatest uncertainties emerge.

The revenues depend on economic growth, job creation and social security contributions (the latter being relatively high in comparison with other countries). Even if the reforms aimed at raising productivity and the employment rate in our country are able to relaunch income growth in the long term, we cannot rule out seeing a scenario of more moderate economic and employment growth than in previous decades [see chapters 1 and 7]. In this scenario, **the gap between pension expenditure and revenues from social security contributions will tend to widen**. It is therefore essential to understand what factors will determine the evolution of future pension expenditure, so that the most appropriate menu of proactive strategies can be prepared.

Figure 21 offers an initial approximation on this,¹⁵⁷ illustrating the way in which demographic, economic, employment and institutional factors could impact pension expenditure as a proportion of GDP in our country between now and 2050. Unlike the estimates previously noted, this is an illustrative exercise and does not cover the interaction between the different explanatory factors.

Fig. 21. Change in public spending on contributory pensions (% of GDP) in Spain under alternative scenarios, in relation to a baseline scenario, 2050



Sources: Authors' own, based on data from Eurostat, INE and the Department of Inclusion, Social Security and Migration.¹⁵⁸

We start from a scenario in which the dependency ratio (which is calculated from age 67), evolves in line with Eurostat projections to reach 53.3% in 2050, while the employment rate over the working age population and the replacement rate remain at 2019 levels.¹⁵⁹ A reduction in the dependency ratio of the order of 3.5 points, resulting from a gradual aligning of working life with the increase in life expectancy and/or a greater migration of the working-age population than assumed in the baseline scenario, would reduce expenditure by just over 1 GDP point. An even larger impact of 3 GDP points would be obtained by raising the aggregate employment rate to 72% from the current 60% [see chapter 7].¹⁶⁰ A combination of this scenario of higher employment with a lower dependency ratio would allow a reduction of 4 points in the GDP expenditure ratio. In fact, this increase in the employment rate could be partly due to higher activity and employment rates among older cohorts, whether induced or self-initiated. In turn, a reduction in the replacement rate - due to legal changes in calculating pensions or higher wage growth associated with higher productivity growth - could also reduce pension expenditure as a share of GDP. For example, reducing the replacement rate by 6 points would contain pension expenditure by more than 2 points.¹⁶¹ It should be noted that, with higher productivity growth, higher pensions can be achieved even if the replacement rate reduces.

From this exercise we can see the enormous complexity of the reform that is required. In the coming years, Spain's pension system will have to overcome **the triple challenge of strengthening financial sustainability, providing adequate retirement income, and ensuring inter-generational equity.**¹⁶² To this end, the increased resources required to adjust income or redistribute expenditure items will need to be defined and anticipated, and the implications of the decisions taken on inter-generational equity will need to be clarified. Whichever route is taken, it will need to respect the principle of equality for all generations, including the younger ones.

The Toledo Pact is taking some steps in this direction. It includes, among other things, the need to gradually bring the effective retirement age closer to the legal retirement age; promote the extension of working life; and promote complementary social welfare.¹⁶³ In line with this, **promoting occupational pension plans** as adjuncts to the public pension is gaining in strength. The aim is to promote a culture of saving throughout life, but without ignoring the differences in the population's capacity to do so: people with levels of lower income will find it more difficult to build a savings buffer and therefore special attention will need to be paid to them. In fact, consideration is being given to the creation of a **public fund to facilitate access to employment plans by SMEs and the self-employed**.¹⁶⁴

Regardless, **there is still a lot of unfinished business**. Far from being over, the debate on pensions has only just begun. It is essential that decisions are taken as soon as possible so that we can **design the appropriate mechanisms to avoid abrupt adjustments in the long term.** This must also be done on the basis of a forward-looking approach, taking account of the social and economic changes that will take place in Spain between now and 2050, and reflecting on the ways in which our public pension system will need to adapt accordingly. For example, it will be necessary to study the way that more fragmented and varied working careers than today's will affect the way that retirement pensions are calculated. It will also be necessary to rethink the functioning of pensions such as widows' pensions and how they progressively adapt to a world in which women will have levels of educational training and professional development comparable to those of men, whilst not forgetting the important role of protection that they still play today.¹⁶⁵ Future reviews will also have to take into account the potential loss of contributions due to family care.¹⁶⁶ The recent approval of a new supplement aimed at further reducing the gender gap in pensions is another step in this direction.¹⁶⁷

III. Changes in the use of health services

As we have already seen, **demographic change alone is not expected to drive up health system spending**, although this will depend to a large extent on the health situation of older cohorts and the way in which the structure and cover of health benefits evolves. The projections made in the European Commission's 2018 Ageing Report set out different scenarios for the rise in Public Health Expenditure (PHE) depending on the way in which the population's health evolves.¹⁶⁸ In a scenario in which gains in life expectancy are not accompanied by improved state of health, the effect of ageing would increase public health spending by 0.9% GDP by 2050.¹⁶⁹ However, if we want to maintain a leading healthcare system that responds to future needs and demands for services, this increase in spending should be higher.

For a complete prognosis, we need to add **the possible disruptive effects of technological and health developments** to this base scenario. In the coming decades, we may see the widespread use of revolutionary pharmaceutical and biotechnological innovations, such as gene therapy, stem cells, the big data and artificial intelligence systems, robotics and wearables. These will allow the development of medicine that is much more personalised, predictive and effective, especially in therapeutic areas such as oncology.¹⁷⁰ Technology will also make it possible to predict survival time more accurately and, with it, the consequences of diseases at the end of life. The concept of "quality of death" will complement the concept of quality of life. There will be a significant development of palliative care services and social positions on ethical issues will develop in regard to the right to a dignified death. In this regard, it is worth highlighting the recent passing of the law regulating euthanasia in our country, making Spain the sixth country in the world to legalise death with dignity.¹⁷¹

All these advances will bring with them challenges and opportunities for the sustainability of the National Health System and they should be analysed as soon as possible. We will need to have a clear plan for the kind of health service we want to have as a country, and design precise standards that will enable us to determine the benefits and effectiveness of health innovations. In this regard, it should be borne in mind that in Spain, as in most countries, the prices of health innovations are not set by the market, but are established through negotiation between public decision-makers and the companies marketing them. This means that **the role of public policies and the regulatory framework will be key to controlling health spending**. The aim should be to relate the price that the health authority pays for new technologies and treatments to their therapeutic and social value.¹⁷²

The future will also bring the emergence of **new communicable diseases** (as HIV/AIDS was in the 1980s and Covid-19 is today) **and an increase in other non-communicable diseases** such as mental and neurodegenerative diseases. This will force us to seek better coordination between the National Health System and the Autonomy and Dependent Care System. We will also need to adapt our health system, moving from an organisational model that is highly focused on treating acute events (as it is at the moment) to a **model more focused on chronic disorders and illnesses**.¹⁷³

Similarly, the extent to which this type of illness proliferates and extends will depend on the implementation of new **health promotion and prevention policies and early diagnosis mechanisms**. As is well known, the determinants of health are multiple and go far beyond the health sphere.¹⁷⁴ The spread of social practices such as sedentary lifestyles, smoking and not following a Mediterranean diet will have profound effects on the health of the elderly and on public health spending [see chapter 9]. To alleviate this, these practices will need to be combatted at root, with education in healthy habits being promoted and the health perspective being included in all policies. On this, it should be stressed that, although in Spain we can find examples of good, extensive **public health policies** and **healthy ageing**,¹⁷⁵ there is no considered, mature and applied framework for health policies aimed at the long term. It will need to be created in the coming years.

These types of reforms, together with other organisational changes and improvements in health governance, may have a greater effect on the evolution of health spending than aspects due to demographic ageing itself, and may in turn serve to strengthen the role of the National Health System as a source of innovation and generator of quality employment.

IV. The need to provide quality long term services to a growing part of the population

Our country's care system will change dramatically over the coming decades. The coronavirus pandemic has highlighted the enormous importance of care and **the room for improvement in the model of residential care** which, along with the demographic, health and cultural changes already mentioned, will precipitate a profound expansion and transformation of the system.

The relationship between longevity and dependency, coupled with the reduced availability of traditional caregivers, point to an **increasing need for long-term care** and a **degree of informal care being replaced by professional services**.¹⁷⁶ It is not yet clear how this combination will be structured, but what is certain is that informal care will continue to be decisive and, in many cases, complementary to professional care.

Something else that is certain is that **the focus will increasingly be on people.** The traditional model will be redefined and new forms of integrated, person-centred care will emerge, designed to ensure that individuals receiving care can continue to maintain their independence and autonomy.¹⁷⁷

The strong preference, on the one hand, of the population to grow older at home,¹⁷⁸ and the increase in single-person households among people over 65,¹⁷⁹ on the other, pose a major challenge for the design of these future services. It is most likely that **care homes will be transformed** and evolve from the current "residential care home" model to a "home-based" model.¹⁸⁰ In parallel, new options will emerge, such as self-care formulas based on technological innovations (telemedicine, *apps*, internet monitoring, home automation adaptations), **cohabitation** with inter-generational support among non-family members, **senior cohousing** in its multiple forms (collaborative, cooperative, collective housing),¹⁸¹ and "time banks" or volunteering assistance aimed at avoiding unwanted loneliness and encouraging such people to participate in society.¹⁸²

With regard to the **profile of family carers**, this will also go through some transformations as a result of the demographic change itself, with a growing involvement of couples (rather than daughters), men and older people as main carers.¹⁸³ Alternating the roles of "caregiver" and "cared-for" will be increasingly frequent, with possible overlaps between them, especially during the initial stage of old age.¹⁸⁴

Projections made by the *Ageing Report* suggest that, under a scenario where gains in life expectancy are not accompanied by improvements in health, Spain's public spending on long-term care could rise to 1.8% of GDP in 2050, compared with 0.8% today.¹⁸⁵ Under a scenario of transition to professional care, spending would rise to 2.2% of GDP. However, if we converge in terms of costs and cover with other EU countries, public spending would rise to 3.0% of GDP. Given the current situation, **an intermediate spending scenario of between 2.2% and 3.0% is the most plausible**. In fact, our calculations indicate that, **in the next three decades, the number of people over the age of 65 benefiting from dependency assistance in Spain could double from the current 806,963 to more than 1,600,000 in 2050.¹⁸⁶ Other studies show similar figures.¹⁸⁷**

For sure, improvements in the population's habits and technological advances will significantly reduce care needs in relative terms. However, it is also true that the level of cover for support should be increased compared to what it is now. It follows that **care needs will grow dramatically in absolute terms between now and 2050**. This will be a remarkable challenge for our country, but also **a magnificent opportunity for businesses and for job creation**, the scope of which could even extend beyond the national population. Spain is considered one of the best destinations in the world to live after retirement,¹⁸⁸ thanks to its excellent geographical position, climate, way of life, infrastructure and transport network. If we exploit this advantage well, our country could become a leader at European and global levels in the provision of services to the elderly and create remarkable economic activity around it,¹⁸⁹ which would be in addition to the benefits yielded by the silver economy in sectors like such as mobility, leisure, education and housing [see chapter 1].

WHAT COULD BE DONE TO ADAPT OUR WELFARE STATE TO A LONGER-LIVING SOCIETY

Between now and 2050, Spain will need to change a large part of its social, economic and labour structures and adapt them to the inevitable and fortunate reality of a longer-living society. Doing so will involve, among other things, **improving the employability of young people, increasing activity rates among the over-55s, reforming the pension system to achieve financial sustainability, adapting the health system and vastly expanding the care system.** However, there is nothing to suggest that these transformations cannot be carried out and even become opportunities to increase the prosperity and well-being of all citizens (not just the elderly). This positive approach should guide future policy decisions.

Of course, it is difficult to achieve that which cannot be measured. It is therefore essential that, in the coming years, we use social dialogue to reach a consensus on a **dashboard of quantifiable indicators and a list of specific goals** that will enable us to monitor the progress made and guide the ambition of our reforms. Here are some suggestions which follow the principles outlined in the Introduction to this *Strategy*:

Goal 28. Progressively increase over-55's participation in work so that, by 2050, they are closer to the levels seen in such as Sweden and Denmark, today's leading countries in this regard. This will require creating the necessary incentives for people who wish to continue working and for employers to be able to recruit them.

Goal 29. Progressively raise public spending on health to 7% of GDP over the next decade, in order to meet the future needs and demands for health services of a long-living society.

Goal 30. Expand coverage and improve the quality of the long-term care system, raising its funding to around 2.5% of GDP by 2050, paying particular attention to how it is coordinated with the health system.

Goal 31. Reduce the waiting time between recognising someone's situation of dependency within the framework of the Autonomy and Dependent Care System and granting them benefits.

Table of indicators and targets

Indicators		Place	Average 2015-2019 or latest data available* (Targets			
				and an analyto	2030	2040	2050
28	Activity rate ¹⁹¹	Between 55 and 64 years old (%)	Spain	62%*	63%	64%	67%
			EU-27	62%*	-	-	-
			EU-8	68%*	-	_	_
		Between 65 and 74 years old (%)	Spain	5%*	7%	9%	11%
			EU-27	11%*	-	-	-
			EU-8	11%*	-	-	-
29	Public expenditure on health (% GDP) excluding health expenditure on long-term care ¹⁹²		Spain	5.7%	7.0%	7.0%	7.0%
			EU-27	5.1%	-	-	_
			EU-8	6.6%	-	-	_
20			Spain	0.8%	1.5%	2.0%	2.5%
30 Public expenditu long-term care (9	re on % of GDP) ¹⁹³	EU-27	1.1%	-	_	_	
			EU-8	2.3%	-	_	-
31 Percentage of people who are entitled to SAAD benefits but do not receive them ¹⁹⁴		eople who are	Spain	17%*	0%	0%	0%
		EU-27	n.d.	_	-	-	
		EU-8	n.d.	-	_	-	

To achieve these goals, Spain will need to undertake profound reforms and launch ambitious initiatives on at least the following fronts:

Front 1: Make health a central focus of public policies, in order to improve the resilience of the population at older ages

Four key policies are suggested to achieve this:

- Create a National Strategy for Healthy Ageing, based on the basic principle that health is affected by all policies and not solely by those that are considered to be strictly health policies. This strategy should be designed with the involvement of all society's stakeholders. It should focus on prevention and self-care of health throughout life (education on habits for healthy living from an early age is key) as well as strengthening public health policies and reducing health inequalities (based on gender, educational level, occupation and place of residence).¹⁹⁴ Due to their special prevalence and impact on the elderly population, mental health and neurodegenerative diseases should be core priorities in health policies [see chapter 9].
- Establish an autonomous independent Health Policy Assessment Agency, the purpose
 of which is to evaluate ex post before, during, and after interventions that have the
 greatest potential to improve life expectancy in good health and reduce inequalities.
 Those that demonstrate success should be built on and those that have social opportunity
 costs higher than the benefits achieved should be dropped.

- To underpin the solvency of the National Health System,¹⁹⁵ making structural changes in terms of organisation of health services along three basic lines:
 - Promote profound institutional changes that allow for the creation of a framework for good health governance. This would include: 1) increasing the transparency of the information provided to users, professionals in the sector, and the general public, facilitating access to planning reports on health services and health policies, communicating the cost of health services and providing free access to the results of the health services themselves by processes and centres; 2) improving the accountability mechanisms of the party responsible in the health system; 3) encouraging involvement and commitment of citizens and the professional sector in decision-making (for example, promoting the free choice of health centres and professionals, and making documents on health projects and policies available for consultation by professionals and the public); and 4) encouraging evaluation of health strategies and policies.¹⁹⁶
 - Transition from a healthcare organisational model highly oriented towards the treatment of acute events, such as the one we have today, to a model that is more focused on chronic conditions. That is, devote more resources to controlling the development of chronic diseases and focus on secondary prevention (detecting diseases at early stages) and tertiary prevention of these events (treatment and rehabilitation to avoid diseases from worsening).¹⁹⁷ This will require strengthening primary care and further improving care coordination (primary and hospital care) as well as coordination between health services and long-term care. It will also be essential to prepare for potential emerging diseases, as the Covid-19 health crisis has shown us.
- Ensure that public financing and use of health services and benefits are oriented towards the efficient and equitable delivery of health outcomes. This would involve rules and procedures so that funding medical services, medicines and health technologies is done on the basis of its cost-effectiveness, and also taking into account criteria relating to equity. It would also involve evaluating the effective use of services, as well as the health provider organisations. Finally, it would entail discontinuing interventions that are commonly applied in health practice but whose effectiveness, safety and efficiency have not been proven (specific "do not do" programmes).¹⁹⁸

Front 2: Substantially increase older people's participation in work and society, taking account of differences in the health of the population.

To achieve this, we propose the following:

Progressively moving towards simplifying and adapting early, partial, flexible and active retirement schemes in order to improve the compatibility between pensions and work. To this end, it will be necessary to take into account the balance between the two objectives required of the compatibility programmes: increasing job vacancies and containing the Social Security system's financial costs. One way of achieving this would be to encourage active retirement, improving the percentage of the pension enjoyed during people's working stage, updating the pension at the end of the compatibility period, and establishing specific incentives for employers (such as reducing salary compensation linked to career length), among other things.¹⁹⁹

- Develop comprehensive programmes for retaining older workers and bringing them back into work.²⁰⁰ Retention must incorporate elements of recycling, updating and modernisation within the company, as well as aspects relating to health, well-being and adapting to the workplace. Reintegration, on the other hand, must be based on transforming the skills of people who cannot continue in the jobs they have been doing - either for health reasons or because of the excessive physical burden involved (for example "training work sabbatical").²⁰¹ A key aspect of these comprehensive programmes will entail aligning timetables and working hours to the physical and mental conditions of older employees.
- Create programmes based around individualised orientation services for preparing for transitions from working life to retirement.
- Implement campaigns that promote a change in the perception of old age, cutting out the negative stereotypes and prejudices that currently exist. It must be ensured that age is not a criterion for being excluded from work or any other field.
- Support entrepreneurship among seniors, improving incentives for older people to create their own businesses aligned with their interests and life values, and supporting the setting up of contact networks to encourage the sharing of knowledge and best practice among this group.²⁰²
- Set up spaces and programmes in which older people can maintain and promote active citizenship which include the development of interpersonal networks and the creation of new links. Older people who participate in general social activities or for their community could be recognised by receiving in-kind (non-pecuniary) compensation and enjoy public goods and services of their choice, or "credits" that could be exchanged for these services or other benefits.

Front 3: Guarantee sufficient pensions within a framework of a fully sustainable Social Security system

Strengthening the sufficiency and sustainability of future pensions must be a priority aim for the State and Spanish society as a whole. As we have seen, the demographic and economic changes that will take place between now and 2050 will add extra pressure on the public system. Improvements in the pattern of economic growth and the functioning of the labour market (increasing the employment rate and reducing employment insecurity) as proposed in chapters 1 and 7 of this *Strategy* will help, in part, to overcome this challenge. There are also a host of measures (some of which have already been outlined in the recommendations approved by the Toledo Pact)²⁰³ that can be adopted and implemented to ensure the dual aim of sufficiency (with a special emphasis on improving the purchasing power of minimum pensions) and long-term sustainability. Among them, we highlight three:

 Develop a system of supplementary pensions that, without undermining the centrality of the public system and its sufficiency, will by 2050 gradually approach those of today's most advanced European countries in this regard. This would make it possible to supplement retirement income from the public system, achieving higher total replacement rates and thus improving the extent to which retirement income as a whole is adequate, whilst at the same time making progress on the goal of making the pension system sustainable. A supplementary pension system like this would encourage savings, which would also contribute to more sustained economic growth. To achieve its purpose, this system should be owned personally such that it accompanies the beneficiary through the different phases of their active life and is portable between companies, and is illiquid until retirement. Exceptions to this would be situations of need such as serious illness, occupational disability or cessation of activity in the case of self-employed workers, among other reasons. Furthermore, it should be developed within a framework of dialogue between companies and workers.

- Continue to reform the public pension system to make it more sustainable, and align it to demographic changes (life expectancy) as they occur, introducing periodic review mechanisms associated with changes in economic and employment dynamics. It would also be advisable to develop measures to bring the contribution criteria for those working under the Self-Employed Regime into line with those of the General Regime, linking the contributions of the self-employed to their actual net income. Progress also needs to be made in protecting non-conventional workers, given their foreseeable increase in the future.
- Establish an advanced role for active retirement that allows us to prolong our working life in a satisfactory way for all of us.
- In the coming decades, and once the effect of the other measures has been assessed, the need to align the retirement age with the increase in life expectancy should be looked at, whilst paying attention to health inequalities.

These are just some of the ways to ensure sustainability in the system. Spain may opt for other complementary alternatives. In any case, the path to be taken must be one that **ensures fairness and equity between different groups and generations (present and future), so that the financing of pensions for some cohorts is not at the expense of an excessive burden on others.** In this regard, it would be advisable to **make explicit the implications on inter-generational equity** of any decisions taken, as well as **increase transparency** in the information offered to citizens in terms of calculating benefits, accrued rights, or financing Social Security, with the aim of reducing the population's uncertainty about their future pension and helping them to plan their retirement better.²⁰⁴

Front 4: Transform the Long-Term Care (LTC) System

There are issues to be resolved within our country's care system that cannot be delayed: improving and simplifying the management of the Autonomy and Dependent Care System (SAAD); reducing waiting lists; strengthening home care; prioritising direct provision of services; increasing funding; and the need for a comprehensive review of the SAAD. On this, it is worth noting the path opened by the recently approved *Shock Plan for the Autonomy and Dependent Care System*.²⁰⁵

In order to strengthen these action points and advance improvements to the care system as a whole, several measures are proposed:²⁰⁶

- Make progress towards greater professionalisation of LTC:
 - Develop a National LTC Training Strategy, aimed at achieving improvements in the training, qualification and accreditation of professionals working in the sector.
 - Increase the proportion of non-financial benefits (day centres, night centres, telecare, home help service, residential centres), and agree a minimum percentage of total benefits earmarked for services to encourage autonomy. Clear conditions for accessing financial benefits associated with home-based care (budgets, care inspections) should be also established, and in-kind services prioritised.
 - Remove barriers to accessing LTC services, by setting explicit maximum time limits for evaluating and providing the required service, and conveying information to the public to enable them to choose a care provider, based on the quality of care, the services offered and the price.
 - Improve coordination between the National Health System and LTC, through appropriate organisational development and with a view to models of care for chronic conditions and person-centred care. To support this change, the planning of health services and LTC should be integrated. A single information system should also be set up for the provision of these services, and encourage the role of "case management" professional.

- Caring for caregivers by:

- Devoting a percentage of the system's resources to training them.
- Promoting "respite and support services for carers".
- Creating specific psychological support programmes for caregivers.
- Reviewing employment regulations to protect caregivers, regardless of how they are hired (whether by a household or by an institution).
- Promoting a culture of care across generations and genders for a more equitable redistribution of informal care.
- Raising the social standing of care work, through education and campaigns to raise awareness of its importance.
- Encouraging co-responsibility in caring for the elderly, through greater numbers of men working in this area.

- Drive forward changes in forms of care:

- Encouraging citizens to choose the most suitable place for their care (home, institution, mixed).
- Favouring a person-centred approach²⁰⁷ as an ethical model for LTC both at home and in care homes.

- Promoting the use of new technologies (apps, internet monitoring, home automation adaptations) in the homes of people with limited autonomy.
- Driving the development of new forms of housing (sheltered housing, self-managed collective housing) and a reinventing of residential care to smaller and more modular models, such as cohabitation units, with more homely and personalised environments and settings.
- Encourage the creation of systematised LTC knowledge:
 - Improve information systems for residential and home-based LTC nationally and in a standardised way involving the collection of regular information on the types, services, characteristics and users.
 - Promoting research to build knowledge and analysis on the different forms of LTC.
 - Sponsoring pilots for experimenting with and validating new LTC models both in homes and care homes.

Front 5: Make it easier for women to have the number of children they really want to have

In Spain, we have fewer children than we would like to have.²⁰⁸ The data reveal that women in Spain would like to have 1.9 children on average,²⁰⁹ whereas the current fertility level is only at 1.2.²¹⁰ The most effective way to move in this direction is to achieve the improvements in employment and redistribution discussed in chapters 1, 7 and 8 of this *Strategy*, with a special emphasis on reducing job insecurity and improving work-life balance. At the same time, we will need to bolster family policies that have already produced the best results in other nearby countries.²¹¹ Among others, we highlight the following:

- Promote greater equality in the sharing of care work and co-responsibility.²¹²
- Strengthen the available options for state funded high quality early childhood education until over 50% of children aged 0 to 3 are in school (the national average is currently 37%).²¹³ Countries like Sweden and Denmark are already above this percentage, with a high level of involvement by state schools.²¹⁴
- Supplement the educational options for 0-3 year olds with assistance services that ensure
 effective schooling of children from the most vulnerable environments. It is proposed
 that families in receipt of the Minimum Living Wage should also have automatic access
 to school dinners and grants for fees at this stage of education.²¹⁵



Challenge #6

TO PROMOTE BALANCED; FAIR AND SUSTAINABLE TERRITORIAL DEVELOPMENT

EXECUTIVE SUMMARY

- Spain has seen a large increase in its urban population. In 1950, 50% of the Spanish population lived in cities; today that figure stands at 80%. This intense urbanisation has had very positive effects on Spain's economic and social development: it has enhanced access to services and infrastructures, stimulated the transfer of knowledge and innovation, and has created more education and job opportunities.
- However, urbanisation has also led to a very uneven territorial population distribution. Demographic aging and a shortage of employment and services are threatening to empty many rural areas (nearly half of all Spanish municipalities are at "risk of depopulation") and accelerating the population loss in some provincial capital cities.
- At the same time, urban concentration has led to significant challenges for cities: difficulties accessing housing have increased (45% of tenants earmark more than 40% of their income for rent), the environmental damage is greater due to heavier use of private vehicles, and phenomena such as social inequality and segregation have worsened in some cases.
- Urbanisation will continue over the coming decades. By 2050, 88% of the Spanish population is estimated to be living in cities with rural Spain losing nearly half of all its inhabitants. If measures are not taken, large cities and their metropolitan areas will become more extensive and disperse which will make them less socially and environmentally sustainable. Meanwhile, many rural towns and medium and small cities will become less economically sound and suffer a significant decline in their society and heritage.
- Fortunately, such scenario can be avoided. If the right policies are implemented and good use is made of megatrends such as digitalisation and the green transition, we can make the cities of the future healthier, more cohesive and more sustainable than they are now, as well as greatly improving the living conditions and opportunities in medium and small towns.
- For better health and urban sustainability, we must return to the compact, friendly city model; access to housing must be facilitated with a decisive commitment to affordable housing; encouraging building refurbishment; creating low-emissions areas; expanding green areas; and transforming the mobility model to favour public transport, carsharing, and active mobility (biking, walking).
- In order to promote balanced territorial development, we must reinforce the backbone role of medium-sized cities, enhance production diversification in smaller-sized towns, and guarantee access to services, all while improving transport connections and technology infrastructures, among other initiatives.

THE PAST: ACHIEVEMENTS

Cities are the engines of the world. The gathering of services, human capital and ideas make them hotbeds of innovation and major epicenters for creating economic, social and cultural opportunities. This is why *urbanisation* (the process of concentrating people and economic activity within urban areas) has grown apace since the Industrial Revolution. Currently, 55% of the population is concentrated in cities where around 80% of the world's GDP is produced.¹

Spain is by no means oblivious to this trend. Over the last century, **the population living in cities** has more than doubled, from accounting for 32% of the total in 1900² to 80% in 2020 ³ [Fig.1].



Fig. 1. Urbanization rates

This urban growth has had very positive effects on Spain's economy and society: it has facilitated the improvement of the services and infrastructures to which citizens have access, it has stimulated the transfer of information and knowledge, it has fostered the development of companies and new professional opportunities and it has contributed to an increase in productivity.⁵

Spain has been able to combine this growth in cities with enhanced levels of security and wellbeing for most of its inhabitants. Various data sources indicate that Spain's streets are some of the safest in the world⁶ and that its urban areas are some of the most child⁷ and elderly friendly.⁸ Moreover, the levels of tolerance for foreigners⁹ and trust among neighbours¹⁰ are higher than in many surrounding countries.

Despite the increasing difficulties, **accessing adequate housing in Spain is no more difficult than in most European countries** [Fig. 2]. The Spanish population reflects a higher ownership rate than the European average¹¹ with a similar housing cost overburden [Fig. 3]. The quality of the country's housing stock has significantly improved over the last few decades. Some 94% of Spain's homes are in good condition with practically all homes enjoying running water, a telephone line, and bathroom; 60% have heating. These proportions contrast with the 1970 figures when barely 8% of all homes had heating and only half had a bathroom or shower.¹² The data also show that the availability of m² per person has doubled from 1970 to 2011.¹³

Source: By the authors based on data from the United Nations.⁴

40% 35% 30% 25% 20% 15% 10% 5% 0% Belgium EU-8 Spain Finland Vetherlands Sweden Denmark France Austria EU-27 Germany Mortgage Rent

Source: Author's own based on data from the OECD.14



Fig. 3. Housing cost overburden rate, 2019



Because of these and other improvements, the percentage of people suffering from overcrowding (6% nowadays) and people suffering from serious hardship inside their home (2%) have gone down with both values below those recorded for the EU-27 and EU-8¹⁶ [Figs. 4 and 5]. Other types of housing problems such as severely sub-standard housing (slums) have also gone drastically down in the last 40 years. In Madrid alone, there were some 30,000 shacks registered at the end of the seventies with more than 100,000 people living in them.¹⁷ In 2018, only 132 sub-standard homes of this type were registered in the same city.¹⁸



Fig. 4. Percentage of the population (total and at risk of poverty) suffering from severe housing deprivation, 2019

Source: By the authors based on data from EU-SILC.19



Fig. 5. Overcrowding rate by poverty status, 2019

Source: By the authors based on data from EU-SILC.²⁰

With regard to environmental sustainability, the country's cities have also seen significant progress. Most Spanish municipalities have implemented measures²¹ aimed at reducing their environmental footprint and improving the usability of their streets. Thanks to this, the percentage of urban population exposed to high levels of air pollution has dropped substantially [Fig. 6], as has the percentage who believe they suffer from environmental problems²² [Fig. 7].



Besides being more sustainable, **the country's cities are now smarter** due to a more extensive and efficient use of sensors, open data and Artificial Intelligence when designing and managing urban areas. Spain has 83 cities with more than 50,000 inhabitants who are committed to using technology and innovation to improve issues such as saving energy, mobility, electronic administration, and services for citizens.²⁵

In short, the urbanisation Spain has experienced in the last few decades has been positive and successful. However, this does not mean there have not been any negative effects. As we shall see, the growth of cities has also led to an uneven territorial population distribution which has also created significant social, economic and environmental challenges in both rural and urban areas.

THE PRESENT: UNFINISHED BUSINESS

Spain has an average population density much like the EU-27.²⁶ Nonetheless, underlying it is **a very heterogeneous distribution over the territory** [Fig. 8], where the high population concentration in areas such as Madrid and Barcelona, the Mediterranean coast, the islands, some provinces of the Basque Country and Andalusia contrasts with the relative depopulation of other Peninsular inland areas.



Fig. 8. Municipality population density by province, Spain

Source: By the authors based on data from the INE (Spanish National Statistics Institute).27

The story of how the country got here is long and complicated.²⁸ **Cities** (municipalities with more than 10,000 inhabitants) **have followed a rather unequal evolution** in space and over time. During the second half of the 20th century, the population increased in most cities in Spain first due to migrations from rural areas and later from the development of the autonomous region model which decentralized government and made it so that provincial capitals and other medium-sized cities²⁹ could house public institutions, universities, businesses and better job and leisure opportunities.³⁰ After the nineties, however, this generalized rising trend began to revert in several

areas of the country³¹ due to the drop in the birth rate (negative population growth), a reduction in foreign immigrants, the inability to continue attracting people from nearby areas,³² and growing attraction to large urban areas.³³ Such is the case that **half of the country's capital cities have lost inhabitants since 2010** [Fig. 9].

There are very different underlying causes for this trend which is determined by a multitude of factors such as economic invigoration, access to transport infrastructures and geographic location (i.e. proximity to the coast or pertaining to metropolitan areas of larger cities).³⁴ In any case, the conclusion is the same: **population decline does not only affect rural Spain; it is also occurring in many medium-sized cities throughout the country, including provincial capitals and county seats**.



Fig. 9. Population growth in provincial capitals between 2010 and 2019, Spain

Source: By the authors based on data from the INE (Spanish National Statistics Institute).³⁵

With regard to rural municipalities (less than 10,000 inhabitants), most have lost population in the last few decades.³⁶ The so-called rural exodus began in the sixties and has not stopped since. The arrival of foreign immigrants to Spain between 2001 and 2008 slowed the rural population decline a little in some areas.³⁷ However, the 2008 and 2011 economic crises reactivated the process³⁸ and consolidated the rural abandonment trend which neither the economic recovery nor the recovery of the influx of immigrants could reverse over the following years.³⁹ Thus, the percentage of the population living in rural towns has dropped from 27% in 1981 to 20% in 2020 [Fig. 10]. Currently, nearly half of all Spanish rural municipalities are at "risk of a population decline",⁴⁰ a phenomenon that affects practically all autonomous regions⁴¹ [Fig. 11] and has major social, economic and environmental implications for the entire country.⁴²



Fig. 10. Percentage of the Spanish population

living in towns with less than 10,000 inhabitants.

Fig. 11. Municipalities with population decrease between 2010 and 2019, Spain



Source: By the authors based on data from the INE (Spanish National Statistics Institute). $^{\rm 43}$

Source: MITECO (Spanish Department for the Ecological Transition and Demographic Challenge).⁴⁴

Population decline in rural Spain has intensified due to the progressive population aging.⁴⁵ The average age of Spanish society as a whole is 43.6 years, yet this average is closer to 50 in municipalities with less than 5,000 inhabitants [Fig. 12]. The proportion of people aged 15-19 in those areas compared to retirees dropped 41% between 2000 and 2018.⁴⁶ As the younger population leave their birth villages due to a lack of opportunities, the proportion of elderly people is rising.⁴⁷ As a result, **there are now 1,109 municipalities in Spain where no child aged 0-4 lives and there are 393 where most of their inhabitants are over 65.⁴⁸ The low birth rate in these population centres,⁴⁹ partly explained by the large number of young women who have migrated from the countryside to the city, has made the demographic growth in these more unpopulated areas negative even when these migrations have stalled.⁵⁰**



Fig. 12. Average age by town size (inhabitants) in Spain, 2020

Source: By the authors based on data from the INE (Spanish National Statistics Institute).⁵¹

The causes

The divergence between the demographic behaviour of urban and rural areas is due to a number of economic, social and cultural factors. One of the main ones is no doubt **the greater attraction cities offer regarding access to services,**⁵² **infrastructures, and employment,**⁵³ **education and leisure opportunities**. The increasing concentration of employment in Spanish urban municipalities is a clear reflection of this [Fig. 13]. Moreover, there is evidence that wages (as well as expenditure) tend to be higher the bigger the city is due to the learning and productivity benefits usually involved.⁵⁴ Thus, the average household income in Spanish urban areas, adjusted for the population's buying power, totaled 20,608 euros in 2019 versus 15,638 euros in rural areas.⁵⁵ In contrast, the lack of diversification of rural economies (very much still dominated by the primary sector) tends to mean less dynamic job markets and limited job and professional development opportunities, especially for women.⁵⁶



Fig. 13. Difference in Social Security affiliation between urban and rural municipalities by provinces, Spain

As far as **access to services and infrastructures**, and despite the great progress seen over the last few decades, the difference between the rural world and urban world is still notable. This is due to the fact that it is more profitable for public administrations and companies to offer services in densely populated areas where they are able to cover more needs for similar overhead costs. Thus, the services and infrastructures in rural areas are much less developed. This reality can be seen, for example, **in the area of broadband access where the urban-rural divide in Spain is still significant** and much greater than is observed in the most advanced European countries [Fig. 14]. Similarly, there is more motorway and highway density in places with a more heavily concentrated population [Fig. 15], which facilitates interactions with other areas, increases the market size for the purchase and sale of products and services and reduces production costs.⁵⁸

Source: By the authors based on data from the Digital Atlas of Urban Areas of Spain.⁵⁷



Source: Author's own based on data from the OECD.59

Fig. 15. Motorway and highway density by Spanish provinces, 2018



Medium (0,05) High (0,1)

A different urbanisation model

The population of the various towns is not the only thing that has changed over the last few decades. An urban model that is different from in the past has also been gradually forming. Up until the eighties, most Spanish cities reflected what is known as the "Mediterranean city" model, which is characterized by compact cities with diverse uses (residential, commercial and services) which tend to be near to one another. This model, the roots of which date back to antiquity, offers several advantages: more efficient use of infrastructures and resources, it encourages social integration, is good for attracting tourism,⁶¹ and enables the development of active mobility habits⁶² which are key to better health and wellbeing.⁶³ As of the nineties, however, suburbanisation processes (the growth of residential areas outside the cities, mostly occupied by the middle classes)⁶⁴ began transforming this urban model towards a more disperse and less dense one [Fig. 16], which is associated with higher land consumption, an increase in environmental pressure, longer travel times and a significant increase in the costs of service provision.⁶⁵

Fig. 16. City Models: Compact Versus Disperse



Source: Adaptation based on Sanabria Artunduaga, Tadeo Humberto, and John Fredy Ramírez Ríos, 2017.66

This rise in suburbanisation was **very much linked to the expansion of the construction sector** up until the 2008 crisis.⁶⁷ In those years, most new homes were built in medium-sized cities and their metropolitan areas,⁶⁸ forming low-density urban developments.⁶⁹ Part of this expansion was **the result of the economic internationalisation of metropolises, the location of business centres in the suburbs**⁷⁰ **as well as the formation of new households** with the latter due to the entry of the immigrant population and the increase in the number of people leaving the nest during those years of a positive economic and employment situation.⁷¹

Many households found that these metropolitan areas better suited their **housing preferences**,⁷² both in terms of the housing characteristics (size or availability of communal areas and parking) and prices. Nonetheless, it is also true that there was a major imbalance in Spain between the demographic and housing market growth⁷³ given that a significant portion of this expansive urban development did not meet any real housing need but rather involved the acquisition of second homes⁷⁴ and fulfilled builders', town halls' and owners' own economic interests. Proof of this can be found in the fact that **25% of the homes in Spain in 2019 were not habitually occupied** either because they were empty or used as second homes.⁷⁵

Other factors that may have aggravated the unequal population distribution throughout the territory and rise of suburbanisation in the last few decades included **the fiscal differences between the various autonomous regions**,⁷⁶ **the complex legal and regulatory framework, and the lack of any coordinated territorial policy**.⁷⁷ The first of these aspects has influenced the location of production resources and company headquarters. On the other hand, legislative plurality has limited the creation of synergies in the distribution of infrastructures and resources, thereby affecting the population distribution throughout the territory.⁷⁸ As well as this, several autonomous regions still do not have territorial planning guidelines that serve as a strategic guide within their regions⁷⁹ and, in terms of town planning, despite the fact that nearly 70% of municipalities have a General Plan,⁸⁰ the time required for its modification does not allow them to respond to a rapidly changing reality. Finally, in addition to all of the above is the fact that urban development processes often extend beyond municipal borders without really any effective coordination between metropolitan and provincial policies.⁸¹

The implications of the territorial imbalance in Spain

The territorial dynamics described have had and have a deep impact on the economy, society and the environment. In fact, **they are closely linked to many of the structural challenges facing Spain** which are discussed in this *Strategy* [see chapters 1, 3, 4 and 8]. More directly, they have led to or worsened four significant challenges that must be resolved over the coming decades: 1) difficulties accessing housing, 2) the deterioration in the environment and urban health, 3) inequality and social segregation, and 4) the loss of dynamismin the rural world.

I. Difficulties in accessing decent and adequate housing

Spain has one of the highest home ownership rates in Europe (76%) and one of the highest percentages of population living in their own property without any type of mortgage (47%).⁸² Notwithstanding, this does not mean the population's residential needs are wholly satisfied. In fact, **the numbers indicate that accessing a decent and adequate home in Spain is becoming ever more complicated.** With regard to owning homes, the rising difficulty of securing a mortgage stands out. Over the last two decades, the sharp drop in interest rates has stabilized the proportion of income households earmark each month for paying a mortgage (at around 30%), and far from the 60% observed prior to the 2008 crisis.⁸³ It has also meant that a lower and lower proportion of people must over extend themselves⁸⁴ to try and make their pending mortgage payments (currently less than 4%).⁸⁵

Yet even though monthly instalments have gone down, **the initial effort it takes to buy a home** (ratio between the value of the home not covered by a mortgage and household income) **has considerably increased**.⁸⁶ The harsher requirements for bank loans⁸⁷ following the financial crisis along with the high seasonality of the job market and low wages have made access to buying quite difficult.⁸⁸ This is especially true in large cities like Madrid, Barcelona and Bilbao, ⁸⁹as well as among the segments of the population with the lowest capacity to save such⁹⁰ as young people and lower income households.⁹¹

At the same time, **the proportion of the population living in rented housing has increased considerably** even though it continues to be quite lower than most countries surrounding Spain [Fig. 17].


Fig. 17. Share of population living in rented housing with a reduced price rent, 2019

Source: By the authors based on data from EU-SILC.92

The increase in demand, along with an insufficient number of homes available for rent,⁹³ has led to a **sustained rise in rental prices over the last few years** particularly in Madrid, Barcelona, Malaga, Valencia, and some areas of the Balearic Islands and Canary Islands.⁹⁴ This increase, added to the **low number of subsidized homes**⁹⁵ in Spain (only 2.5% of the total number of primary residences are estimated to be reserved for subsidized rent when such percentage exceeds 20% in countries like Austria, Denmark and Holland)⁹⁶ has led to a **significant increase in the proportion of people who are financially overburdened when it comes to to paying their rent** in this country, which now reflects **one of the highest rates in Europe for such figure** [Fig. 18].



Fig. 18. Housing cost overburden rate among tenants (% out of the total number of tenants, 2019.

Source: By the authors based on data from EU-SILC.97

The increased difficulty accessing a home, along with the precarious employment situation, has had **very profound effects** on this country: it has contributed to the increase in inequality [see chapter 8]; it has altered social dynamics, and has further prolonged the length of time young adults remain living with their parents.⁹⁸ At present, 64% of all Spaniards between the ages of 18 and 34 live with their parents. This proportion is much higher than in the EU as a whole (50%)⁹⁹ and the figure for Spain just two decades ago (51%).¹⁰⁰ This delay in the age of leaving home has also contributed to a higher average age of first-time mothers, a drop in the birth rate, and worsened living propects for millions of young people¹⁰¹ along with everything this implies for the country's overall economy and society.

As far as housing quality is concerned, the situation in Spain is rather favourable in comparison with most European countries. However, there are significant unresolved challenges that affect the most vulnerable groups in particular. For the population below the poverty threshold,¹⁰² housing quality has substantially worsened: 11.3% are living in situations of overcrowding and 4.9% are experiencing severe housing deprivation.¹⁰³ All of this has a real impact on the physical and mental health of this segment of the population.¹⁰⁴

Another unresolved issue is that of **reducing the energy poverty**¹⁰⁵ still affecting many households in Spain, especially those headed by women and people over the age of 65.¹⁰⁶ Nearly 17% of all households in this country face energy bills which are in absolute disproportion to their income,¹⁰⁷ and 8% cannot keep their homes at an adequate temperature; this percentage is similar for the EU-27, but much higher than for the EU-8 [Fig. 19].





Source: By the authors based on data from EU-SILC. 108

One additional aspect that must be improved is **accessibility to buildings, which is key to the social inclusion of the population with mobility problems.** In 66% of Spanish residential buildings, people in a wheelchair can not get to the door of a home from the street without help.¹⁰⁹ This situation will be more problematic in the future because of the ageing population.¹¹⁰

II. Environmental deterioration, quality of public areas and improvement in urban health

Spain has made great progress in urban sustainability over the last two decades. In spite of this, the country's cities still face major challenges concerning their ability to reduce urban health problems, fight climate change and environmental deterioration as well as adapt to the most negative effects.

The recent trend towards a more disperse and lower density city model has made some of these issues worse, particularly as concerns mobility. City compartmentalization into different areas with various purposes (work area, residential area, leisure area) has caused **an increase in urban and metropolitan travel**. Travel on foot, by bike or by public transport is more common in city centres while the use of private vehicles is predominant in the surrounding metropolitan areas.¹¹¹ Such use in Spain is generally very polluting as the average cars are much older than in neighbouring European countries.¹¹² This has brought several negative consequences. Nowadays, **around 60% of the public areas in major Spanish cities are for private vehicles (circulation and parking)**,¹¹³ meaning a significant decrease in the public space available for pedestrians and residents. Moreover, travel by car is responsible for many of the air and noise pollution and congestion problems suffered in the cities, all of which generate harmful effects for the environment and people's health.

Although air quality has improved in recent years, in part due to greater awareness of the impact of pollution¹¹⁴ and the implementation of measures such as low-emissions zones,¹¹⁵ the most congested cities continue to surpass the regulated limits for air pollutants,¹¹⁶ which causes thousands of deaths and diseases each year [see chapter 4]. Moreover, Spain still has relatively high noise pollution levels. In 2017, more than three million Spaniards were exposed to high noise levels according to the European Environment Agency.¹¹⁷

Finally, the trend towards a more dispersed city model has also led to an increase in the environmental footprint of urban areas and their disconnection from rural areas, thus increasing the cost of providing public services and making the development of sustainable, short-distance supply chains more difficult.¹¹⁸

III. Poverty, Inequality and Social Segregation

Spain has one of the highest poverty rates in Europe [see chapter 8]. This rate is higher in rural areas;¹¹⁹ however, it is in the cities where the lack of resources may have a greater impact on the population's quality of life. Nowadays, **23% of all people living in urban areas are at risk of poverty or social exclusion**, which exceeds the EU-27 average (20%).¹²⁰ The number of vulnerable neighbourhoods in Spanish cities (918 in 2011) has increased since the start of the 21st century along with the number of people living in them.¹²¹ In many places, the situation is truly concerning. In fact, a recent UN report highlighted the extreme poverty found in some Spanish neighbourhoods as one of the unresolved issues that our country must tackle.¹²²

At the same time, poverty is just a part of a much bigger problem: **income inequality**. This is one of the great paradoxes of modern cities: **although the urban areas offer better opportunities and higher income levels, they also reflect higher inequality than the rural world**.¹²³ Such inequality is associated with social/spatial segregation issues which create a differentiated population distribution in urban areas based on income level, origin, gender and age. The factors behind this segregation are quite diverse and numerous¹²⁴ yet the housing market is perhaps the main one.¹²⁵ Real estate development, the interest in centric areas among certain population segments (the recent gentrification¹²⁶ and touristification¹²⁷ phenomena) as well as the increased presence of office space in residential buildings have worsened this segregation in big cities leading to a certain displacement of the people with fewer resources to the peripheral areas and resulting in changes to the social makeup and local trade in affected areas.¹²⁸ **There are numerous significant negative impacts of urban segregation for the entire country.** The increased segregation tends to create a less cohesive society, limits long-term economic growth,¹²⁹ increases tensions and conflict,¹³⁰ and also reduces wellbeing and education and job opportunities in certain neighbourhoods.¹³¹

IV. Loss of dynamism in the rural world

Although the aforementioned challenges have had a greater impact on cities, the rural world has also been deeply affected by the imbalances in the country's territorial development. Firstly, the ageing and declining population has been accompanied by **a sharp drop in economic dynamism**.¹³² Thousands of companies and jobs have been lost in small towns,¹³³ and this has conditioned residents' income levels and wages.¹³⁴ This trend is added to a deterioration in access to basic services such as education, medical care, public transport and banking¹³⁵ making it more difficult for those who wish to remain in rural areas.¹³⁶

The emptying of rural Spain has **also accelerated the environmental deterioration of several places around the country and aggravated the climate emergency**. Difficulty in obtaining land has limited the inclusion of younger generations in farming.¹³⁷ The abandonment of many farming and forestry practices has increased vulnerability to fires, soil erosion and the loss of biodiversity,¹³⁸ while putting at risk the development of some primary activities which are essential to the entire country¹³⁹ [see chapter 4].

Likewise, this rural depopulation is endangering the conservation of a significant portion of the country's material heritage (churches, traditional architecture, roads, bridges) and immaterial heritage (dialects, oral traditions, dances, festivals, artisan techniques, culinary traditions)¹⁴⁰ with consequences for people's wellbeing and the country's cultural identity.

THE FUTURE: CHALLENGES AND OPPORTUNITIES FOR THE COMING DECADES

The short-term: life in cities and rural areas during Coronavirus

The pandemic has revealed just how vulnerable our country's towns and cities are to public health and environmental emergencies, which will almost certainly increase in frequency and severity over the next few decades as a result of climate change and the deterioration of our natural environment [see chapter 4]. The social and economic impact of the coronavirus has been particularly severe in the most vulnerable and impoverished towns and neighbourhoods, largely due to the employment situation of their residents (greater precariousness and less access to teleworking) as well as their poorer health,¹⁴¹ but also because they do not have adequate housing, live in overcrowded conditions or are more dependent on the use of public areas.¹⁴² During the lockdown, many homes were proven to have too little space and reflected a lack of adaptability for new activities such as teleworking and education in addition to deficiencies in ventilation, acoustic and thermal insulation, and not to mention a lack of sufficient natural light and balconies. Urban areas particularly suffered the impact of the pandemic as more recurrent and sustained restrictions were adopted. Even though the population in rural towns got through the public health crisis better, its effects were also significant considering the difficulties accessing certain public or commercial services within a nearby radius.

Whatever the circumstances, the pandemic also brought **many opportunities for change** which is the not too distant future may be useful to modifylife in cities and dynamise rural areas. On the one hand, the drop in traffic over the months of greatest restrictions on mobility led to a **significant decrease in** air and noise pollution,¹⁴³ thus making clear the positive effects of less car use on our cities if the right measures are implemented. The crisis also led to the **reassessment of public areas** and made clear the need to recover areas currently used by motor vehicles. Moreover, the coronavirus led **people to placing much higher value on having natural areas nearby, away from any urban congestion**. It is still too early to know if this will lead to a certain exodus to the rural world or smaller cities by some segments of the population; however, the greater use of remote work could boost this trend.

Meanwhile, the crisis has also helped **speed up some changes that had been gradually observed in recent years as far as consumption channels and habits**. The rise in e-commerce and the development of food delivery logistics platforms are proof of this. Thus, in a context of the complete collapse of global production chains, it is hardly odd that the ties between cities and rural areas have become more highly valued, especially those concerning food supply.

Finally, the pandemic highlighted **the resilience and capacity for transformation in our social system**. During the lockdown, neighbourhood support networks became more important as they offered essential assistance to the most vulnerable. Social relations among neighbours were strengthened and helped people deal with the pandemic, especially when contact with family and friends was partially interrupted.

In summary, the coronavirus crisis helped us re-think our city model and its relationship with the rural world, thus creating a context that is conducive to major changes on both fronts.

The medium and long-term: changing trends

In the medium and long-term, our territorial model will go through profound transformations as a result of its interaction with a series of megatrends which will become apparent over the coming decades.

One of the most important will be **demographic aging and its impact on population growth.** Over the next 30 years, Spain's population will increase at around 5% to exceed 49 million people by 2050.¹⁴⁴ Notwithstanding, this growth will be mainly due to international immigration as more deaths will occur every year than births. This will have effects on the country's demographic structure with a clear **increase in the proportion of elderly** [Fig. 20]¹⁴⁵ and those born abroad [see chapter 5].





Source: By the authors based on data from the INE (Spanish National Statistics Institute).¹⁴⁶

Such a change in the demographic dynamics **will affect the various regions and municipalities in Spanish territory very differently**. From now until 2035,¹⁴⁷ nine autonomous regions and one autonomous city will lose population: Asturias, Castilla y León, Extremadura, Galicia, Cantabria, Ceuta, Castilla-La Mancha, the Basque Country, Aragón and La Rioja, in order of magnitude.¹⁴⁸ The population will increase in all the other regions. The biggest relative increases will occur on the islands (Balearic Islands and Canary Islands) and in the Region of Madrid [Fig. 21]. However, in absolute terms, the increases will be particularly concentrated in the Region of Madrid (where 614,049 more people will be living than now) and in Catalonia (with an increase of 414,060 people)¹⁴⁹ due to the arrival of people from abroad as well as from other autonomous regions.¹⁵⁰



Source: By the authors based on data from the INE (Spanish National Statistics Institute).¹⁵¹

The same asymmetry will affect the urban – rural balance. At the dawn of the digital revolution (end of the nineties), it was expected that the spread of the Internet and new technologies would have a corrective effect on the population distribution since it would help distribute the economic opportunities throughout the territory more evenly. However, the opposite occurred: the digital economy concentrated its activities even more in cities and metropolitan areas with an expansion of the services sector and greater accumulation of companies in urban belts.

Everything seems to suggest that **this trend will be maintained or even accentuate in the future.** Although the progress being made with teleworking, telemedicine, e-commerce and other innovations will make it possible to reduce the divide with the rural world in the coming decades,¹⁵² cities will continue to comparatively offer citizens more opportunities for education, employment and services. As a result, **the proportion of the resident population in urban centres will continue to rise and may even move from the current 80% of the total to 88% in 2050.** ¹⁵³ This same trend will also be seen in Europe and the rest of the world [Fig. 22].





Source: By the authors based on data from the United Nations.154

Moreover, it is quite possible that the **population concentration in large Spanish cities** such as Madrid,¹⁵⁵ Barcelona, Valencia and Zaragoza will become even more pronounced and there will be **a progressive expansion of the metropolitan areas surrounding them**,¹⁵⁶ as they will move from currently being home to 30% of the population to 32% in 2035.¹⁵⁷

As for medium cities, their future will largely depend on their participation in regional and national urban networks, their proximity to expanding metropolitan areas, their capacity to take advantage of all their economic potential, and the evolution of nearby rural population centres. If a medium city has the role of providing services to rural areas and these areas lose population or even disappear, the city will likely end up falling into decline unless it finds activities to self-sustain or joins metropolitan areas. This same logic applies in the opposite sense and, therefore, the development of medium cities will be essential in preventing an even greater exodus from our country's villages and achieving instead a more balanced distribution of the urban population.¹⁵⁸

With regard to **the rural population**, everything seems to suggest **it will continue declining from the current 9 million to 5 million in 2050**.¹⁵⁹ The process will not be the same throughout the territory at any rate. As a general rule, **the largest rural municipalities**, with between 5,000 and 10,000 inhabitants, are expected to **continue growing**,¹⁶⁰ while **the smallest population centres** (especially those with less than 500 inhabitants) **may experience severe population loss**. Given the absence of new births and the reduced capacity to attract population, towns with a more elderly population may die out naturally.

The destination of the country's villages will depend on many factors: their current size, their demographic pyramid, their proximity to nearby cities, their capacity for economic dynamism, and guaranteeing access to quality services as well as the commitment and ties of their people. Well-connected rural towns that are able to take advantage of opportunities provided by the green transition and digitalisation to boost their attractiveness as places to settle, and whichare brought to life through economic, educational, or cultural projects may retain and even draw in more residents. On the contrary, poorly connected peripheral rural towns with barely diversified economies will continue to lose inhabitants.¹⁶¹

There will be positive as well as negative effects from this contrast. On the one hand, the population concentration in larger towns may help re-organize public expenditure (i.e. that which is associated with health, education and waste management) and achieve greater economic dynamism in the country as a whole. On the other hand, the population decline in some medium cities and rural towns may increase the saturation of large cities, worsen the deterioration and abandonment of the country's natural ecosystems,¹⁶² provoke an immense cultural and heritage loss, and accelerate the economic decline in those areas, thus leading to the close of many businesses, the loss of agricultural, forestry and tourism activities and the depreciation of thousands of properties. Finding a balance between these potential losses and gains, and designing a strategy to halt the loss of dynamism in the smallest towns based on such balance will be one of the greatest challenges Spain must resolve between now and 2050.

The change in demographic structure will also modify our society's priorities. In the cities, it will force the refurbishment of thousands of buildings and public areas, the adaptation of services such as healthcare and mobility and the expansion of care networks to ensure a balanced distribution throughout the urban territory. In the rural world, where aging will be more pronounced, the implementation of these changes will be particularly relevant and, in some cases, quite complex. In any case, it is important to keep in mind that the new technologies, if developed under accessibility criteria, will facilitate the work quite a bit. In addition to being a challenge, these transformations will create a significant opportunity for economic and social development [see chapter 5].¹⁶³

Another *megatrend* which will alter the country's territorial model is **the green transition**. Over the next three decades, Spain must become a carbon neutral economy, resilient to climate change and sustainable in the use of its natural resources [see chapter 4]. As we will see, the country will have to undertake deep transformations in its territorial model which will affect the cities and towns, as well as the relationship between the two in order to reach this goal. Cities in general are more vulnerable to climate change,¹⁶⁴ as well as being responsible for most energy, water and food consumption not to mention nearly 70% of the greenhouse gases emitted in Spain.¹⁶⁵ Rural municipalities, on the other hand, will be key to produce clean energy, absorb emissions and ensure the sustainability of the country's ecosystems.

Likewise, the Spanish territorial model will be affected by **the digital revolution and progress in innovation which may help substantially improve the quality of life in the urban and rural world if well-managed**. The massification of technologies such as Artificial Intelligence, advanced robotics, autonomous vehicles, the Internet of Things (IoT) and 5G will have an impact on the way in which our cities operate and may give rise to new jobs, new businesses, new forms of consumption and service provision as well as new possibilities for management and government which may enhance citizen participation and facilitate accountability.¹⁶⁶ The increase in teleworking may reduce congestion in central hubs, expand the economic opportunities in many neighbourhoods and make living in new areas and towns attractive. To this end, the creation of innovation districts (knowledge districts of renewed urban development that are attractive for entrepreneurial initiatives and foreign investment)¹⁶⁷ may be one means of growth for smaller cities with a lower cost of living.¹⁶⁸

The use of digital technologies will also help design **smarter cities**¹⁶⁹ which are capable of identifying pockets of poverty and social vulnerability, adjusting traffic and public transport based on need at any given time, and better managing the supply of water and energy as well as waste management, among many other key issues for urban sustainability.¹⁷⁰

Furthermore, **the technology revolution will help enhance life in rural areas and smaller cities** by facilitating access to more and better jobs, information and service opportunities. In 2050, the digitalization of the public sector will bring services closer to all of the population; telemedicine will make it possible to serve thousands of patients each day in rural areas; e-commerce will take products to even the most isolated corners; and online education will allow those living in small towns to take the very same courses as those living in cities.¹⁷¹ Plus, teleworking will give people more flexibility when choosing a place of residence meaning the demographic loss expected for some villages may be mitigated. Getting goods and services closer to those who do not have them today combined with the benefits of living in small towns may make them increasingly attractive places to live.

The Spanish urban model and future challenges

The megatrends will also change (and will be modified by) the evolution of the Spanish urban model over the coming decades. Although it is impossible to anticipate anything with absolute certainty, everything seems to suggest that **the dynamic towards greater suburbanisation will hold steady and increase from now until 2050**, making cities become ever more extensive and dispersed and borders increalingly diffuse, as has already occurred in metropolises like London and Paris.¹⁷² This increase in dispersion may bring an increase in motorized mobility¹⁷³ and travel times and, in the absence of measures, a bigger environmental impact.

This dispersion trend will coincide with **and increase in the densification of consolidated areas which still allow for such** either due to the existence of available space, an increase in buildability or the refurbishment of areas in poor condition. There are many benefits of a potential urban regeneration: it may help invigorate the local economy, decrease social segregation and make progress towards the environmental sustainability of cities and their adaptation to climate change. However, an increase in densification may also lead to additional challenges for housing prices, availability and access to urban facilities (i.e. education, healthcare, culture and sports) or the healthiness of public areas. Greater densification also does not ensure the creation of communities or prevent problems like undesired loneliness.

It is reasonable to think that **the processes of touristification and gentrification observed in recent decades will continue**. Once the current crisis ends and tourism goes back to prepandemic levels, many of the country's neighbourhoods are likely to become renovated and occupied by holiday rental flats and hotels or even homes for young people with greater buying power than the previous residents who may be forced to move to peripheral or less attractive neighbourhoods. This process may modify the social structure of the country's major cities, thus increasing segregation and altering the cultural and neighbourhood dynamics¹⁷⁴ as has already occurred in several places around Barcelona and Madrid.¹⁷⁵

This and the other undesirable processes described may, of course, be avoided. As will be seen, if we are able to take advantage of the opportunities afforded by the social, technological and environmental changes and implement the right policies, the Spain of the future may end up having more habitable cities, livelier villages and more just and balanced territorial development.

I. Guaranteeing access to housing

From now until 2035, **the number of households in Spain will increase by 1.1 million** at a slightly higher pace than has been observed over the last few years (73,600 new households a year)¹⁷⁶ and with trends differentiated by region [Fig. 23]. This increase in household formation will be due to demographic growth as well as a change in type, moving away from the traditional nuclear family with children model. Thus, the expectation is that **the average size of Spanish households will fall**,¹⁷⁷ the number of households with just one or two people will increase (accounting for 61% of the total in 2035) ¹⁷⁸ [Fig. 24], and there will be more households with elderly members.



Fig. 23. Household projection in Spain, 2020-2035

Source: By the authors based on data from the INE (Spanish National Statistics Institute).179





Source: By the authors based on data from the INE (Spanish National Statistics Institute).180

These changes, along with the trends already described, **may intensify the difficulties accessing housing in some areas of the country.** The situation will particularly affect young people residing in large cities and, above all, those with worse job conditions. Without decisive measures aimed at improving employment rates and job conditions [see chapters 1 and 7], the increase in prices will prevent many households from owning a home as they will not have the capacity to make a down payment or stable revenue to pay a mortgage. Therefore, rentals are expected to continue growing as the primary alternative¹⁸¹ even though the increase in prices in some areas will also make such access more and more erosive on tenants' incomes, thus turning shared rentals into real options for some sectors of the population.

In this context, other **alternative occupation formulas** may become more relevant than the traditional purchase or rental ones such as temporary ownership¹⁸² or shared ownership.¹⁸³ The collaborative economy may also erupt onto the housing market in Spain: some shared housing methods (like cohousing) may become interesting options for young people as well as the elderly, leading to new forms of intergenerational co-existence. In any case, many people will not be able to access decent and adequate housing without support from the State, meaning it is believed that **the potential demand for subsidized housing in Spain will nearly double over the next decade** from the 1.5 million homes some studies calculate as necessary currently to 2.6 million by 2030.¹⁸⁴ One of the key aspects will no doubt be that their implementation takes in to account people's real housing needs and prevents the development of a new social-spatial process of segregation.

Reducing the difficulties accessing quality housing is crucial to improving birth rates, favouring household consumption and savings capacity, and thus preventing an increase in inequality, both regarding revenue as well as wealth, which is very much in Spain is very much dependent on owning a home [see chapter 8]. If we do not move in this direction, our large cities may lean towards a model of "rich owners and poor tenants",¹⁸⁵ thereby polarizing households with one or more owned homes (either because they have purchased them or received them in inheritance) and those living in rented or shared homes. While some of these households may have savings and resources to finance potential expenses (health, education, entertainment), a growing sector of the population will have to earmark a large part of their wages or pension to paying rent each month which may exacerbate the inequality seen among the elderly.

II. Improving environmental sustainability and urban health

By 2050, Spanish cities must be carbon neutral, free of pollution, more sparing and circular in the use of resources and have greater resilience to the impacts of climate change, especially in regard to people's health [see chapter 4]. In order to get there, major changes will be necessary on several fronts. Three are highlighted below:

Firstly, Spanish cities must develop a more sustainable urban model that will reduce the times and distances for travel between home, work and leisure places as this will minimize their environmental footprint and help improve people's wellbeing.¹⁸⁶ Along these same lines, the space

occupied by vehicles (circulation and parking) must be freed up and pedestrian areas expanded as such measures will benefit health and commercial activity in local neighbourhoods.¹⁸⁷ Initiatives designed to reduce traffic to a minimum and encourage pedestrian life with super-blocks, for example, will become more and more common in Spain.¹⁸⁸

Secondly, our cities will have to transform their mobility models.¹⁸⁹ The progressive widespread popularity of electric vehicles and autonomous vehicles¹⁹⁰ will contribute to this transformation although it will not be enough to reach the goals established for Europe as a whole. Thus, reducing the use of private vehicles in favour of public transport, shared mobility services¹⁹¹ (such as carsharing and carpooling), and active mobility models (biking, electric scooters and walking)¹⁹² with a special emphasis on metropolitan mobility will be essential. At the same time, the integration of all these mobility services must be enhanced with shared memberships, digital apps, and the use of technologies like Artificial Intelligence and the Internet of Things to optimize the design and management of transport networks based on users' changing needs.¹⁹³

The expansion of e-commerce and home delivery will pose an additional challenge as it is already threatening to turn the logistics sector into one of the main sources of pollution and congestion in the cities of the future.¹⁹⁴ In order to prevent this, **the last-mile delivery model** (the last step before a product arrives at a customer's door) **must be completely re-devised**. Companies will have to replace their current fleets of vans and lorries with lighter, carbon-neutral vehicles, possibly even including delivery drones. They will also have to find new delivery methods such as local neighbourhood pick-up points (mobile package boxes in urban centres) and use digital technologies to make the distribution chain more efficient while reducing goods traffic.

Thirdly, our cities will have to reduce the environmental impact of their buildings and public areas. This involves a mass renovation of the housing stock which is generally rather old ¹⁹⁵ and reflects a significant margin for improvement in terms of energy efficiency.¹⁹⁶ Nowadays, some 26,000 homes are being renovated a year in Spain; this accounts for 0.1% of the total stock.¹⁹⁷ In European countries like France and Norway, on the other hand, the percentage of renovated homes each year is 2%.¹⁹⁸ If we wish to adapt our homes to the new environmental paradigm, we must drastically increase the renovation rates.¹⁹⁹ The Spanish National Integrated Energy and Climate Plan (PNIEC)²⁰⁰ already indicates some 1.2 million homes must be refurbished from now until 2030, with a particular emphasis on enhanced energy efficiency with wall and roofing insulation and more modern building enclosures [Fig. 25]. These housing modifications must be done considering the characteristics and needs of modern households which will possibly favour smaller homes without architectural barriers, and that are adapted to people with reduced mobility all while considering the physical, mental and social health of those inhabiting them.²⁰¹ Additionally, electricity is expected to become more widespread in household climate control systems with a greater use of heat pumps powered by renewable energies as opposed to traditional gas boilers, not to mention the rollout of renewable and smart public lighting as well as an increase in self-consumption fixtures in line with the surge observed over the last few years.²⁰² Solar panels will supply homes with the electricity needed for lighting, cooking and heating and they may be used to charge electric vehicles as well as to store renewable energy at times of high production and low demand.²⁰³

Fig. 25. Projected energy-refurbished homes in Spain as per the PNIEC (2021-2030)



Source: By the authors based on data from MITECO (Spanish Department for the Ecological Transition and Demographic Challenge).²⁰⁴

Moreover, **Spanish cities will need to become greener**, with the expansion and re-designing of parks and gardens²⁰⁵ so they have hardier species that demand less water; the creation of noise-free areas; promoting the construction of planted facades and terraces;²⁰⁶ encouraging urban and peri-urban vegetable patches²⁰⁷ and the development of technologies like hydroponics and aeroponics;²⁰⁸ as well as improving the reuse of grey water and capture of rainwater for irrigation. In doing so, cities will expand their role as carbon drains and greatly reduce their consumption of resources, further enhancing their self-sufficiency in food supply, fostering biodiversity and increasing their resilience to climate change.²⁰⁹

Finally, better physical connectivity between cities, regardless of their size, and the rest of the territory with the incorporation of a new paradigm of infrastructure modernisation and environmental sustainability, the promotion of the railway and the development of intermodal transport nodes must be ensured.

All of these transformations will pose significant challenges for public administrations, companies and citizens both from the resource mobilization point of view and the management of the interests of different social groups. Yet, if well-managed, they may also provide opportunities for huge economic and social development. They will create thousands of jobs in crucial sectors in Spain, lead to energy bill savings and greater comfort in homes and workplaces, and improve people's health while enabling new forms of leisure and living in society.

III. Reducing poverty, inequality and social segregation

If decisive measures are not taken, economic inequality will continue to grow in Spain over the coming decades [see chapter 8]. This may lead to an increase in social/spatial segregation in cities, especially in the biggest ones, as they may become more and more atomised where people of different ages, income levels and origins barely interact. As already mentioned, the increase in the price of housing in some areas both for buying and renting may also add to the polarization of the spatial distribution of the population. Households with high buying power may mostly concentrate in the centre of cities or most socially highly-valued areas while lower-income households will do so in the more impoverished and worse-equipped urban areas. The result will be a less cohesive society with all of the social, economic and political consequences of such a situation.

In order to prevent this prognosis, cities that identify these risks must implement **decisive antisegregation actions** over the next few years which guarantee equal access to public services in all neighbourhoods, prevent housing discrimination,²¹⁰ mitigate the effects of gentrification and touristification (as the loss of identity and local commerce in metropolises) and foster intergenerational co-existence and the creation of a sense of community so as to reduce problems of isolation and loneliness. The goal must be for Spanish cities of the future to be places where people of different ages, origins and socioeconomic conditions live and interact cohesively.

IV. Dynamising rural Spain

In the next few decades, the heterogeneity of rural Spain is likely to intensify. The most isolated and smallest towns which are disconnected from the new infrastructure and transport networks as well as from urban centres for geographic or other reasons will probably continue to lose population. In some very extreme cases, they may end up completely depopulated.

At the same time, however, **many rural towns will begin enjoying new-found prosperity** thanks to greater economic diversification, the spread of new technologies and improved connections with other municipalities providing access to quality services.²¹¹ The ecological transition may also bring new opportunities to rural Spain as well as what is known as the "silver economy", which is associated with the needs and new interests of the elderly. Technological advances such as 5G, satellite Internet, robotics, autonomous vehicles and other social innovations will bring business, employment, and service (healthcare, education and transport) opportunities to places that have never before had them. For example, digital healthcare services will make it possible for those in rural areas to have lab analyses, receive care from specialists hundreds of kilometres away and complete administrative procedures with their mobile and electronic devices.²¹²

Likewise, the popularisation of emerging social changes and dynamics such as the revaluation of the environment and the increase in teleworking [see chapter 7], e-commerce and new forms of entertainment (i.e. watching series and content online instead of going to the cinema) may turn some disadvantages of living in a village around, with many people choosing to remain or even move to a rural area to enjoy the benefits of living in these areas:²¹³ a lower cost of living, better housing access and greater contact with nature, just to name a few. Moreover, the rural world may also be conducive for the development of innovative educational projects, new means of active aging and new cultural and sports activities.

To summerise, it is highly probable that less people will be living in rural Spain in 2050 than today. However, if a more integrated and balanced territorial model is developed, those who are able to take advantage of the opportunities created by trends like digitalisation, the green transition and demographic change will live better than ever.

How can this be achieved? Various measures will be suggested on the following pages.

WHAT CAN BE DONE TO ACHIEVE BALANCED TERRITORIAL DEVELOPMENT AND MORE LIVABLE AND SUSTAINABLE CITIES

Over the next few decades, Spain must achieve a more balanced population distribution throughout its territory to facilitate the development of a more prosperous, socially just, and environmentally sustainable economy. In order to do so, access to services and job opportunities in rural areas must be improved on the one hand and, on the other, the livability, sustainability and resilience of cities must be improved by opting for a compact urban model of proximity, thus enhancing territorial cohesion and implementing ambitious initiatives aimed at improving urban health and social inclusion.

To acheive these changes it will be vital over the next few years to reach a consensus, through social dialogue, on a **dashboard of measurable indicators and a list of specific goals** to monitor and update progress made in these areas as well as guide the ambition of these reforms. Here are some suggestions, following the principles outlined in the Introduction to this *Strategy*.

Goal 32. Progressively reduce the proportion of population suffering from housing cost overburden from now until 2050, especially those living in rented accommodation as they are the ones with the greatest overburden.

Goal 33. Increase the annual percentage of renovated homes using an integrated approach which includes enhancing their energy efficiency so that by 2050, 2% of the total stock is being rehabilitated (now, 0.1%) to be in line with the *European strategy for rehabilitation (Renovation Wave)* and the *Long-Term Strategy for energy renovations in the building sector in Spain.*²¹⁴

Goal 34. Reduce the maximum percentage of municipal waste deposited in landfill to 10% in 2030 (versus the current 53.4%),²¹⁵ thus complying with the shared EU objective.²¹⁶ For 2050, this goal must be even greater so that no municipal waste is deposited at landfill.

Goal 35. Reduce the number of people exposed to air pollution levels (PM_{2.5}) above the levels recommended by the WHO by as much as possible.

Goal 36. Eradicate energy poverty by 2050, in line with the European Committee of the Regions proposal.²¹⁷ Measures aimed at enhancing home energy efficiency should be added to increasing income and reducing income inequality [see chapters 1 and 8].

Scoreboard and Goals

Indicators	Place	Average 2015-2019 or latest data available*	2030	Targets	2050
32 Percentage of population suffering housing cost overburden ²¹⁸	Spain	9.5%	8.0%	6.5%	1 5%219
	ELL-27	9.2%	-	-	4.370
	LU-27	7.270	_		
	EU-8	9.4%	-	-	-
33 Proportion of dwellings rehabilitated per year (% of total stock) ²²⁰	Spain	0.1%	1.5%	1.8%	2.0%
	EU-27	n.d.	-	-	-
	EU-8	n.d.	-	-	_
 34 Municipal waste sent to landfill (% of total generated)²²¹ 	Spain	55%	10%222	5%	0%
	EU-27	25%	-	-	-
	EU-8	4%	-	-	-
 35 Population exposed to air pollution levels (PM_{2.5} particles) above WHO recommendations (% of total)²²³ 	Spain	51%	25%	15%	2%224
	EU-27	73%*	-	_	-
	EU-8	63%*	_	_	_
36 Energy poverty (% of population unable to keep their dwelling at an adequate temperature) ²²⁵	Spain	7.5%*	6.0%226	3.0%	0.0%227
	EU-27	8.2%*	-	-	_
	EU-8	3.0%*	_	_	_

In order to reach these goals, Spain must undertake extensive reforms on at least five fronts as set out in the Spanish Urban Agenda:²²⁸

Front 1: Foster more balanced territorial development so those who so desire can remain in medium and small cities as well as in rural areas.

- Improve and increase economic and employment opportunities in smaller towns, taking advantage of local resources and promoting rural development. This means:
 - Encouraging productive diversification by enhancing people's skills, boosting innovation and the knowledge economy [see chapter 1], and taking best advantage of the opportunities offered by trends such as the green transition and the digital transformation. To do so, entrepreneurism must be encouraged and SMEs must be supported with advising plans and feasibility analyses in accordance with the territorial potential, paying special attention to fostering youth and female employment. One starting point to be explored would be business incubators.²²⁹
 - Effectively updating and implementing the National Law on Sustainable Rural Development,²³⁰ considering the territorial heterogeneity when diagnosing priorities for action, evaluating the potential benefits of public/private collaboration, empowering local action groups, and focusing on protecting heritage and natural resources. the experience of the LEADER fund may be a good reference to this end.²³¹

- Reducing the digital divide between rural and urban areas, guaranteeing 100% of the population has 100 Mbps coverage by 2025, in line with the target established in the 2025 Digital Agenda.²³² In order to do so, digital infrastructures must be expanded and improved in rural centres by following the Spanish National Strategy for the Demographic Challenge,²³³ and developing digital education programs.
- Implementing a "Rural Guarantee Mechanism" which ensures the needs of rural communities are taken into account as concerns the design and application of sector and economic laws and policies.²³⁴
- Balance the presence of public bodies belonging to the state in each territory without creating duplicities. The digitalization of public administration may help achieve this [see chapter 1].
- Design a strategy for metropolitan industrial clusters aimed at preventing dispersion of efforts, reducing dependence on external areas, promoting the exportation of high addedvalue products and creating stable employment. Some examples include the aerospace cluster in Toulouse, the chemical corporations cluster in the Rhine basin (Bayer, BASF) as well as the robotics cluster in Pittsburgh, among others.
- Develop a network of strategically located innovation districts which attract talent and drive research and entrepreneurism by strengthening human capital as a key to improving people's wellbeing. Models such as the one in Boston (Boston Waterfront Innovation District),²³⁵ which is replicated in the metropolitan area (Kendall Square²³⁶ in Cambridge), could be implemented.
- Increase access to both public and private services in small towns, which requires:
 - Developing more integrated territorial planning, not necessarily focusing on municipal administrative limitations, based on people's needs and aimed at the optimal use of available resources.
 - Adjusting public infrastructure and services options in rural areas based on criteria of demand, basic needs coverage, and efficiency, with a particular focus on territories at risk of depopulation. The fundamental principle will be to ensure quality services are provided and deciding upon the most appropriate approach or strategy in accordance with the situation in each municipality. New technologies and social innovation will facilitate both the provision of services as well as the analysis and prediction of priorities for each population.
 - Facilitating the integration of rural areas in metropolitan systems and offering incentives for the creation of municipal groups with shared interests by improving the network of public transport connections and other shared mobility options so that they may benefit from those already existing without resorting to the use of private vehicles.

Front 2: Effectively guarantee access to decent and adequate housing while reducing the economic effort and improving its suitability

- With regard to the reduction of the economic effort, we recommend:
 - Increasing the availability of public and subsidized housing with the acquisition of homes in already consolidated buildings and communities, housing renovations or the construction of new homes.²³⁷ Their locations should prevent any new social/ spatial segregation processes.
 - Encouraging the rental of empty homes while offering property owners sufficient guarantees and controlling the quality of the housing offered. To do so, the creation or improvement, as applicable, of public rental listings²³⁸ and public/private collaboration frameworks that contribute to better management (partnerships or models similar to housing associations) are proposed.²³⁹
 - Creating a taxation system aimed at fostering both an increase in the range of rental homes on offer at affordable prices as well as effective access to housing for those in the lowest income brackets, particularly emphasizing territorial areas subject to greater tension. With regard to the second point, it is important to consider the ratio between rental prices and household income levels, as well as the regional and municipal heterogeneity of the Spanish housing market.
 - Establishing mechanisms to protect the stock of public housing and reserve land for housing subject to rent control, ensuring the maintenance and availability thereof as well as preventing their transfer to the private market.
 - Offering incentives for alternatives to absolute ownership and rental such as temporary ownership and shared ownership, adjusting such methods to the Spanish reality.
 - Guaranteeing households receive the correct information with regard to financing when buying or renting a home, thus facilitating residential mobility as household needs change. This implies ensuring their protection starting with the pre-contract phase, the professionalism of real estate agents and the creation of public advisory and supervisory systems that promote transparency (the Danish example).²⁴⁰
- To adjust the existing housing stock to the needs of today's households, the following is proposed:
 - To implement aid programs aimed at achieving universal housing access as well as alternative housing solutions such as exchange programs for housing managed by public agencies or partnerships where people with mobility problems may rent their home and become a tenant of another home that is better adapted to their housing needs.
 - To implement a National Strategy for integrated urban regeneration which particularly focuses on underprivileged and vulnerable neighbourhoods or those with a presence of shanty towns, as well as homes which are not in vulnerable areas yet are below the acceptable housing standard.

Front 3: Reduce the ecological footprint and improve the sustainability and environmental health of the country's cities

- Highlight the value of the compact, local urban model ("Mediterranean city") in the country's urban planning in an effort to improve people's health, foster inclusion and social interaction and increase cities' resilience to climate change.
- Promote the urban green transition by reducing the consumption of resources (water, energy, food) and improving their management. To do so, the following is suggested:
 - Develop strategies to improve adaptation to climate change in cities by integrating climate criteria in urban planning, developing municipal regulations and institutions that support and reinforce them, applying technologies that enable local risk assessment and a decisive commitment to nature-based solutions.
 - Integrate specific health and qualify of life criteria in urban planning in line with the One Health concept [see chapter 4].
 - Reducethe generation and improving the management of municipal waste. In the first instance, with measures that encourage less use of packaging and packing, limit food waste and foster community composting. In the second instance, with rubbish compacters in bins powered by renewable energies, smart fleet management systems and bin fill prediction.²⁴¹ Successful examples in this field can be found in Seoul and Singapore.²⁴²
 - Promote sustainable water management systems that facilitate the collection of rainwater, the re-use of used water and the reduction of flood risks with permeable paving, planted trenches, plant covers and green roofs on buildings.²⁴³
 - Encourage local food sourcing with the creation of urban and peri-urban vegetable patches and by setting up more local markets.
 - Implement measures aimed at energy efficiency and the use of renewable energies for all public infrastructures and buildings.²⁴⁴
 - Raise the volume of energy generated with photovoltaic panels on roofs so that a high proportion of the total solar energy produced in the country will be coming from this method by 2050.²⁴⁵ Moreover, legal frameworks and the necessary incentives must be established to facilitate the generation of energy in the power supply system, thereby enabling areas without generation capability to benefit from the energy captured from adjacent buildings.

- Promote the energy efficiency of residential buildings by renovating them to reduce energy consumption among the existing housing stock to around 35% from now until 2050.²⁴⁶ Actions to improve building energy efficiency should include: the installation of heat pumps for climate control and domestic hot water systems, the development of renewable energies and improvements to thermal building envelopes (facade and roof insulation, the replacement of wooden and metal frames, green roofs, etc.). The construction sector also needs to spread the application of solutions that comply with energy efficiency requirements as well as establish greater control for proper compliance. This energy renovation will also act as a lever for approaching the issue of energy poverty, eliminating architectural barriers and improving healthy housing, especially among people with disabilities and among the elderly.²⁴⁷
- Promote sustainable and inclusive urban and metropolitan mobility ²⁴⁸ [see chapter 4].
- Use the Spanish Mobility Law to develop Sustainable Urban Mobility Plans guided by health, specific age-gender perspective, climate change mitigation and adaptation as well as education and awareness as the transversal backbones in order to drive changes in mobility behaviours.
- Implement low and ultra-low emissions areas (such as the Low Emissions Area in Barcelona or Central Madrid), urban tolls (Stockholm, London, Milan) and super blocks (Barcelona), for the purpose of lowering air and noise pollution to the levels recommended by the WHO²⁴⁹ in addition to road accident rates. Further proposed is the establishment of maximum congestion and noise levels in Sustainable Urban Mobility Plans.
- Streamline delivery logistics throughout urban areas by establishing a regulatory framework and incentives that promote the use of low-emissions vehicles, implementing local drop-off and pick-up spots to reduce e-commerce logistics (returns and damaged items), creating ordinances on minimal storage areas and preventing delivery activities during peak traffic hours.
- Encourage the use of public transport, improving route efficiency and frequencies with Artificial Intelligence techniques. On a metropolitan scale, the connectivity between residential areas and the main public transport stops needs to be reinforced (such as in Vitoria Gasteiz) by increasing the frequency of radial connections and dissuading the use of private cars with public car parks at transport stations.
- Promote active mobility by expanding bike lane systems and guaranteeing quality pedestrian routes using not only the pavement but also stoplight cycles and all types of intersections pursuant to universal accessibility criteria.

Front 4: Work towards greater social cohesion by reducing vulnerability and social/spatial segregation while fostering the sense of community belonging

- Turning public areas into meeting places for co-existence and social integration that value daily living and contribute to the provision of care services. To do so, the following will be necessary:
 - Creating cultural and leisure areas which are adequately equipped in areas where they still do not exist or have not been sufficiently implemented all while following quality, accessibility and inclusiveness criteria and performing adequate maintenance.
 - Recovering areas used for vehicle parking and limiting the privatization of public spaces.
 - Improving the design of public areas and urban furniture, ensuring universal accessibility and facilitating diverse, intergenerational use.
 - Incorporating care needs into urban designs by expanding proposals like the MICOS Project in Madrid.²⁵⁰ Also proposed is the implementation of safe itinerary designs in the collective local space with less traffic around schools, parks, primary care centres, elderly centres, hospitals and any other location where this need is detected.
- Adding mechanisms and protocols for flexible action and networked social services so they may be more proactive in collaboration with key stakeholders in the early detection of social vulnerabilities. This includes social workers in the public arena and those working directly with groups at risk of exclusion.
- Developing a national integration and welcoming strategy for immigrants aimed at better understanding and meeting the needs and aspirations of recently-arrived communities, reducing stereotypes and prejudice, eliminating any form of discrimination in housing access and fostering social relations with the locals. This strategy shall take into account the needs associated with changing the future immigration profile.
- Approaching the problem of loneliness by developing early detection systems, emphasizing the value of community care among neighbours, implementing community co-existence plans and reinforcing social service interventions. To this end, encouraging volunteering and community action will be particularly relevant.

Front 5: Improving territorial dynamics governance, monitoring and evaluation tools.

- Expand and optimize available databases and statistics, increasing their frequency and including new indicators while desegregating them according to census tracts. This measure should be completed with a stronger role played by Observatories already in existence so they move beyond the descriptive dimension they mostly fulfil currently, and begin to actively contribute to analysis efforts (generating open data which are available to any user) and decision making by the competent bodies. Also suggested is the creation of new Observatories in fields where the new territorial and urban realties require them²⁵¹ as well as improved coordination between research and decision-making bodies.
- Implement a shared, continuous assessment and monitoring system for policies and plans to establish proper diagnostics, make quick modifications when the outcomes are not as expected and respond to unforeseen external changes.
- Implement effective multi-level, networked anticipatory governance systems in order to take best advantage of territorial synergies, streamline available resources and create new shares responses to the economic, social and environmental challenges of the future. To do so, the following is suggested:
 - Foster multi-level governance and strengthening methods of intra- and interterritorial collaboration by defining shared strategies among autonomous regions, implementing new metropolitan management systems and offering incentives for supra-municipal forms of collaboration when they are deemed efficient.
 - Develop a nationwide urban policy which promotes sustainable, inclusive and resilient long-term urban development and incorporates potential health risks and benefits as the criteria for decision making [see chapter 4].²⁵² It will be coordinated with relevant sectoral policies (such as housing, mobility or climate change) and implemented based on the collaborative framework established in the measure above. The purpose is to handle present challenges as well as prevent and act in view of possible future risks.
 - Boost the role of city networks such as the Global Covenant of Mayors,²⁵³ Eurocities²⁵⁴ and the Spanish Network of Cities for Climate.²⁵⁵
 - Increas cities' influence on decision making and the design of national, EU and international public policy. ²⁵⁶ This means empowering local governments as well as citizens by implementing the channels that foster more fluid communication with government administrations, overcoming the current difficulties of bureaucracy and taking advantage of all the potential of digitalization. All of this will favour the early detection of any problems, an increased sense of belonging and greater support for the measures adopted²⁵⁷.



Challenge #7

ADDRESS THE SHORTCOMINGS OF OUR LABOUR MARKET AND ADAPT IT TO NEW SOCIAL, ECONOMIC AND TECHNOLOGICAL REALITIES

EXECUTIVE SUMMARY

- Over the last four decades, Spain has undergone a profound transformation in its labour market, which has led to an increase in the employment rate from 50% in 1980 to 65% in 2019, a substantial reduction in gender gaps, and the significant improvement of the rights and working conditions of millions of people.
- However, this progress has been overshadowed by the persistence of problems such as high unemployment, high job insecurity, and job dissatisfaction, which have led to the marked segmentation of the labour market. In Spain, established companies and skilled workers with stable employment coexist with a majority of low productivity SMEs and workers in unstable employment. This duality is splitting our society in two and limiting the economic and social development of the whole country.
- The demographic and technological transformations of the coming decades will bring new challenges, but also new opportunities to redress this situation. Ageing will lead to 3.7 million fewer potential workers in our country. Unless reversed, this could lead to a fall in employment of -0.5 per cent per year by 2050, compared to the 2.0 per cent increase we have seen between 1995 and 2019. To neutralise this loss of labour force, it will be necessary to increase the employment rates of women, young people and the over-55s; incentivise legal immigration and boost the recovery and attraction of talent.
- Our goal must be to bring the unemployment rate to less than half and to reach an figure similar to that of the most advanced countries in Europe (80% in 2050). This means increasing our labour market insertion by 15 points over the next 30 years. It is an ambitious yet feasible goal and one that has already been achieved in a number of neighbouring countries.
- The spread of new technologies and the digital economy will profoundly change the way we conceive, organise and caryy out work. In the short term, it could lead to job losses and a worsening of the employment conditions of certain groups, a risk that will have to be countered by a firm commitment to retraining and an adequate provision of social safety nets. In the medium to long term, however, the technological transformation will create new jobs, increase productivity, and improve working conditions for most workers.
- To take advantage of the opportunities of the future, Spain must modernise its productive network; update and strengthen its active labour market policies; adapt its regulatory framework to the new economic and labour realities; update its collective bargaining mechanisms; and improve working conditions to make work a more satisfactory experience for all citizens.

THE PAST: WHAT WE'VE ACHIEVED

Employment is the foundation of any country's economy, a source of income, life stability and fundamental personal development for citizens. Since the transition to democracy, **Spain has undergone a profound modernisation of its labour market**, the balance of which has left important unfinished business, but also many achievements that should be kept in mind, as they are the irrefutable proof that our country is also capable of carrying out successful transformations in this area.

In the last four decades, Spain has gone from having a closed and antiquated economy, with a heavy reliance on agriculture,¹ to a dynamic and open economy, with a productive structure similar to that of our European partners. Thanks to this modernisation process, **Spain has managed to significantly increase the labour market integration of its population**, successfully incorporating groups that had not previously participated in the labour market. While in the early 1980s only 47% of our workforce was working,² in 2019 the employment rate was 63% [Fig. 1]. The key players in this process were women, who accounted for 70 per cent of the almost 8 million people who entered the labour market since 1980.³ Over this period, the female employment rate has doubled, reducing the gap between it and the male employment rate to 10 points, a gap which in the 1980s was more than 40 points ⁴ [Fig. 2].



This sharp increase in women's labour force participation has been accompanied by **a progressive narrowing of the gender gap**. In the last two decades alone, the gender pay gap has narrowed from 20% to 12%[Fig. 3], with an increasing presence of women in governance and decision-making bodies, on a par with the European average, both in the public and private sector⁷ [Fig. 4]. Today, Spain is among the EU countries with the lowest levels of gender-based and other forms of discrimination in the workplace.⁸



Fig. 4. Percentage of women on Boards of Directors



Source: Drafted by the authors based on data from Eurostat.9

Source: Drafted by the authors based on data from Eurostat.¹⁰

No less important have been the **advances in labour rights and conditions**,¹¹ many of them driven by European directives. We have forgotten that until not so long ago, most jobs in Spain were physically demanding and often dangerous. Accidents and work-related illnesses were frequent, and social protection mechanisms for such contingencies were very weak. Labour rights were limited, and abuses and violations were common. Dismissal was poorly regulated and unemployment benefits lasted barely half a year.¹²

Recent decades, however, have seen the modernisation of the productive network [see chapter 1] and the advances resulting from collective bargaining¹³ have led to a substantial improvement in working conditions in Spain.¹⁴ Fatal accidents at work have fallen by 60 per cent since the late 1980s [Fig. 5],¹⁵ the proportion of physically demanding jobs has fallen to one of the lowest rates in the EU,¹⁶ and jobs that are perceived as prestigious or more fulfilling have increased significantly.¹⁷

In addition, the number of hours worked per week per employed person have fallen from an average of 42 in 1980 to 37 in 2019,¹⁸ and the percentage of those working more than 50 hours per week has fallen from 13% to 7%, in alignment with the EU-27 and EU-8 averages.¹⁹ This reduction in working hours has been accompanied by the extension and recent equalisation of maternity and paternity leave,²⁰ and more flexible working hours, which together have led to a clear improvement in the work-life balance and the levels of well-being of millions of workers. At the same time, dismissal has been regulated, the minimum wage has been raised,²¹ and unemployment protection has been extended.²²



All these transformations have served to create a more flexible and efficient labour market. Unfortunately, and as we will see below, **most of these measures have been overshadowed by the persistence and/or worsening of a series of structural deficiencies that have made the labour market the great Achilles' heel of the Spanish economy today**.

THE PRESENT: UNRESOLVED CHALLENGES

Despite the progress made in recent decades in terms of rights, quality and integration, the Spanish labour market still suffers from a series of structural deficiencies that prevent us from converging with the EU-27 and with the most advanced countries in Europe, here grouped under the term "EU-8".²⁵ What are these shortcomings? Here we highlight four.

Firstly, there is the low employment rate. Despite the significant increase in recent decades, Spain has not yet managed to meet the labour force participation rate of the most advanced EU economies. The recessions of 2008 and 2011 cut short the route to convergence initiated in the mid-1990s. All the gains made since joining the euro were wiped out during the banking and sovereign debt crises. And, although the economic recovery that started after the Great Recession allowed for intense job creation, in 2019, Spain had the same employment rate as in 2008, and its gap with the EU-27 and EU-8 average was still 7 and 11 percentage points, respectively [Fig. 1].

This lower employment rate is reflected in high unemployment and high employment volatility. On the one hand, **Spain has an average unemployment rate much higher than that of most developed economies** (17% over the last four decades, compared to 8% in the EU-8 and 9% in the EU-28) [Fig. 7]; on the other hand, our country creates more jobs than any other when the economy is booming, but also destroys more in times of crisis. The result of this dynamic is that, in 14 of the last 39 years, our unemployment rate has exceeded 20%, an exorbitant rate,

even if we take into account that the official unemployment figures hide a significant segment of the population employed in the black economy.²⁶ Only once (between 2005 and 2007) was our unemployment rate close to the EU-8 average (9%), at a time when our economy was growing at 4% and in an unbalanced way [see chapter 1].²⁷



Fig. 7. Unemployment rate

Source: Author's own based on data from the OECD.28

One of the starkest manifestations of this reality is the **extraordinary level of long-term unemployment** in our country. In 2019, 5% of the labour force and 44% of those experiencing unemployment had been unsuccessfully seeking work for more than a year [Fig. 8].²⁹ This problem particularly affects those over 45 with a low level of education³⁰ and means that in at least 4% of households, the head of the household is long-term unemployed.³¹ The longer a person is unemployed, the more likely they are to give up looking for a job; a "discouragement effect" suffered by more than 280,000 people in our country.³²





Source: Author's own based on data from the OECD.33

The high rate of youth unemployment is another of the great unresolved issues with our labour market. In Spain, 33% of 16-24 year-olds who wanted to work in 2019 were unable to do so, compared to 13% in the EU-8 and 15% in the EU-27 [Fig. 9]. This low labour market integration of young people has severe implications for the country as a whole, as it affects phenomena such as the rising age of leaving home (among the highest in the EU),³⁴ the delay in having children,³⁵ and the reduction in fertility rates,³⁶ thus contributing to progressive demographic ageing [see chapter 5].



Fig. 9. Youth unemployment rate, 2019

The second shortcoming of the Spanish labour market is job insecurity, which is projected in at least four dimensions. Firstly, the high rate of temporary contracts.³⁸ In Spain, 1 in 4 employed persons has a temporary contract,³⁹ twice as many as in the EU-8 and the EU-28[Fig. 10]. This problem particularly affects the population with a migrant background⁴⁰ and young people⁴¹ [Fig. 11], who are finding it increasingly difficult to get a permanent⁴² full-time job.









Source: Author's own based on data from the OECD.43



Source: Authors' own, based on Eurostat data.37

A second dimension of job insecurity is the expansion of non-voluntary part-time work, which has accelerated since the 2008 crisis, and which disproportionately affects **women**⁴⁵ who also suffer a higher unemployment rate⁴⁶ [Figs. 11 and 12].



Fig. 12. Involuntary bias rate

Thirdly, job insecurity can be seen in the high labour turnover. Over the last decade, the chaining of very short-term temporary contracts,⁴⁸ coupled with an increase in the turnover of permanent contracts⁴⁹ and the expansion of some forms of atypical employment associated with digital platforms,⁵⁰ has led to an increase in the number of workers who change jobs every few years; something that often brings with it greater uncertainty and vulnerability for these people and their households.

Job insecurity can also be detected in the low quality of work that many of our workers suffer from: little autonomy and accident rates which remain high⁵¹ [Fig. 13], fewer opportunities for training and career development, and longer working hours than in many European countries [Fig. 14]. All these factors negatively affect our social well-being, as they increase absenteeism and sick leave, accelerate the flight of talent and reduce the productivity of those in employment.



Source: Drafted by the authors based on data from Piasna.52

Source: Author's own based on data from the OECD.47

Fig. 14. Daily time distribution, 2016



Source: Drafted by the authors based on Fernández-Crehuet.53

The third shortcoming is job dissatisfaction. There are numerous indicators suggesting that work in Spain is generally less fulfilling and enriching than in other European countries. Surveys tell us that 11% of our workers deal with emotionally disturbing situations (the highest percentage in the EU),⁵⁴ that 15% feel dissatisfied with their work situation [Fig. 15] that 31% do not learn anything on the job,⁵⁵ and that 1 in 3 suffer from work-related stress (a much higher proportion than the EU-8 or EU-22 average) [Fig. 16].⁵⁶ In fact, if they did not need the job to live, more than half of employed people in Spain would not work; in contrast, three out of four Danes or Dutch people would.⁵⁷ The truth is that we have failed to make work a positive and rewarding experience, something that affects both the productivity of our workforce and the subjective well-being of citizens [see chapter 9].



Fig. 15. People satisfied with their employment situation, 2018

Source: Authors' own, based on Eurostat data.58





Source: Drafted by the authors based on data from $\mathsf{OCDE}^{.\mathrm{59}}$

Finally, there is the problem of wage and employment polarisation, a phenomenon shared by most developed countries. In recent decades, technological change has played a key role in transforming the structure of the Spanish and European labour market.⁶⁰ Medium-wage occupations involving routine tasks (e.g. administrative or industrial tasks) have become increasingly automated and have been losing weight in the production structure, while those requiring high abstraction and decision-making skills (e.g. legal advisory services), or a high nonroutine manual content (e.g. care work) have seen their weight in the economy increase⁶¹ [Fig. 17]. This has resulted in **greater wage polarisation** (more high and low wages, and lower average wages), especially noticeable in cities,⁶² and in an increase in labour (working conditions, type of contract) and income inequality in Spain [see chapter 8].





Source: Authors' own, based on European Commission data.63
Taken together, the shortcomings described above (unemployment, job insecurity, job dissatisfaction and polarisation) have led to a marked segmentation of the Spanish labour market, divided between companies and skilled workers capable of generating and performing productive and stable jobs; and many SMEs and workers who are forced into unproductive and unstable pairings and, therefore, job insecurity, unemployment and, in many cases, poverty. This phenomenon, often referred to as "duality," is splitting our society in two and is severely limiting the economic and social development of our country. Progress in reducing it will be crucial if we are to take advantage of the opportunities of the digital revolution and compete on a level playing field with the world's most advanced economies.

The channels of improvement

The causes of the dysfunction of our labour market are numerous and complex. In an effort to summarise, they could be grouped into two: **the particularities of our production system and the characteristics of our regulatory framework.**⁶⁴ Reducing unemployment, seasonality and job insecurity requires simultaneous work on both fronts. Only in this way can we create stable, quality jobs and reduce volatility in the face of changes in the economic cycle.

Let us start with the production system. As we have already seen, the deficit in human capital, the lower technological implementation in the business network, the limited effort in innovation, and the existence of bureaucratic obstacles limit the growth of our companies, which are predominantly small in size [see chapter 1]. This, in turn, restricts the development of new ideas and products, and means that our productive structure is biased towards industries with lower added value, whose demand for human capital is also lower, and where recourse to temporary employment becomes the first resort when faced with a crisis. Consequently, incentives for training and for the implementation of workforce requalification programmes are substantially reduced.⁶⁵ The first way to improve the situation is therefore to break with this dynamic, which has been a feature of our economy for decades.

The other front that needs to be addressed concerns the **regulatory and institutional factors** that characterise our labour market. Although the Spanish economy does not reach the productive complexity or the average level of human capital of the EU-8, it is in the upper part of the world distribution in these variables. However, unemployment and temporary employment rates remain higher than those of the world's most advanced countries and, in many cases, exceed those of countries with a less sophisticated production system and a less educated population [Fig. 18].⁶⁶ This shows that, in addition to improving business and productive dynamics, some **regulatory dysfunctionalities need to be corrected if we are to lay the foundations for a more efficient and equitable labour market**. This will require review of three priority areas: labour regulation, collective bargaining and active labour market policies.

Fig. 18. GDP per capita, unemployment rate and seasonality rate, 2019



Source: Authors' own, based on Eurostat data.67

I. Labour regulation

Labour regulation explains, in part, the high level of temporary employment in our country. The reforms of the *Statute of Workers* in the early 1980s opened the door to the increasingly widespread use of **formal temporary contracts**, that is, contracts that do not respond to companies' temporary production needs. What was initially conceived to create flexibility in entering the labour market has also created flexibility for job destruction in times of recession, especially among those who had been employed in the company for a short time.⁶⁸ Today, despite successive reforms, the practical application of the regulations continues to allow a high level of fraud in temporary contracts, without sufficient supervision and penalties for the perpetrator⁶⁹ and improper use of temporary and permanent contracts,⁷⁰ and the difficulties in establishing objective grounds for dismissal in permanent employment relationships⁷¹ have also encouraged the use of temporary contracts.

The result of all the above is that **temporary contracts continue to have an excessively high weight in our labour market**. This results in **high employment volatility** by fostering extensive adjustment, based on a "hire and fire" policy, rather than intensive adjustment, where firms and workers negotiate changes in, for example, wages or hours worked.

In the case of SMEs and the public sector, the use of flexible temporary contracts for jobs that are often open-ended in nature is particularly high.⁷² If "temporary unemployment" is to be reduced and a higher conversion rate from temporary to permanent is to be achieved [Fig. 19], this "culture of temporary contracting" in labour relations must be eradicated.

Fig. 19. Transitions from temporary employment to unemployment and conversion rate from temporary to permanent contracts, 2018



Source: Drafted by the authors based on data from Eurostat.73

II. Collective bargaining

Collective bargaining is a key mechanism for balancing industrial relations. The Spanish model has irrefutable strengths that have enabled it to contribute enormously to improving the conditions of the working population. In fact, many of the labour and social rights we have today would not have been achieved without it. However, there are also major weaknesses to collective bargaining that need to be addressed if it is to continue to play an important role in the new social and economic realities. Among other issues, collective bargaining should address the debate on the model of representation of the social partners (on both the trade union and employer sides); improve the coordination and articulation of sectoral and company agreements; and resolve the limitations of agreements on fundamental issues such as technological innovation, new forms of work organisation, lifelong learning for the working population, or the adaptation of the workplace to the needs of older people.⁷⁴ It will also have to improve the elements of internal flexibility to allow for wage and working hour changes (both upwards and downwards) in line with the economic situation, in order to prevent companies from resorting to temporary hiring as a lever for adjustment.

III. Active labour market policies

The main tools available to the welfare state to fight unemployment are passive and active labour market policies. The former cushion the blow of job loss; the latter aim to reduce employment search time as much as possible. In Spain, high unemployment rates have meant that a large proportion of the resources allocated to the fight against unemployment have gone to passive policies (mostly benefits managed by the State), while the resources devoted to active policies (transferred to the Autonomous Communities)⁷⁵ have been considerably lower [Fig. 20].

Fig. 20. Public expenditure on employment policies, 2018



Source: Author's own based on data from the OECD.76

In addition to this lack of funding, there are some specific characteristics that limit the correct functioning of these policies. In particular, the following should be noted:

- Recruitment subsidies and incentives (many of which are of low effectiveness⁷⁷) make up the bulk of the budget, while money for training (including design, implementation and evaluation) is much lower [Fig. 20] [see chapter 3].
- The low efficiency of the public employment services, due to the lack of resources; the limited use of new technologies in the processes of searching for and filling vacancies; the difficulties of coordination with the multiple collaborating entities; and the scarcity of follow-up, control and evaluation mechanisms.⁷⁸
- Insufficient public-private partnership in both intermediation and training processes.
- The impossibility of transferring some social welfare benefits (e.g. housing assistance) from one autonomous community to another hinders the mobility of jobseekers and hampers adjustment at the aggregate level of the labour market.⁷⁹

Addressing these shortcomings in active labour market policies is imperative to make our labour market institutions more effective in activating, orienting and guiding the unemployed back to work.⁸⁰ If progress is made in this direction, the time it takes for an unemployed person in Spain to return to work, currently much longer than in **most EU countries**, will be substantially reduced [Fig. 21].

Fig. 21. Distribution of unemployment by duration, 2019



Source: Authors' own, based on Eurostat data.81

The long shadow of the Spanish labour market

These dysfunctional features of the Spanish labour market described above have a profound impact on Spain's economic and social life. Indeed, it is no exaggeration to say that **most of our country's problems are related, directly or indirectly, to the same**.

To begin with, **high structural unemployment is limiting our capacity for growth**. Spain is wasting the skills of its labour force, something that not only damages our economy and conditions our ability to grow in the long term [see chapter 1], but also explains much of the high income inequality and poverty rates in our population [see chapter 8].⁸²

Similarly, excessive temporality and high worker turnover are undermining labour productivity and social cohesion. Firstly, because the short-term nature of the temporary contract reduces the incentives for companies and workers to invest in training, which prevents productivity gains through on-the-job learning [see chapter 3].⁸³ Secondly, because, far from generating sustained employment, the extension of job insecurity systematically leads to a reduction in the quality of jobs and labour rights, and a decline in social well-being that distances us further from an inclusive society.

The job insecurity of the labour market is also conditioning young people's age of leaving home,⁸⁴ and parenting decisions,⁸⁵ thus contributing to the problem of the low birth rate, population ageing, and demographic contraction in our country [see chapter 5].

Finally, high unemployment rates and poor working conditions are **undermining the well-being** of millions of workers and are currently **the main source of dissatisfaction and unrest in Spain**. This is because unemployment not only determines current income and future income expectations, but also affects other issues fundamental to well-being such as physical and mental health (increased susceptibility to depression, anxiety and stress⁸⁶) [see chapter 9].

As we can see, the effects of our labour market deficiencies are multiple and profound and, if not addressed, could be exacerbated in the coming years as a result of demographic change, digitalisation and transformations in the international economy.

The good news is that this can be changed. Although the improvements achieved to date have been insufficient, the fact is that Spain has the human, institutional and economic resources necessary to carry out far-reaching reforms, and with room for improvement still to be exploited which, if properly undertaken, could help to mitigate or correct many of the current and future problems, and to articulate a much more efficient and fairer labour market between now and 2050.

THE FUTURE: POSSIBLE DESTINATIONS

The short term: the labour market during the coronavirus crisis

The coronavirus pandemic arose when the Spanish labour market was close to recovering the peak level of employment (20 million employed) it had a few months before the 2008 crisis. As in other episodes of economic recession, there was a rapid and intense destruction of employment, leading to a spike in unemployment and an increase in job insecurity. The most negative effects, again, were concentrated on those with temporary contracts and on the young population.⁸⁷

The temporary nature of lockdown facilitated the government's intensive use of temporary furlough scheme (ERTE).⁸⁸ The ERTEs prevented the destruction of some 3.5 million jobs during the months of the March 2020 lockdown,⁸⁹ coinciding with the closure of production activity on a national scale. This has allowed the adjustment of employment in this crisis to be smaller than that of economic activity, a notable difference with respect to what was observed in the 2008 and 2011 crises [Fig. 22].

Fig. 22. Correction of real GDP and employment in Spain during the last recessions (average quarterly change)



Source: Drafted by the authors based on data from the INE.90

Other labour **flexibility measures** such as the MECUIDA Plan,⁹¹ the redistribution of working hours, organisational changes or the **promotion of remote working**,⁹² have also helped to protect and maintain employment.⁹³ For example, remote working made it possible to keep about 30% of our country's workforce active during the toughest weeks of lockdown (compared to 46% in the EU-8).⁹⁴

Despite the measures taken, **the pandemic has led to an economic crisis, the consequences of which are expected to be severe on the employment front**. In 2020, almost 600,000 people⁹⁵ lost their jobs and the number of unemployed increased by 280,000 (9% more than before the pandemic),⁹⁶ especially in those sectors hardest hit by mobility restrictions, social distancing and border closures (e.g. hospitality, catering, air transport). At the worst moments of the crisis, the unemployment rate reached 16.3%, 2.5 points higher than at the beginning of the pandemic.

What happens from here on? This will depend to a large extent on how many of the hundreds of thousands of people currently on ERTE⁹⁷ or in receipt of self-employed benefits⁹⁸ manage to keep their jobs and businesses open once the payment of these benefits comes to an end. This, in turn, will be determined by the future evolution of the virus and progress with vaccination, the performance of the global economy, and the effectiveness of the economic recovery measures being implemented.⁹⁹

Similarly, the evolution of unemployment in Spain will depend on the country's capacity to carry out **a sectoral reallocation of employment after the asymmetric impact of the pandemic**, that is, its capacity to generate jobs in those sectors that have been less affected by the crisis, and meeting this new demand with the appropriate professional profiles [Fig. 23]. In this sense, it will be essential that, in the future, both the ERTEs and the self-employed benefits are articulated in such a way that they continue to prevent a greater loss in the productive network and do not compromise to the necessary reallocation of employment between industries.

Fig. 23. Forecasts of the unemployment rate in Spain



Source: Prepared by the authors based on data from Banco de España, European Commission, International Monetary Fund, FUNCAS, Department of Economic Affairs and Digital Transformation, and OECD.¹⁰⁰

The greatest risk is that the rise in unemployment will become chronic and lead to an increase in job insecurity and inequality, as we saw in previous recessions [see chapter 8]. However, the coronavirus crisis will also bring important opportunities that, if seized, could help to significantly improve working conditions in Spain. For example, the trends necessary for transformation, such as the digitisation of businesses and public administrations, the rise of remote working, flexible working hours aimed at achieving a better work-life balance, and the revaluation of essential jobs are likely to accelerate. Furthermore, the COVID-19 experience could be used to incorporate transitional employment adjustment mechanisms such as ERTEs into our labour regulations, facilitating internal flexibility in companies at times of crisis and helping to avoid job destruction in future recessions.

The medium and long term: the future of our labour market

Sooner or later, Spain will overcome the coronavirus crisis. Our economy will return to growth and employment generation, new businesses will be created and the economic situation of many households will improve significantly. However, for the recovery to be sustained and to benefit the majority of our population, it must be accompanied by a root and branch reform of the labour market that corrects the deficiencies we have been experiencing for decades, creates quality employment, and prepares us to deal with phenomena coming down the line like the transformation of work or the ageing and contraction of our labour force. Otherwise, the same patterns observed in the recent past will be replicated and Spain will move inexorably away from the levels of prosperity and welfare enjoyed by the EU-8 countries.

Achieving this will not be easy. However, there is nothing to suggest that it cannot be achieved. As we see below, Spain has the human and economic means to undertake the necessary transformations and significantly reduce its unemployment and job insecurity by the middle of the century.

A shrinking labour force and a substantial change in the profile of our working population

Demographic ageing could reduce our working age population by 12% by the middle of the century.¹⁰¹ The effects of demographic change will be almost imperceptible between now and 2030, but will become significantly more pronounced thereafter [Fig. 24], so that **by 2050, Spain could have 3.7 million fewer potential workers** [see chapters 1 and 5].¹⁰² If 2019 (pre-pandemic) employment rates are maintained, this fall in the working-age population would translate into a reduction in the number of employed by 2.5 million, ¹⁰³ which would have **major consequences for the economy and public revenue, and would place great strain on the sustainability of the welfare state** as we know it today.



Fig. 24. Working-age population over total population

Source: Authors' own, based on Eurostat data.¹⁰⁴

To avoid this potential loss of labour force, Spain must do two things. First of all, **increase the integration of women, young people and over-55s into labour market.** Secondly, **incorporate hundreds of thousands of immigrants into the labour market and society**.

In Spain, women, young people and the over-55s have lower employment rates than in the EU-8 countries [Fig. 25].

Fig. 25. Employment rate by age group and gender, 2019



Source: Authors' own, based on Eurostat data.105

If we are to mitigate the negative effects of demographic change on our economy, we must close this gap, taking advantage of the organisational, educational and cultural changes already underway [see chapters 2 and 3].

Over the last two decades, Spain has managed to increase **female employment** rate by 20 points. If we were to achieve a similar increase between now and 2050, Spain would add almost 2 million additional workers to its workforce, many of them highly educated (in 2019, 58% of Spanish university graduates were women).¹⁰⁶ This would help close the gender gap and raise the productivity of our economy and the growth of our per capita income in the long run [see chapter 1].

To achieve this, it will be necessary to continue to raise the average education level of women, to boost professional networks for elderly care [see chapter 5], to continue to combat the persistence of certain gender roles, and to further promote work-life balance, especially after having children. Gender occupational segregation in our country is not only about women's and men's choice of different educational and employment paths. It can also be observed in early stages due to socialisation patterns and values acquired in the family environment.¹⁰⁷ For example, a mother's working time outside the home has an important effect on children's attitudes towards gender equality, largely conditioning their behaviour as adults.¹⁰⁸ With regard to work-life balance, the data reveal that, after having a child, a significant proportion of working women in our country reduce their working hours or abandon their careers, resulting in a drop in their labour participation of around 9% compared to their male partners.¹⁰⁹ Greater equality in the sharing of care, both for children and other dependants, and an increase in co-responsibility would help reverse this situation.¹¹⁰

As far as **young people** are concerned, the key will be to reduce school dropout rates, to make the boundary between work and training more porous, to promote formats like dual vocational training, which offer students the possibility of entering the world of work while they complete their studies, and to adapt their training to the real needs of the productive network [see chapters 2 and 3]. In 2007, our country's youth employment rate was over 40%; in 2019, it was just 25%. We must recover these levels based on the foundations of a better education that provides more and better job opportunities for young people, and not as a result of the expansion of low-skilled labour-intensive sectors of activity that lead to early school leaving [Fig. 26]. In fact, in the EU-8 countries, the youth employment rate has been around 45% for the last three decades and without major variations. Increasing the employability and quality of youth work would also contribute to progress in other fundamental dimensions of social development: it would improve the possibilities of emancipation,¹¹¹ be favourable for the birth rate,¹¹² and significantly increase commitment to work.¹¹³

Increasing employment rates among the **over-55s** will require progress in four directions. Firstly, a paradigm of lifelong learning must be established as a way of improving the adaptability of our workers to the new economic and employment realities, avoiding the obsolescence of their skills and avoiding unemployment at an advanced age [see chapter 3]. Secondly, the way in which work is organised and structured will have to change. Studies show that people bring a different balance of skills depending on their age and work experience, all of which are valuable. The younger population has better skills related to physical work, reading comprehension, numeracy and the use of new technologies. In contrast, the senior population excels in key skills like the ability to plan, monitor and react to setbacks.¹¹⁴ Over the coming decades, our country will have to learn to make better use of the skills of both groups and the synergies between them. A key way to achieve this will be to enable new positions in both business and government that better match the interests (reduced hours, flexible working hours, greater autonomy and leadership ¹¹⁵) and skills of our older workforce, while encouraging mentoring programmes and more horizontal collaboration between generations.¹¹⁶ Thirdly, some stereotypes still associated with old age, such as poor productivity or frailty, must be broken, so that people can develop and continue to contribute their talents and experience for longer and longer [see chapter 5]. Fourthly, and finally, incentives to work at older ages, with attention paid to health inequalities, and mechanisms such as active retirement [see chapter 5] should be encouraged in order to increase employment rates in older age groups, where Spain still has significant growth potential [Fig. 26].





Source: Authors' own, based on Eurostat data.117

Ultimately, **our aspiration should be to reach a labour force participation rate of 80% by 2050**,¹¹⁸ positioning ourselves slightly above current EU-8 levels [Fig. 27]. Doing so will allow us to mitigate the negative effect of demographic ageing and increase the number of employed people by 1.5 million compared to the 2019 level [Fig. 28]. This would, in turn, imply a growth in per capita income of up to four tenths of a percentage point higher, on average, than we would have in a scenario in which the employment rate remains unchanged at current levels,¹¹⁹ with all that this implies for the maintenance of the public system of social services and benefits. This is a difficult but achievable goal. After all, it means increasing our country's employment rate by 15 points over the next 30 years - the same increase we already recorded in the 30 years before the 2008 crisis.





Fig. 28. Number of employed in Spain

The other thing our country will have to do to limit the reduction of its labour force is to welcome and integrate hundreds of thousands of immigrants between now and 2050, achieving, at a minimum, a migration balance (the difference between people entering and leaving) of more than 191,000 people each year.¹²² If we can integrate more, even better. For example, if we achieve an annual migration balance in the region of 255,000 people, the fall in the working age population would be 1.8 million (rather than the 3.7 million projected in a scenario with a migration balance of 191,000).¹²³

If well managed, the arrival of this foreign population in our country would have eminently positive effects. Empirical evidence shows that increased immigration does not lead to increased unemployment and it does benefit the economy.¹²⁴ This has also been the case in Spain. Between 1998 and 2007, Spain received 3.8 million immigrants¹²⁵ and the rate of employment rose by 17 points.¹²⁶ The foreign population have significantly higher activity and employment rates than the indigenous population,¹²⁷ are a key workforce in sectors such as care or agriculture, contribute to public finances, and do not use public services and benefits such as unemployment benefits or pensions more than the Spanish population.¹²⁸ In short, **immigration can, for a country like Spain, be a source of solutions rather than a source of problems**. It can help us to cushion the decline in the working age population, to maintain our relative weight in Europe, and to ensure the sustainability of our welfare state.¹²⁹

Technological transformation

The other major megatrend that will transform the Spanish labour market is technological change. In the coming decades, the generalised spread of technologies such as Artificial Intelligence, Internet of Things, 5G, autonomous vehicles and advanced robotics will bring significant improvement in our well-being, but also profound changes in the structure of the labour market, which will affect both the distribution of occupations and the organisation of work itself.

This process is already underway. Since the late 20th century, technology has automated many routine tasks associated with medium-skilled occupations, and has generated an increased demand for occupations that are highly skilled and involve predominantly analytical and interpersonal tasks. On the other hand, low-skilled occupations that cannot be digitised, such as care occupations, have been able to better withstand technological progress [Fig. 29].¹³⁰



Fig. 29. Evolution of the type of tasks in employment, USA. .

Source: Drafted by the authors based on Autor & Price.131

In the coming years, **automation will continue to advance and will increasingly cover routine** (physical and abstract) tasks that, until now, could only be performed by humans (e.g. administrative management, street cleaning, driving trains and underground trains). At the same time, **automation will extend its range of action to other more abstract and less repetitive** tasks where awareness, creativity or versatility are important.¹³² Examples are medical diagnosis (IBM Watson),¹³³ legal advice (LawGeek or Legal Robot),¹³⁴ text translation (Google translator),¹³⁵ building construction,¹³⁶ copywriting,¹³⁷ music composition, or graphic design. Finally, it is expected that non-routine manual tasks will progressively require greater specialisation and will gain in importance as personal care services become more important.

This technological transformation will have three effects on our labour market: 1) destroy some occupations, 2) create new ones, and 3) transform the rest.

First, the technological transformation will lead to the disappearance of many occupations. In 2050, many of the jobs performed by people today will be done by autonomous machines, supervised or coordinated by humans. Where once there were several accountants, in the future there will be only one, aided by powerful digital assistants. Where there used to be a forestry crew, there will be a forestry technician in charge of managing and maintaining a fleet of fire drones and robots for forest clearance.

It is impossible to anticipate precisely how many jobs will be automated in the future. In fact, all estimates made in the recent past have failed or are on the way to failing,¹³⁸ and the latest available estimates give very different results [Fig. 30]. What is certain is that **a high number of occupations will disappear** and that it will most strongly affect those jobs that today eminently involve physical tasks or repetitive abstract tasks that can be performed by a robot or a low to medium-cost digital agent.



Fig. 30. Estimates of the proportion of jobs at high risk of automation in Spain



In any case, this does not mean that structural unemployment will inexorably increase in Spain. History shows us that, although technology may generate job losses for some groups in the short term, in the medium and long term it always ends up creating more jobs than it destroys.¹⁴⁰ This is why the percentage of the working population in Spain today is higher than in 1850 despite the fact that, in between, several disruptive technologies (e.g. the telephone, the automobile, the personal computer or the Internet) have become widespread [Fig. 31]. If technology were to destroy net employment on a sustained basis, the countries that have automated and digitised their economies the most in recent decades should be the ones with the highest levels of unemployment, when in fact the opposite is true.¹⁴¹



Fig. 31. Employment rate over total population in Spain

Source: Drafted by the authors based on Prados de la Escosura.142

This is because, by becoming more technologically advanced, companies increase their productivity, which in turn allows them to increase profit margins, reinvest, grow, and employ more staff. It happened to the textile sector during the first industrial revolution, to manufacturing companies in the early 20th century, to service sector companies that introduced computers in the 1980s and 1990s, and to factories that introduced industrial robots between 1990 and 2016.¹⁴³

This dynamic has been with us for centuries and there is no reason to believe that it will not continue to do so in the future: **new technologies will also create jobs**, many of them associated with the development, management and repair of these same technologies (programmers, mechanics, remote robot operators, data scientists¹⁴⁴) and with the growth of the metaverse and virtual reality. Jobs such as Minecraft gardener, avatar trainer, or e-sports professional will become increasingly common.

New jobs associated with increasing longevity, the green transition or changes in social dynamics will also emerge. The Spain of the future will need more health personnel specialised in care of the elderly and dependants, as well as psychologists and counsellors [see chapters 5 and 9]. Labour demand in science and engineering will also increase, with more specialists needed in renewable energy, recycling, water management, building renovation or sustainable food [see chapter 4]. In fact, it is estimated that the transformation of the energy system and the development of the circular economy will generate a net increase in employment in our country of around 250,000 people, on average per year, between now and 2050.¹⁴⁵ More jobs will also be created in the fields of training (especially for adults), culture, mobility, and digital rights to name but a few. As a result, the greatest growth in employment over the coming decades is expected to be concentrated in sectors such as healthcare, technology, R&D, leisure, and care[Fig. 32].

Source	Oliver (2018)	PWC (2013)	Adecco (2016)	CEDEFOP (2018)	Alós (2018)
Sectors that will grow	Health and social services	Hospitality and catering	Technology and R&D	Trade	Health and social services
	Manufacturing	Trade	Tourism and leisure	Culture and leisure	ICT services
	Culture and leisure	Culture and leisure	Health and social services	ICT services	Culture and leisure
Sectors that will decrease	Trade	Public administration	Manufacturing	Agriculture	Banking and insurance
	Public administration	Agriculture	Construction	Professional services	Administrative tasks
	Education	Manufacturing	Trade	Public administration	Manufacturing

Fig. 32. Main sectors in which employment will grow and shrink in Spain

Source: Drafted by the authors based on the above-mentioned studies.¹⁴⁶

In addition to destroying and creating new jobs, what **technological change will do is to severely transform most existing jobs**. This transformation will be seen in at least two main ways.

On the one hand, the level and type of skills required for the job will be altered.¹⁴⁷ The jobs of the future will require more complex knowledge and skills than today, especially in terms of technology. These skills will also be different. Physical performance will become less and less important and STEM knowledge, advanced cognitive skills (such as creativity or deductive reasoning) and transversal and soft skills (such as communication, teamwork, leadership or negotiation) will gain in importance [Fig. 33], which are not really replaceable by machines and algorithms.¹⁴⁸

Fig. 33. Future demand for labour skills in Spain



Source: Drafted by the authors based on Hidalgo.149

It will also change the way we conceive, carry out and organise work. The spread of digital technologies, the growing outsourcing of economic activities (accelerated by the gig economy), and the increasing concentration of production in larger and larger companies¹⁵⁰ will mean that **full-time salaried employment will become less common**. The numbers in atypical forms of employment such as the self-employed, freelancers, and on-demand workers,¹⁵¹ who combine several sources of income and various professional activities will increase.¹⁵²

In Spain, a model in which companies increasingly contract more tasks than people, and in which people are paid for the results obtained, rather than for the hours worked will become the norm. Perhaps the best example in this respect is the growth of employment linked to digital platforms. The latest European Commission survey reveals that, in 2018, 18% of the working population in Spain already worked on a recurrent or one-off basis for a platform, a much higher proportion than in the EU-8 countries included in the study [Fig. 34] and which is likely to grow in the future.

Fig. 34. Intensity and relevance of work for platforms



Source: Drafted by the authors based on Urzì Brancati, Pesole and Fernández-Macías.153

Between now and 2050, physical workplaces will also change. "Work" will cease to be a place you go to and become an activity that takes place in the office, in the factory, on the street, but also at home, in a rural house, abroad, or in one of the hundreds of *coworking* spaces that are springing up in our cities. In Spain, there will be an increasing number of digital nomads, both nationals and foreign, who combine remote and face-to-face work. In fact, it is estimated that the number of people who will routinely work remotely in Spain could triple over the coming years.¹⁵⁴

This digitisation of the workplace will open the door to **a global market** in which Spanish citizens can and will have to collaborate and compete with professionals from other countries [see chapter 3]. We will also see the **boundaries between personal and professional life become more blurred and porous**. Working time will be mixed with private life, each adapted to to the other, in some cases resulting in greater flexibility and in others in a heavier workload.

In this new employment paradigm, **careers will have less continuity**. Instead of remaining with the same employer all their lives, people will change employers or even sectors several times. This will be due to the greater fluidity of the business world, but also the will of the workers themselves, who are less and less interested in dedicating their entire professional career to the same institution (surveys reveal that 52% of millennials in Spain plan to change jobs in the next 5 years).¹⁵⁵

All these transformations in how we conceive, carry out and organise work will bring challenges, but also immense opportunities to the country, which will be minimised or maximised depending on how far-sighted and efficient the response of public administrations, companies, trade unions and citizens is in regulating and channelling them. We tend to think that traditional forms of employment (employed, permanent and full-time) are inherently better than other forms of employment. But this is not true in all cases nor need it remain true for most in the future. If well managed, the rise of self-employment and freelance work, partly associated with the expansion of digital platforms, could contribute to more flexible working hours, a better work-life balance, and a **significant increase in career development and wage opportunities** for many people (especially younger people and those living in unpopulated areas with low levels of economic activity).¹⁵⁶ It could also lead to a potential increase in business productivity, especially in companies that are more digitised.¹⁵⁷

On the contrary, if not well managed, the transformations over the coming decades could end up leading to **an erosion of the working conditions and welfare of a large part of the population**, through greater labour duality and social inequality. The growth of the gig economy, together with the considerable weight of its large companies and platforms and the low bargaining power of its workers, could lead to unstable and poorly paid jobs,¹⁵⁸ lower levels of labour protection,¹⁵⁹ and longer and less satisfactory working hours.¹⁶⁰ At the same time, the rise of digital competition and the possibility of outsourcing services to workers in other countries (often with high skills, similar wage expectations and lower tax rates) could negatively affect employment and wages in Spain.¹⁶¹

Changes in the world of work could therefore lead to a weakening of social safety nets. As new forms of work (voluntary non-permanent, part-time and non-dependent) become more prevalent, our social safety nets may become less effective and leave more people unprotected.¹⁶² Despite the advances in social coverage achieved in recent decades,¹⁶³ the Spanish welfare state, like many other European states, continues to be based on work and on a dominant way of understanding and exercising it: permanent, full-time and employed, regulated by a contract and a wage relationship between the employee and the employer.¹⁶⁴

To avoid this potential weakening of the welfare state, two major transformations will be necessary. **Firstly, it will be necessary to change the way in which workers contribute to the system** by ensuring that all workers, including those in unconventional forms of employment linked to the digital economy,¹⁶⁵ are taxed on their real income [see chapters 5 and 8].

The way in which welfare state benefits are conceived and articulated will also have to be adapted. Spain will have to consolidate a model in which citizens are protected on the basis of their needs and not just their employment history.¹⁶⁶ A model financed by workers' and employers' contributions, but also by general taxation. Doing so will not be easy. The transition poses significant economic, social and cultural challenges. However the process is already underway. Our country has already moved from a health care system determined by social contributions to a tax-financed universal health care system in the 20th century.¹⁶⁷ In the first half of the 21st century, we will have to take a further step in the same direction, and extend the universality of our welfare state to other areas. The adoption of the Minimum Living Income in 2020 is an important step in this direction [see chapter 8].

How can these transformations be achieved? A number of measures are suggested on the following pages.

WHAT NEEDS TO BE DONE TO ENSURE QUALITY EMPLOYMENT FOR ALL CITIZENS

Over the coming decades, Spain will have to carry out far-reaching reforms aimed at correcting the structural shortcomings of its labour market, **adapting it to the new social, economic and technological realities and preparing it for the changes that these will bring in the future**. In addition, our country should **progressively raise its employment rate to the current levels of some of the most advanced economies in Europe**. It must do so by improving the labour market integration of all groups and, in particular young people, women and the over-55s.

It is impossible to attain that which cannot be measured. That's why it's fundamental that, over the coming years, to reach a consensus through social partnership on **a dashboard of quantifiable indicators and a list of specific goals** that will enable us to monitor the progress made and guide the ambition of our reforms. Here are some suggestions, following the principles outlined in the Introduction to this *Strategy*:

Goal 3. Increase the employment rate from the current 62% to 80% by the middle of the century. This increase should take place across all autonomous communities and in all social groups, especially in those that currently have a lower rate of labour market insertion than the EU-8: young people, women and the over 55s.

Goal 19. Increase funding for active labour market policies dedicated to training to reach 0.25% of GDP by 2030 and 0.4% by 2050.

Goal 37. Reduce the unemployment rate to EU-8 levels (7%) by the middle of the century.

Goal 38. Raise the employment rate of women to at least the same level as that of men by 2050.

Goal 39. Reduce the youth unemployment rate by half, bringing it into line with the EU-8.

Goal 40. Increase the labour market participation of the population aged 55-64, raising their employment rate by at least 15 points compared to the 2019 level.

Goal 41. Reduce the temporary employment rate to converge with the EU-8 average.

Goal 42. Cut the rate of involuntary part-time employment by half.

Goal 43. Progressively reduce the number of hours worked per week to levels similar to those in the EU-8.

Goal 44. Close the gender pay gap by 2050.

Goal 45. Raise the percentage of people satisfied with their employment situation from the current 85% to the 93% recorded in the most advanced EU-8 countries.

Table of indicators and targets

Indicators	Place	Average 2015-2019 or latest	Targets			
			2030	2040	2050	
	Spain	62%	68%	72%	80%169	
3 Employment rate ¹⁶⁸	EU-27	68%	-	_	-	
	EU-8	73%	-	_	-	
19 Active labour market policies	Spain	0.11%	0.25%	0.30%	0.40%	
devoted to training	EU-27	0.15%	-	-	-	
(% of GDP) ¹⁷⁰	EU-8	0.27%	-	-	-	
	Spain	18%	12%	10%	7%	
37 Unemployment rate ¹⁷¹	EU-27	8%	-	_	_	
	EU-8	6%	-	_	_	
	Spain	57%	65%	75%	82%	
38 Employment rate of women ¹⁷²	EU-27	63%	-	_	-	
	EU-8	70%	-	_	_	
	Spain	40%	30%	21%	14%	
39 Youth unemploy-	EU-27	18%	-	_	_	
	EU-8	13%	_	_	_	
	Spain	51%	56%	62%	68%	
40 Employment rate (55-64 years) ¹⁷⁴	EU-27	56%	-	_	_	
	EU-8	62%	-	_	-	
	Spain	26%	23%	18%	15%	
41 Temporary rate ¹⁷⁵	EU-27	15%	-	_	_	
	EU-8	14%	_	_	_	
	Spain	9%	7%	5%	3%	
42 Involuntary part-time rate ¹⁷⁶	EU-27	5%	-	_	_	
	EU-8	5%	-	_	_	
	Spain	37.7	37.0	36.0	35.0	
43 Hours worked per week ¹⁷⁷	EU-27	37.1	-	_	_	
	EU-8	35.4	-	_	_	
	Spain	14%	10%	5%	0%	
44 Gender wage gap ¹⁷⁸	EU-27	15%	-	_	_	
Q- IF	EU-8	15%	-	_	-	
	Spain	85%*	87%	90%	93%	
45 People satisfied with their employment	EU-27	83%*	_	_	_	
situation ¹⁷⁹	EU-8	88%*	_	_	_	

To achieve these objectives, Spain must undertake **far-reaching reforms and implement significant initiatives** on at least eight fronts:¹⁸⁰

Front 1: Correct the shortcomings of our productive system and promote the creation of quality jobs

Many of the problems of our labour market stem from the deficiencies of our productive system: lack of innovation, low implementation of technology in the business network, a deficit of human capital, bureaucratic obstacles, and insufficient development of alternative sources of financing to the banking system. Until these shortcomings are corrected, problems such as job insecurity and unemployment cannot be solved. It is essential, therefore, to improve the skills and education of the active population, increase R&D, promote the adoption of technologies, boost business growth and modernise the functioning of the public sector, as set out in chapters 1, 2 and 3 of this *Strategy*.

Front 2: Update and strengthen active labour market policies

Over the coming decades, technological change will cause many occupations to disappear, new ones to emerge and the rest to be transformed. We must endeavour to ensure this transition is as rapid and beneficial as possible for our working population. To this end, we must significantly increase the capacity of our labour institutions to retrain, guide and assist jobseekers. In this regard, it is proposed:

- To move towards the creation of an integrated system of lifelong learning that allows us to keep our workforce up to date and to rapidly requalify those who will be irretrievably displaced by automation in the coming decades [see chapter 3]. The philosophy must be to protect the worker, not the job, and to understand that it is better to anticipate rather than resist unstoppable trends of change. The evidence shows that those workers who left the more routine jobs in the first wave of automation ended up with faster wage growth than those who remained in them, regardless of the occupation they migrated to (manual-low or cognitive-high).¹⁸¹
- To create a state-wide digital platform that functions as a job marketplace connecting all jobseekers with all job vacancies nationwide, both public and private. This platform will rely on the use of Artificial Intelligence, profiling algorithms and big data to improve the efficiency of job matching and increase competition and productivity in the economy. It should be operated in a transparent and anonymous manner, both for workers and companies, in order to avoid segregation and discrimination at work on the basis of gender, age or race. In this respect, a good starting point could be the modernisation of the Single Employment Portal.¹⁸² In the medium to long term, it will also be necessary for this jobs marketplace to be integrated into a similar one for the EU as a whole, thus facilitating the creation of a truly integrated European labour market that allows the social and economic advantages of the Union to be exploited to the full.
- To expand and improve guidance services for the unemployed to provide quality and personalised guidance, with a special focus on the integration of women, young people and the long-term unemployed.¹⁸³ To this end, we propose the following:
 - Increase the ratio of guidance counsellor to unemployed person.
 - Digitalise and automate administrative procedures related to unemployment, so that the human and spatial resources of the State Public Employment Service (SEPE) can be fully dedicated to vocational guidance. Priority should be given to returning

to work from the first visit, introducing commitments on actions to be undertaken by the jobseeker in the short term, and generalising coaching techniques [see chapter 3].

- Improve the training of counsellors, especially in the use of digital tools.
- Putting new technologies at the service of guidance counsellors and the unemployed. Create a system that, based on the digital jobs marketplace, makes it possible to know the present training needs and anticipate the future needs of the productive fabric [see chapter 3].
- Increase the search range of the unemployed to broader economic activities, occupations and geographical areas than those suggested by their most recent jobs.¹⁸⁴
- Achieve maximum coordination between the SEPE, regional employment services, trade unions, employers' organisations and educational bodies to structure coherent and integrated public-private responses at national level.
- Make social benefits fully portable (e.g. housing benefits) in order to facilitate the mobility
 of jobseekers from one autonomous community to another. To this end, it will be necessary
 to improve coordination between the different administrations (local, regional and state)
 with responsibilities in this area. In parallel, this portability must also be fostered at
 European level.¹⁸⁵
- Increase funding for active policies through the establishment of a guidance counsellor/ unemployed person ratio or other objective indicators to close the relative gap between Spain and EU-8 countries [see chapter 3]. It will also be necessary to redirect hiring subsidies towards groups with especial employability difficulties.
- Create an effective evaluation and monitoring system for active policies by standardising all the information and including key criteria such as the success of labour market insertion or the quality of the employment achieved. Data from this system should be shared (properly anonymised) with the research and academic community, so that they can also contribute to the monitoring and improvement of public policies.

Front 3: Modernise our regulatory framework to reduce unemployment and temporary contracts and adapt it to the new social, economic and labour realities of the country A number of measures are proposed in this regard:

- To make progress in simplifying the recruitment system, the establishment of three main categories: a permanent one, a temporary one for temporary needs and substitutions, and another of a training nature.
- Increase penalties and compensation for the use of fraudulent temporary contracts to discourage the use of temporary work.
- Improve inspection resources to reduce unjustified temporary employment, job insecurity and the black economy. This would require, among other measures, streamlining and digitising all administrative processes in the labour and business sphere, and

strengthening the Labour and Social Security Inspection System (ITSS), providing it with adequate financial, human and technological resources (e.g. using Artificial Intelligence to massively identify patterns such as the unjustified chaining of contracts of very short duration).¹⁸⁶

- At the same time, the introduction of mechanisms to encourage permanent contracts as opposed to temporary contracts at the end of the contract should be considered, in order to help reduce the incentive to use the latter, always taking into account the effects on job creation and workers' rights. It would also be desirable, within the framework of social dialogue, to improve legal certainty for companies and workers in decisions to adjust the workforce. These changes would help to avoid the massive destruction of temporary employment during recessions and the excessive creation of precarious jobs during periods of economic growth.
- Reform the Basic Statute of Public Employment to reduce as much as possible the high use of temporary contracts and their chaining in public institutions (especially in health and education). Employment should be limited to permanent open-ended, open-ended or temporary positions with a maximum duration of three years until the position is filled.
- Incorporate a new employment adjustment mechanism which, based on the experience
 of the ERTEs, introduces greater internal flexibility in companies in the face of temporary
 or cyclical downturns in activity. This system should establish training programmes for
 affected workers to facilitate their reintegration at the end of the crisis period.
- Progressively adapt, through social dialogue, labour regulations in order to achieve greater equality of labour rights and obligations for the working population. To this end, one could:
 - Define, in the framework of a new Workers' Statute, a Charter of social rights common to all workers in areas such as health protection, prohibition of discrimination or data protection.¹⁸⁷
 - Progressively adapt our labour regulation to converge, by 2050, with the regulatory frameworks of the rest of the EU, which is essential if we want to implement common policies such as a European unemployment benefit, reduce regulatory arbitration, and achieve the articulation of a truly integrated EU labour market.
- Gradually reduce the differences between regular activities and new forms of employment in order to avoid regulatory and fiscal arbitration, and increase protection against potential fraud and abuse of the working population. To this end, the differences between paid employment and self-employment must be assessed with concrete and quantifiable criteria (in terms of dedication, exclusivity, own means of production, and management and control), taking into account the fact that circumstances are variable over time and can be combined with each other. Particular attention should be paid to the regulation of work on platforms.¹⁸⁸
- Further update the regulatory framework to extend the recognition and protection of workers' digital rights (right to privacy, data ownership),¹⁸⁹ and take advantage of the opportunities offered by remote working or hyper-connectivity to improve working conditions and the work-life balance of men and women.

- Adequately regulate markets for goods and services in order, on the one hand, to foster competition and create an environment that facilitates the creation of firms and removes barriers to their growth [see chapter 1], and, on the other hand, to prevent some firms from having price and wage-setting power.
- Make changes to our regulatory and fiscal frameworks and push for the development of international mechanisms and agreements to ensure social protection and tax engagement for remote digital workers globally. The objective to be achieved is twofold: firstly, that our companies can easily access talent in the international labour market; and secondly, that our digital workers can access opportunities beyond our borders with common rights and obligations.

Front 4: Modernise the social safety nets of our welfare state, adapting them to present and future employment realities

Our entire welfare state is designed according to a single way of understanding, conceiving and organising work and labour relations. As we have seen, this form is changing. It will therefore **be necessary to gradually adapt our welfare benefit system so that benefits are allocated not only on the basis of people's employment history, but also on the basis of their needs**, as recommended by European directives¹⁹⁰ [see chapter 8]. Thus, for example, retirement benefits will have to adapt to a near future in which professional careers will be increasingly heterogeneous and discontinuous; and unemployment benefits must adapt to an employment reality in which full-time permanent work will no longer be an option for a large part of the Spanish population.

Front 5: Expand and update collective bargaining mechanisms

If collective bargaining is to continue to play an important role in the future, it must adapt to the new social, economic and technological realities of the country. In this regard, it is proposed:

- To redesign the criteria for classifying professional groups and contracts so that they better adapt to the reality of our productive activity. This process will need to be flexible and dynamic, given the pace of change in technological developments.
- To update existing agreements, incorporating content related to technological innovation, variable remuneration based on objectives, new forms of work organisation and the right to lifelong learning for employees.
- To bring the regulatory framework closer to the changing needs of business, without undermining workers' rights. One possible option would be to maintain the application of firm collective agreements in those companies of a certain size with legal worker representation and to bring sectoral collective agreements closer to smaller companies. In this sense, a wage guarantee could be established at sectoral level to avoid excessive wage adjustments (both in rate and duration) while, at the same time, allowing greater flexibility in other relevant aspects such as work organisation, the distribution of hours or the adaptation of the job to the skills of the workers.
- To strengthen business and trade union representation and representativeness, adapting it to the reality of the business and social makeup of Spain, through a greater presence of small companies both in the negotiation of sectoral collective agreements and in trade union elections.

- To extend collective bargaining to the self-employed without dependent employees and other types of workers in the digital economy, while respecting the rules of free competition.¹⁹¹
- To adapt the mechanisms for renewing collective agreements in order to avoid prolonged blockages and failure to update collective agreements over long periods of time, especially in changing circumstances such as those caused by economic crises.
- To encourage the role of workers in decision-making in their companies and in the sharing of productivity gains resulting from the technification of production systems. To this end, it is recommended to facilitate the participation and investment of the workforce in the robotisation and digitalisation of their companies, following the philosophy of cooperative enterprises linked to the social economy [see chapter 8].

Front 6: Encourage labour participation, especially among young people, women after having children and those over 55 years of age

- In order to bring the Spanish youth employment rate closer to the EU-8 average, and in addition to the measures included in the Department of Labour and Social Economy's Youth Employment Shock Plan 2019-2021¹⁹², it is proposed:
 - To promote compliance with the European Youth Guarantee, whose implementation in Spain has so far been very poor. The aim is to ensure that, once they have spent a maximum period of time unemployed or not in education, young people are contacted by the corresponding public employment service and receive a personalised activation plan.
 - To promote dual vocational training as one of the most efficient ways of increasing the labour market integration of young people [see chapter 3].
 - To strengthen career guidance systems in universities and vocational training centres, increasing the number of guidance counsellors per student and improving their technical training with constant refresher courses.
 - To promote the development of experimental pilot policies within public administration, following the example of Denmark's Building Bridge to Education.¹⁹³
 - Promote and incentivise entrepreneurship and self-employment among young people, with a special focus on the most depopulated areas.
 - Create a national second-chance education programme to facilitate the reemployment of young people aged 15-29 who are in neither employment nor training. It should provide personalised training, which reinforces basic and work-related skills and promotes practical experience in the company.
 - Encourage better and greater collaboration with specialised third sector entities to reach the most vulnerable sectors.

- Continue working to reduce the gender gap, both in education (greater presence of women in science, technology and engineering) and in employment (greater presence of women in certain sectors and equal working conditions), in the knowledge that an increase in the female labour rate will contribute significantly to increasing the productivity and longterm growth of the economy.¹⁹⁴ To this end, it would be advisable to combat gender stereotypes from an early age, focusing on both the family environment and primary education. To avoid the drop in labour participation that affects many women after motherhood, it is proposed, among other measures, to increase the public network of childcare centres and to strengthen work-life balance policies, so that the burden of parenting is reduced and shared equally between men and women.
- To increase the participation rates of the over-55s, it is suggested to match future jobs to the skills and interests of older workers and to create more flexible tax and wage mechanisms that facilitate and encourage their continued employment [see chapter 5].

Front 7: Incentivise labour migration and talent recovery

Our country must avoid the drain of domestic talent and encourage the arrival of foreign talent to improve the quantity and quality of human capital [see chapter 1]. Spain should facilitate the reception and integration (economic and social) of the foreign population to cushion the potential reduction of the working-age population and underpin the sustainability of the welfare state. By 2050, our country will need at least 191,000 net migrants per year if it is to meet the conservative projections set out in this *Strategy*. To achieve this, Spain must:

- Promote recruitment at origin, in order to meet the potential needs of our productive fabric in a more rapid and surgical manner.¹⁹⁵ Doing so will require, among other things, establishing more bilateral agreements with those countries from which we receive the largest migration quotas, and updating and expanding existing ones.
- Optimise the procedures for hiring and Social Security registration for workers of foreign origin and, while at the same time improving the administrative regularisation procedures through channels other than employment and reducing technical difficulties, costs and waiting times. The ultimate goal is for the immigrant population to integrate successfully into the labour market and society, and to have full access to social protection mechanisms and public services.
- Improve labour inspection and control instruments to avoid situations of abuse and the black economy, as suggested by the Pact of Toledo.¹⁹⁶
- Develop mechanisms to improve the professional skills and lifelong learning of immigrants, as well as their knowledge of the official languages of the State.¹⁹⁷
- Promote, at European level, the adoption of a common migration, asylum and refugee policy that favours the socio-occupational integration, activation, recognition of qualifications and development of migrants' skills.¹⁹⁸

Front 8: Promote healthier and more satisfying work

As we have already seen, work in Spain stands out as less satisfying, less enriching, more frustrating and more stressful than in most of the countries around us. To correct this problem, it is proposed to:

- Amend workplace health and safety legislation to update the catalogue of occupational diseases, renew the procedure for notification of workplace accidents, and incorporate the treatment and prevention of stress, anxiety and other physical and mental health conditions among workers [see chapter 9].
- Continue to adapt legislation to achieve more flexible working hours and shorter working hours to converge on the EU-8 number of hours worked per week, taking advantage of the opportunities of digitalisation and productivity improvements.¹⁹⁹
- Create public and private programmes to improve the training of managers in companies (among the worst trained in Europe)²⁰⁰ and public institutions to introduce a management style that is less authoritarian, more participative and more committed to the professional concerns and well-being of employees.

By adopting these and other measures, our country could address the shortcomings of our labour market; adapt it to the new social, economic and technological realities and, as a result, close the gap in labour market insertion with the EU-8.



Challenge #8 **REDUCE POVERTY AND INEQUALITY AND REACTIVATE THE SOCIAL ELEVATOR**

EXECUTIVE SUMMARY

- Spain has made substantial progress in living conditions, with benefits for almost all of its population, thanks to the improvement of public services and the expansion of social welfare provisions, both contributory and non-contributory.
- Nevertheless, Spain still has many shortcomings and imbalances that make it the country with the third highest income inequality in the EU and the fourth highest population at risk of poverty.
- In terms of wealth, the situation is somewhat more favourable, with a level of inequality in Spain similar to the EU average. However, for some years now, there has been a worrying trend towards the concentration of wealth, with sharp intergenerational differences. So far this century, the wealth gap between 65 year olds and 35 year olds has doubled, and now resembles that of the US.
- The main causes behind this situation are the shortcomings of our labour market and the insufficient revenue-raising and redistributive capacity of our tax system and welfare state. In Spain, the poorest people pay more taxes (in relative terms) than the middle class, and social transfers are less focused on vulnerable groups than in other neighbouring countries.
- Moreover, since the beginning of the century, our social elevator has been running poorly.
 In Spain, being born into a low-income family conditions educational and professional development opportunities to a greater extent than in other European countries.
- Demographic ageing and technological transformation could exacerbate these negative trends over the coming decades. If we are to avoid this, Spain needs to change its growth pattern, strengthen public education, address labour market deficiencies, and tackle the housing problem, with a special focus on young people and the most vulnerable groups. It will also be necessary to undertake a gradual but far-reaching tax reform that will make the system more progressive, raise tax collection to the average of the most advanced EU countries, and reduce tax fraud and the black economy.
- This is the only way we can strengthen the welfare state and increase public spending on social protection (especially non-contributory benefits). The ultimate goal is to reduce income inequality to the level of the most advanced countries in Europe and to halve the poverty rate by 2050.

THE PAST: WHAT WE'VE ACHIEVED

Spain is one of the most unequal countries in Europe. The particularities of our growth pattern , the deficiencies of our labour market, the insufficient revenue-raising and redistributive capacity of our welfare state, and the dynamics of our real estate market have created a vicious circle in which some types of economic inequalities, far from being corrected, have been exacerbated over the last decade. This has led to a severe social fracture that is preventing us from realising our full potential as a country and is conditioning the lives of millions of people.

This does not mean, however, that Spain has not made great progress in living conditions [see chapters 1 and 9] or that important progress has not also been made in the distributive sphere. This progress began as early as the 1980s, when root and branch reforms were implemented to make the tax system more progressive,¹ increase public spending on social transfers (unemployment and pensions),² and universalise access to key services for equal opportunities, such as education and health.³ This resulted in a significant reduction in economic inequality (due to both the improvement in low incomes and lower accumulation of higher incomes)⁴ and a sharp fall in poverty, which fell by more than 10 percentage points between 1980 and 1990⁵ [Fig. 1].

In the 1990s, the **expansion of the welfare state continued**, albeit more moderately, in the 1990s. During this period, mechanisms created in previous years were consolidated and new, no less important, mechanisms were introduced, such as **non-contributory pensions** and **regional minimum income schemes**, which made it possible to regulate and expand social assistance spending that until then had been limited almost exclusively to one-off, poorly regulated benefits.⁶



Fig. 1. Inequality of disposable income as expressed by the Gini coefficient in Spain

Source: Drafted by the authors based on data from Ayala and Cantó.⁷

Joining the euro and the adoption of the *Lisbon Strategy* at the beginning of the 21st century gave the social agenda new impetus in Spain. Resources for the fight against social exclusion were increased and coordination between different levels of government was improved, following the *National Action Plans for Social Inclusion.*⁸

Unfortunately, **the Great Recession of 2008 halted this progress and led to a rapid and significant increase in inequality and poverty in Spain**.⁹ In the crisis years, the rise in unemployment and part-time employment and the fall in labour income¹⁰ led to a sharp increase in income inequality¹¹ [Fig. 2], **and wiped out much of the progress made in previous decades** [Fig. 1].¹² **In that period, one in six middle-income households fell into the lowest income group, and one million people crossed the poverty line**.¹³ Our redistributive system managed to mitigate the most negative impacts of the crisis by half between 2012 and 2015.¹⁴ Even so, public intervention was insufficient, and inequality and poverty increased in Spain more than in the rest of Europe during those years.¹⁵

When the economy started to grow again, from 2014 onwards, income inequality started to fall again, but at a moderate pace. Spain was unable to recover the peak levels of equality reached at the end of the 20th century. Persistently high levels of unemployment and underemployment (unwanted temporary contracts and part-time work), low wages for younger people who had entered the labour market during the crisis, and a falling wage share in national income until 2018,¹⁶ prevented a more equitable distribution of economic growth [Fig. 2]. By 2019, half the population still reported difficulties making ends meet, and one in three people were unable to meet unforeseen expenses.¹⁷



Fig. 2. Average annual growth rate of disposable income by income decile in Spain

Source: Drafted by the authors based on data from the Life Conditions Survey (INE).18
Despite these difficulties, some important redistributive advances have also been made in recent years. One of them is the approval of the **Minimum Living Income** in 2020, a welfare income guarantee that represents a significant step forward in non-contributory benefits and which, when fully developed, will bring us a little closer to the least unequal countries in Europe.¹⁹

Today, our welfare state has reduced inequality by over 37% as a result of the tax and benefits system; this is less than in other EU countries, but over 11 percentage points higher than it was in 1980 [Fig. 3]. It also has also reduced poverty by more than 37%, while in 1980 that figure was 30% [Fig. 4].







As we will see below, there is **still a long way to go.** But it is important to keep in mind the many achievements to date, which show that, we put our mind to it, Spain can make great strides towards equality and equity.

THE PRESENT: UNRESOLVED ISSUES

Despite significant progress on social issues in recent decades, today Spain remains what it was at the end of the last century: **one of the countries in Europe with the highest levels of income inequality**. This is evident in virtually all available indicators that measure the differences in income that citizens derive from their labour and capital. The Gini index is one of them.²² According to the latest data, **Spain is the country with the third highest disposable income inequality in the EU-27** [Fig. 5].





Source: Authors' own, based on Eurostat data.23

High inequality in turn translates into a high incidence of poverty.²⁴ In 2019, 21% of Spain's inhabitants lived on less than 740 euros per month [Fig. 6] and more than 5% suffered severe material deprivation, not being able to afford a personal computer or to keep their home at an adequate temperature [see chapter 6].²⁵



Fig. 6. Percentage of population at risk of poverty, 2019

Source: Authors' own, based on Eurostat data.26

These levels of poverty risk, disproportionately high for an advanced economy such as ours, are also **highly chronic**²⁷ **and especially impact the younger population**.²⁸ Over the last two decades, but especially since the Great Recession, the population at risk of poverty among over-65s and over has fallen considerably, but has grown among those under 25 [Fig. 7] as a result of youth unemployment, low entry wages, and rising housing prices.²⁹

This process has also affected households with dependent children, resulting in a significant increase in children's vulnerability. Currently, an estimated **27% of children and adolescents under the age of 18 in Spain live at risk of poverty and social exclusion, and 12% suffer from severe poverty; a proportion that is almost double the EU average³⁰ This is one of the most serious structural problems in Spain, and a serious threat to the future, since child poverty has a high cost for society and is one of the main determinants of poverty in adulthood,³¹ generating a vicious circle due to its interdependence with other multiple aspects of social inequality.³² Child poverty is also a burden for the reduction of school drop-out rates and the improvement of educational results,³³ and affects equal opportunities among the young.³⁴ All this is reflected, of course, in the access to quality jobs,³⁵ thus affecting the welfare of a significant number of citizens.³⁶**

Another worrying trend is that poverty is no longer only associated with unemployment, but has spread **to those still working.** In fact, it **already affects 13% of those in full-time employment in Spain, the second highest rate of "working poor" in the EU**.³⁷ Even having a job is no guarantee of protection against poverty and social vulnerability.



Fig. 7. Percentage of population at risk of poverty by age group in Spain

Source: Authors' own, based on Eurostat data.38

In addition to income inequalities, **there are also significant differences in wealth among citizens.** If we understand wealth as the sum of the value of assets owned (homes and other buildings, and financial investments, mainly) minus debts, the latest available data reveal that, in 2017, **the richest 10% of the Spanish population accumulated more wealth than the remaining 90%**, hoarding assets worth 1.3 million euros. In contrast, the poorest 25% had debt worth an average of 200 euros more than their assets.³⁹

Although this is a big difference, **Spain has a moderate level of wealth inequality in the European** context, similar to the EU-27 average and lower than the likes of Germany, the Netherlands and Austria [Fig. 8].



Fig. 8. Wealth inequality, 2017

This is not to say, however, that this issue is of minor importance. Although wealth inequality remained relatively moderate between 1980 and 2007, mainly due, as we shall see below, to the high percentage of households in Spain with home ownership and rising house prices,⁴¹ we observe a change in the trend towards greater concentration of wealth from 2007 onwards, which threatens to continue into the future [Fig. 9].

Source: Drafted by the authors based on data from HFCS.⁴⁰

Fig. 9. Distribution of wealth by income level in Spain



Source: Drafted by the authors based on data from Martínez-Toledano.42

There has also **been a marked increase in intergenerational wealth inequality**. Between 1999 and 2015, the average wealth of 65 year-olds in Spain more than doubled compared to the average wealth of 35 year-olds. Today, **people aged 65 have five times more wealth than people aged 35**. This generation gap is common in advanced economies (people accumulate assets over the years), but in Spain it has accelerated to the point where it has reached the level of extremely unequal countries such as, for example, the United States. [Fig. 10].





Source: Drafted by the authors based on data from Martínez-Toledano and Survey of Consumer Finances.43

The effects of inequality

The impacts that inequality has on a country are not easy to gauge given the enormous complexity of the causal processes involved and their great variability depending on the context in which they occur.⁴⁴ A certain wage differential between workers with different productivity levels can provide an incentive to improve human capital and thus economic growth in the long run.⁴⁵ However, **an excessive level of inequality has very severe negative effects, not only on individuals at the bottom of the income distribution (the poorest), but also on society as a whole.** Indeed, there is ample empirical evidence to suggest that inequality can harm economic growth⁴⁶ by increasing financial instability.⁴⁷ discouraging innovation,⁴⁸ and impeding the upgrading of labour force skills, which in turn hinders productivity gains.⁴⁹ Numerous studies have also shown that greater inequality is associated with greater instability and lower political participation,⁵⁰ higher crime⁵¹ and violence,⁵² more corruption,⁵³ less trust in institutions,⁵⁴ lower well-being⁵⁵ and less social cohesion.⁵⁶

Excessive inequality also tends to erode two of the main pillars of any liberal democracy: intergenerational social mobility and equality of opportunity. Absolute social mobility is often referred to as the "social elevator", and its study allows us to establish whether the next generation reaches a better, equal or worse socio-economic position than that of their parents. Equality of opportunity refers to the possibility for everyone to attain a certain level of education, occupation and income regardless of the socio-economic position of their parents.

In the past, Spain managed to install a powerful **social elevator** that allowed many people to progress and achieve a better social position than their parents had.⁵⁷ From the mid-1990s onwards, however, this social elevator became rusty and has run increasingly poorly, in particular for men⁵⁸ [Fig. 11]. Today, **Spain suffers from low and poorly distributed intergenerational social mobility,**⁵⁹ which mainly affects the less wealthy autonomous communities and young people from poorer households.⁶⁰



Fig. 11. The social elevator in Spain

Source: Drafted by the authors based on data from Marqués.61

In addition to low intergenerational mobility, there is another major problem: **the lack of equal opportunities.**⁶² Data show that **equality of opportunity in the fields of education and employment in Spain is one of the lowest in the EU**⁶³ [Fig. 12]. Of particular concern is the persistence of intergenerational transmission of educational disadvantage: 45 per cent of those born into households with basic education remain at the same level, and only 32 per cent of children from families with basic education go on to higher education.⁶⁴



Fig. 12. Educational and occupational social mobility

This inequality of opportunity most affects people in the poorest quintiles. Being born into a low-income family in Spain is associated with poorer income⁶⁶ and career outcomes,⁶⁷ and significantly reduces the likelihood of good health.⁶⁸ So much so that in cities such as Madrid and Barcelona, average life expectancy in wealthier neighbourhoods is between 7 and 11 years higher than in the poorest neighbourhoods.⁶⁹

These gaps in opportunities and outcomes mean that the problems associated with poverty and inequality impact generation after generation from the same households, becoming entrenched and magnified over time, which in turn is an obstacle to improving human capital, productivity and the well-being of the country as a whole. If Spain wants to converge with the EU-8 by 2050, it will have to correct this situation and guarantee equal opportunities for all. Doing so will not be easy, but it is perfectly possible. Spain has already made significant progress on this front in the past and can do so again. Many of the necessary instruments and conditions already exist. The key, as we will see below, is to address the causes of the problem in a comprehensive and sustained manner.

Source: Author's own based on data from the OECD.65

Pathways to improvement: ways to reduce inequality in Spain

The high levels of inequality in Spain are caused by a multitude of factors, many of which respond to **global trends** that have affected most advanced economies in the West.⁷⁰ One of the most important of these has been **the internationalisation of production processes and the emergence of transnational value chains**, which have given rise to a new economic order in which Europe's middle and working classes have benefited less.⁷¹

Another important factor has been **technological change**. Over the last two decades, digitalisation has been transforming the structure of the European labour market and the type of income it produces. Demand for medium-skilled labour has fallen, while demand for low and high-skilled labour has increased,⁷² contributing to wage polarisation⁷³ [see chapter 7]. In the case of Spain, the effects of these global trends have been compounded by a series of **idiosyncratic factors** that have aggravated the problem of poverty and inequality. **These factors are serious problems for Spain, but also clear avenues for improvement that, if well exploited, could help us build a fairer and more equitable society over the coming decades**. Here we highlight four.

I. Modernising our productive apparatus and our labour market

As we have already seen, the Spanish economy is characterised by a **low level and growth** of productivity and a sectoral composition heavily skewed towards labour-intensive activities [see chapter 1]. These characteristics, together with the peculiarities of our regulatory framework, mean that employment in Spain is very sensitive to fluctuations in economic activity, making for a very precarious labour market, with low wages, very high levels of unwanted temporary and part-time work, and an abnormally high structural unemployment rate for a developed economy [see chapter 7]. When a crisis arises, many Spanish households suffer very pronounced losses of income, and a significant number of them (especially those belonging to the lower-middle class) fall into poverty or even social exclusion.⁷⁴ On the contrary, in phases of economic expansion, income differences are reduced at a rate below increasing income, which leads to a perverse dynamic that pushes Spain towards greater inequality. Correcting this dynamic will allow us to mitigate or even prevent an important part of inequality, as it involves implementing measures that can directly influence the "primary" distribution of income (*pre-distribution*) and make *ex-post* redistribution measures less necessary.⁷⁵

II. Harnessing the full revenue-raising and redistributive potential of our tax system

Our tax system collects less and redistributes income and wealth poorly compared to other European countries [Fig. 13]. This problem improved greatly during the 1990s and early 2000s, but worsened again from 2008 onwards, when the share of after-tax income held by the richest 10% rose again, while that of the poorest 50% fell [Fig. 14]. This indicates that taxes and social transfers (discussed in the next section) did not exert sufficient corrective action either during the Great Recession of 2008 or during the subsequent recovery.



The low revenue-raising capacity of our tax system is mainly due to a combination of two factors. Firstly, the characteristics of the productive apparatus and the high weight of the black economy in Spain [see chapter 1]. Secondly, the design of the system itself, whose shortcomings have prevented it from increasing the size of its revenues and its progressivity. In 2019, Spain's tax revenue was 35% of GDP compared to an average of 41% for the EU-27 and 43% for the EU-8 [Fig. 15].



Fig. 15. Tax collection, 2019

Source: Authors' own, based on Eurostat data.78

The Spanish tax system is progressive in that the average effective rate increases with the gross income of taxpayers, and the taxes and social contributions paid by taxpayers as a whole manage to reduce income inequality (as measured by the Gini index) by around 3.5%.⁷⁹ This progressivity, however, is very imperfect, especially at the lower end of the income distribution. So much so that, **in Spain, the poor pay more taxes (relative to their income) than the middle class**, an effect that also occurs in other countries such as the UK and Ireland, and which is mainly due to the effect of social contributions and indirect taxes [Fig. 16].



Fig. 16. Taxes paid as a share of gross income by income quintile in Spain, 2017

Source: Drafted by the authors based on data from López Laborda et al.80

Below, we look at some features of our main taxes, which contribute to limiting revenue collection and the overall progressivity of the tax system.

Personal Income Tax (IRPF),⁸¹ which has marginal rates similar to those of other countries and **is the figure with the highest collection capacity, is the main source of progressivity in our system.** Despite this, **its redistributive effect falls below the EU average**,⁸² and its collection volume⁸³ is affected by the existence of certain tax benefits (despite their reduction in recent years⁸⁴), the systems for quantifying income from economic activities⁸⁵, and the capital gains tax.⁸⁶

As far as **Value Added Tax** (IVA), the second most important tax revenue figure in Spain, is concerned, its revenue is reduced by the differentiation of rates that currently exists (general rate versus reduced and super-reduced rates).⁸⁷ Moreover, like other consumption taxes, it is considered a regressive tax, as it taxes consumption ignoring household income levels.⁸⁸

Thirdly, in terms of revenue collection, **Corporate Income Tax**⁸⁹ revenue has fallen substantially since the 2008 crisis, **and is now half of what it was in 2006**.⁹⁰ The lowering of its tax rate from 35% to 25% in recent years, to bring it into line with the EU average, may have contributed to this decline,⁹¹ but it has not been the only factor. The characteristics of our productive network (with a predominance of SMEs, which suffer sharp falls in profits in times of crisis) [see chapter 1] and the relocation of companies and tax bases are also key.⁹²

Finally, it is worth mentioning that the **Wealth Tax** and the **Inheritance and Gift Tax**, which, although of a lower collection amount, are relevant for the progressivity of the tax system. The lack of coordination between the different Autonomous Communities, as well as the tax benefits introduced by them, however, significantly limit their scope.⁹³

Overall, the elements described above mean that, **although the Spanish tax system today has a ratio between direct and indirect taxes similar to the EU average**,⁹⁴ **its revenue-raising and redistributive capacity is considerably lower than that of its European neighbours.** This situation is a problem, but its detection is **an opportunity to mitigate the problem of inequality in Spain**. Bringing the tax collection capacity of our tax system into line with the EU-27 average would enable us to implement social policies that would significantly reduce inequality and poverty.

III. Strengthening our social transfers system

A third way to reduce the levels of inequality and poverty in Spain is to strengthen the capacities and efficiency of our social transfer system. In Spain, redistribution through taxation represents a low percentage of the total redistributive effect. The rest is achieved through the provision of public services such as education and health, and, above all, through the payment of cash benefits such as contributory and non-contributory pensions, unemployment benefits, study grants, minimum incomes, and other benefits.⁹⁵ These payments play a key role in alleviating poverty and inequality,⁹⁶ as they benefit lower-income population groups the most.⁹⁷ However, **the data suggest that the effect is smaller in Spain than in most European countries** [Figs. 17 and 18].



Fig. 17. Reduction in inequality (Gini) explained by social transfers, 2019

Source: Authors' own, based on Eurostat data.98





Source: Authors' own, based on Eurostat data.99

Why? There are two main reasons for this. On the one hand, **the lack of funding, which in turn is conditioned by lower tax revenues.** In 2019, Spain spent 17% of its GDP on social protection expenditure, compared to 19% for the EU-27 and 20% for the EU-8 [Fig. 19].



Fig. 19. Public expenditure on social protection, 2019

Source: Authors' own, based on Eurostat data.100

On the other hand, **the very design of the social protection system**, which gives less relative weight to those transfers that most directly benefit the poorest groups (e.g. housing, child or social inclusion benefits) and to non-contributory benefits (only 20% of the total), which is particularly problematic given the high levels of underemployment and unemployment in Spain.¹⁰¹ The result is a system in which **the richest quintile receives more public transfers** (30%) **than the poorest quintile** (12%). **In the OECD, only Portugal, Italy and Greece have more regressive systems in this respect**¹⁰² [Fig. 20].



Fig. 20. Share of public transfers by income group, 2016

Source: Author's own based on data from the OECD.¹⁰³

IV. Improving property market dynamics

A fourth way to reduce inequality and poverty in Spain is to improve housing market dynamics. The different ways in which people access housing in Spain have a direct and very notable influence on inequality in terms of income, wealth and well-being. **The first major fracture** in this respect **is between those who own the home in which they reside and those who do not.** In Spain, 76% of inhabitants live in an owner-occupied home; 7 points higher than the EU-27 average. Of these, 38% have outstanding payments. In contrast, more than 20% live in rented accommodation, often having to spend a very high proportion of their income on monthly rent,¹⁰⁴ which makes it much more difficult for them to save and accumulate wealth and thus to prepare for retirement or to cope with eventual hardship, such as job losses or recession [see chapter 6].¹⁰⁵

Among the **poorest households**, the percentage of those renting is substantially higher than average. In Spain, 43% of the population below the poverty line live in rented accommodation and only 15% have subsidised or low-cost rent.¹⁰⁶ This reality, together with the high prices paid in some large cities, means that rent has become the main cause of evictions (67% in 2019)¹⁰⁷ and that **the risk of social exclusion in Spain is three times higher in households living in rented accommodation than in owner-occupied homes**.¹⁰⁸

Among those living in owner-occupied homes, there are also notable differences, with the key distinction being between those who have inherited their home and those who have purchased it. The former can devote the bulk of their income to expenses such as education and health, to savings, or to building up their wealth. In contrast, most home buyers must dedicate a significant part of their income to the monthly mortgage payment and have savings to pay for the deposit. This mortgage pressure is particularly high among households in the lowest quintiles¹⁰⁹ and often results in situations of stress, vulnerability and severe deprivation that affect not only the economic situation of households, but also their professional performance and health status [see chapter 6]. These dynamics mean that income and wealth differences are greater, especially among the young and older population.¹¹⁰ In fact, it is estimated that **inheritance accounts for**

almost 70% of wealth inequality in Spain, a higher percentage than in other European countries and similar to the US.¹¹¹

Housing also directly impacts wealth inequality through changes in property prices. Although housing is the main economic asset of the Spanish population,¹¹² there are notable differences in the wealth composition of households [Fig. 21]. Poorer households channel their minimal savings into maintaining a cushion of money, either in cash or on deposit in a bank. The middle class, having a greater volume of wealth, opt for the purchase of their main residence, albeit generally by taking out a mortgage. In contrast, the wealthiest groups (the richest 10% and, even more so, the 1%) diversify their asset portfolios in such a way that, although they tend to own the home in which they reside, they also invest in other rental properties and financial assets such as company shares or investment funds. Compared to other countries, in Spain, the use of housing as a second residence and investment asset by higher income households is particularly high.



Fig. 21. Composition of household wealth in Spain, 2015

Source: Drafted by the authors based on data from Artola Blanco et al.113

These differences in the composition of wealth mean that house price fluctuations have a very different and direct impact on the wealth accumulated by households. Thus, between 1980 and 2007, the increase in the relative price of property assets (those that have a greater weight in the portfolio of the poorest 90% of the population) meant that the wealth concentrated in the hands of the richest 10% of the population fell, making Spain a slightly less unequal society. The end of the housing boom in 2007, however, reversed this trend; the fall in house prices and the greater ability of the richest 10% to adjust and diversify their savings saw wealth inequality rise again in Spain and in the rest of Europe, a trend that, as we shall see, continues today.

THE FUTURE: A MORE UNEQUAL SOCIETY?

The short term: inequality in times of the coronavirus

The coronavirus pandemic has had a very asymmetric impact on Spanish households that will almost certainly lead to an increase in income inequality in Spain in the short term.¹¹⁴ The lockdown in spring 2020 has already set the wheels of this process in motion, affecting citizens very unevenly. While some households kept their incomes intact and some even increased their savings, others suffered a severe reduction and were forced to dip into their savings or borrow to pay the bills.¹¹⁵ This situation was especially common among households in the lowest income quintiles, whose members work mostly in those sectors most affected by the closure of non-essential activities (e.g. non-food retail, and hotels and restaurants) [Fig. 22].¹¹⁶





The lockdown was particularly tough for younger generations (20-30 years), those of immigrant origin (especially those from countries with lower per capita income),¹¹⁸ and women,¹¹⁹ who, due to their over-representation in the sectors most affected by the closure of activity, were affected more severely by 5 points than men in all age groups [Fig. 23].

Source: Drafted by the authors based on data from the $\mathsf{MCVL}\text{-}\mathsf{CDF}\text{.}^{117}$

Fig. 23. Working population affected by closures by sex and age in Spain



Source: Drafted by the authors based on data from the MCVL-CDF.120

The response of the benefit system, with the addition of new emergency assistance, served to mitigate the asymmetric impact of the pandemic, reducing the proportion of people with no income by more than 20 percentage points and the proportion of people on low incomes by more than 10 percentage points, thus limiting the increase in inequality to almost 13% at the worst point of the first wave of the pandemic¹²¹ [Fig. 24]. Even so, some studies estimate that lockdown caused a 10% drop in the lowest incomes in Spain¹²² and **an increase in income inequality of 1.7 Gini points** ¹²³ (or up to 30% more).¹²⁴ This represents a slightly larger increase than during the first year of the Great Recession in 2008.¹²⁵ During the summer, inequality remained stable, but increased again in autumn, coinciding with the second wave.

One of the groups most affected by the coronavirus has been **schoolchildren**. It is estimated that after the closure of the schools, some 3 million pupils (more than 30% of the total) were left without access to any learning activities.¹²⁶ Most came from disadvantaged households, which have fewer digital means and fewer socio-cultural resources, both of which are necessary to maintain the normal pace of learning from home.¹²⁷ It is likely that subsequent years will not fully redress the learning inequalities generated during lockdown, which could lead to a general deterioration in learning achievement and a possible increase in dropout and failure among secondary school students from vulnerable families [see chapter 2].





Source: Drafted by the authors based on data from CaixaBank Research.128

What happens next? The major pandemics of the last two decades (SARS, H1N1, MERS, Ebola and Zika) were followed by a spike in income inequality of 1.5 Gini coefficient points in most of the affected countries, mainly as a consequence of job losses and reduced income from other sources (e.g. reduced remittances).¹²⁹ The coronavirus pandemic will most likely have a similar effect in Europe. This would have a particularly pernicious effect in Spain due to the magnitude of the economic crisis and the greater relative weight in our production of some of the economic sectors most affected by the virus (e.g. tourism services).¹³⁰ Some experts estimate that 2021 could end with up to 700,000 more people below the poverty line.¹³¹ It is therefore reasonable to assume that the Spain of 2023 will be more unequal than that of 2020.

The medium and long term: what might happen if major changes are not made

Although there is much uncertainty about the intensity and duration of the current crisis, Spain is expected to reach pre-pandemic levels of growth and employment by 2023, in part thanks to the boost from European recovery funds [see chapter 1]. In any case, the fact that the economy is recovering does not mean that the gaps caused or widened by the coronavirus will close, just as the inequality generated during the Great Recession of 2008 was not fully corrected during the growth phase of 2013 - 2019. In fact, all indications are that, without far-reaching reforms and more ambitious redistributive policies, inequality in Spain could stagnate at current levels or even increase between now and 2050.¹³²

In the absence of major productivity gains and a significant increase in employment rates, the Spanish economy could experience very low growth over the coming decades, resulting in lower wages, lower public revenues and a reduction in the equalising effect of social transfers and public services [see chapter 1], in other words, more inequality. If the projected productivity gains are achieved, but are not accompanied by the improvements in education and social mobility described above, inequality could also increase, as a result of the rising incomes of professionals in the most competitive and leading sectors.

The evolution of our tax system, of our public services, and of labour regulation will also determine economic inequality over the long term. If we do not manage to increase the revenue-raising capacity of the State, make the tax system more progressive, protect social benefits and strengthen instruments such as collective bargaining over the coming years, it will be very difficult to achieve a fair distribution of the benefits derived from the aforementioned productivity gains and to prevent inequality from continuing to grow.

This process could be further exacerbated by **the effects of megatrends** such as demographic ageing, technological transformation or ecological transition. Over the next three decades, Spain will experience a significant increase in the proportion of its population that is elderly and in 2050, 1 in 3 Spaniards will be over 65. This trend suggests an increase in the share of retirement benefits in household income, which is expected to reduce income inequality after taxes and transfers. However, if we fail to achieve better growth and reverse the decline in the share of wage income in GDP, the financing of the public pension system as we conceive it today could be jeopardised, affecting future pension payments [see chapter 5].

Moreover, if the criteria for allocating retirement benefits remain unchanged, the increase in nonstandard workers (e.g. freelancers) and the development of increasingly fragmented careers expected over the coming decades [see chapter 7] are likely to **lead to a greater proportion of people reaching retirement age without having contributed to their pension for a sufficient number of years and without accumulating sufficient personal savings capacity**, leading to a greater dispersion of income among older people.¹³³ Also, in the future, many people will continue to work beyond the current statutory retirement age, which will allow them to earn higher incomes for more years. Others, on the other hand, will not be able to do so, either because of their health conditions or because of the type of work they do. This divergence, if not well managed, could be an additional source of inequality among older people.

Problems of access to housing could also lead to an increase in inequality. The current difficulties in accessing home ownership will mean that, by 2050, more and more people will reach retirement having to pay rent or part of their mortgage [see chapter 6]. This will substantially reduce their savings cushion and deprive them of an asset that, in case of need, can be sold or monetised to cover, among other things, care services.

The other major megatrend that will influence inequality in Spain is technological change. So far this century, the digital transformation has altered much of the occupational structure in Western countries, increasing wage inequality and favouring capital income over labour income,¹³⁴ through an increase in the capital intensity of production and rising employment and wages for skilled workers [Fig. 25]. It is unclear whether this trend will continue in the future. What is clear is that, if it does, the spread of technologies such as Artificial Intelligence and advanced robotics could lead to an increase in inequality in the short-term.¹³⁵





Source: Drafted by the authors based on data from AMECO.136

Climate change and ecological transition will also be key to how inequality evolves over the long term. Firstly, because the most disadvantaged and vulnerable populations are often the hardest hit by the adverse effects of climate change. These adverse effects include issues such as food insecurity, loss of income and livelihoods, health impacts, and population displacement.¹³⁷ Secondly, because climate policies will lead to a redistribution of wealth between and within countries. An example of this is how the distributional consequences of fuel price interventions have opposite effects on oil-exporting and oil-importing countries and, within each country, affect some sectors (such as transport) more than others.¹³⁸

In short, without far-reaching reforms to lay the foundations for a prosperous, sustainable and socially inclusive economy, capable of seizing the many opportunities offered by the megatrends described above, our growth will be very moderate and **the future will replicate (or accentuate) the income and savings divergences**¹³⁹ observed in the past. This will also result in **an increase in wealth inequality**, even if residential property prices grow more moderately and in line with inflation at a national level.¹⁴⁰ This increase in inequality will be greater if household saving patterns are like those observed between 1995 and 2015, when the richest 10% of the population accounted for more than 70% of total savings, while it will be more gradual if the reference period is extended to 1984 (the share of savings hoarded by the richest 10% falls to around 60%) [Fig. 26].

In addition to this prognosis, there is also the potential effect of the growth of cities in the face of the depopulation of some rural areas expected over the coming decades [see chapter 6]. In large cities (e.g. Madrid and Barcelona), this could lead to an increase in the total weight of nonproductive revenue from fixed factors such as land, commercial premises and housing (e.g. rents), and an increase in their value, which in turn would generate greater income inequality, greater inequality in the intergenerational transmission of wealth, and greater difficulty in accessing credit.



Fig. 26. Possible evolution of wealth in the hands of the richest 10% in Spain according to past savings patterns

Source: Drafted by the authors based on data from Bauluz et al.141

Another future is possible

Naturally, **none of these processes is unalterable or inevitable**. Ultimately, **the evolution of inequality over the coming decades will depend on us**; on our ability to make the changes described in the other chapters of this *Strategy* and to seize the opportunities offered by future megatrends.¹⁴²

If we can lay the foundations for economic growth driven by productivity gains and the generation of stable, quality employment, we will be able to improve the purchasing power of the population as a whole, greatly reduce the effects of economic crises on inequality and poverty, and generate sufficient public revenue to raise social spending and improve the redistributive potential of our welfare state [see chapters 1 and 7]. To do so, we must modernise our productive network, through innovation and technological diffusion in our companies, but, above all, through a notable improvement in the training and skills of our entire population, from childhood to old age. Education and the retraining of our workforce must be the main levers to reactivate the social elevator and provide more and better economic and employment opportunities for our population as a whole [see chapters 2 and 3].

It will also be necessary to **adjust and modernise labour regulation** so that productivity gains are shared fairly. If recent decades have shown us anything, it is that generating wealth unequally and then redistributing it is not enough. In the future, this wealth must be generated in a more balanced way. At the same time, it will be necessary to **increase the revenue-raising and redistributive capacity of our tax system and of public benefits and services**, something for which new technologies such as big data or Artificial Intelligence will be of crucial help, both in the detection of fraud and in the administrative management of aid.

If the reforms proposed throughout this *Strategy* are implemented, through a very significant increase in investment in education, a rise in productivity and greater redistributive capacity through the policies described in this chapter, **inequality could fall to the current levels of countries such as Germany, France or Sweden (below 30 Gini points), and poverty could reduce to historic lows**.¹⁴³

Our welfare state will also have to adapt to the new economic and social realities that will define the future of Spain. As we have seen, many of the dynamics that characterise our labour or housing market today will be reproduced when today's population of young population reach old age. The reforms that will be undertaken in the public pension system over the coming years will have to take into account the discontinuity of working lives and the normalisation of new forms of employment that break with the traditional paradigm of salaried staff spending several years in the same company and generating the right to receive a contributory pension in retirement [see chapters 5 and 7]. Similarly, it will be necessary to address the problems of access to housing that exist in some parts of Spain, reducing, among other things, the overburdening of many households to pay rent [see chapter 6]. This would reduce their vulnerability to a sudden drop in income or a rise in prices and, together with the necessary improvement in working conditions, would correct the current inequalities in the generation of savings and wealth.

At the same time, **the effects of new technologies on inequality can be minimised** with good public policies aimed at ensuring that the new robots and digital agents do not replace human workers, but rather empower and complement them; with intensive reskilling programmes that facilitate the reincorporation of displaced workers; and with reforms to our tax and benefit system that encourage more equitable distributions of productivity and improve the redistribution of market rents.¹⁴⁴ Indeed, if well governed, **digital transformation could help mitigate many of the inequalities that currently afflict our society**, reducing the gap in services and opportunities that exists between rural and urban Spain; facilitating access to services and productivity tools for small businesses and the self-employed; enabling potential additional sources of income for many workers; and improving the working conditions of thousands of people.

Similarly, **the green transition need not become a source of inequality in Spain.** There will be transition costs in the short term; of that there is no doubt. But there are instruments, already in place in several countries, aimed precisely at avoiding the regressive effects that certain measures can have, such as increasing green taxation, and at guaranteeing a socially just green transition. In the medium term, the development of the circular economy, renewable energies and sustainable mobility could lead to a better distribution of economic and employment opportunities across the territory, a reduction in the gender gap, the replacement of thousands of brown economy jobs with more stable and secure ones, the mitigation of pollution and extreme events (which tend to

affect the most vulnerable groups more), and a reduction in energy bills for many households [see chapter 6]. These improvements could lead to reduced inequalities in health and living conditions, and greater educational and economic equity.¹⁴⁵

Moreover, **the world is changing and our welfare state must change with it**. Spain should therefore study, debate and evaluate new collective protection mechanisms to help extend or reinforce existing ones. There are numerous proposals which, although still embryonic, are already present in the social debate in our neighbouring countries. One of the most prominent is **universal public inheritance**. As we have seen, intergenerational wealth inequality is one of the greatest challenges facing European society. Inheritance is playing an increasingly crucial role in wealth inequality. This unequal distribution of inheritance has a decisive impact on equality among younger generations. A novel proposal to help prevent this phenomenon from worsening in the future is the possible creation of a universal public inheritance; a financial endowment that all young people in the country would receive once they reach a certain age. This endowment could be used to buy a first home, to finance the creation of a business, or to complete training. It may sound utopian right now, but it may become a reality in some countries over the coming decades. Spain should therefore explore this possibility taking into account the levels of inequality existing at the time of its implementation, as well as its effect in addition to other social measures.¹⁴⁶

A second idea that should be explored is the development of a **public investment fund** that would allow the provision of long-term, "patient" financing to sectors where returns on investment are more uncertain, such as the most innovative and cutting-edge sectors. Such funds complement private investment and help diversify collective protection mechanisms against economic fluctuations and global disruptions.¹⁴⁷ A well-capitalised public investment fund in Spain, with specific missions, could channel the role of the state as an entrepreneur in those areas where we face the greatest idiosyncratic challenges.¹⁴⁸

In short: although rising inequality is a structural trend influenced by a multitude of factors, there are ways to mitigate or even reverse it over the coming decades. This is essential if we are to build a fair and cohesive society.

How can this be achieved? A number of measures are suggested on the following pages.

WHAT NEEDS TO BE DONE TO REDUCE INEQUALITY AND POVERTY

By 2050, **Spain will need to significantly reduce its levels of income inequality and poverty and mitigate opportunity gaps in areas such as education in order to reactivate the social elevator**. Doing so will be essential if we are to remain a cohesive, prosperous and competitive country.

To achieve this, we will have to carry out a **profound transformation of the productive system**, resolve the deficiencies of our **labour market**, solve the problem of access to housing and modernising our system of lifelong learning and retraining, following the ideas set out in the previous chapters of this *Strategy*. Of all these measures, the importance of improving human capital and generating **quality employment** in Spain is vital. Without these structural changes, the problem of inequality and poverty in Spain cannot be solved. In addition, **the governance and the revenue-raising and redistributive capacity of our tax system and our welfare state** will have to be improved, as this is a fundamental equity tool, the potential of which has not yet been fully exploited in Spain. The proposals detailed below focus on improving the revenue-raising and redistributive capacity and inequality, particularly those related to the transformation of the labour market.

It is difficult to achieve that which cannot be measured. It is therefore essential that, over the coming years, Spain reaches a consensus, through social dialogue, on a **dashboard of quantifiable indicators and a list of specific goals** that will make it possible to monitor progress and guide the ambition of the reforms. Here we suggest a few, in addition to those already mentioned on economic growth, education, the labour market, and access to housing in previous chapters:

Goal 46. Reduce income inequality to converge with the current EU-27 average in the medium term and that of the EU-8 countries by 2050.

Goal 47. Reduce the proportion of people living at risk of poverty from 22% today to 18% by 2030, to 10% by 2050.

Goal 10. Minimise the weight of students' social background on educational attainment to reach the EU average by 2030 and converge with the EU-8 by the middle of the century.

Goal 48. Progressively increase revenue collection in our tax system from 37% of GDP today to 43% by 2050.

Goal 49. Increase public spending on social protection to converge with the EU-8 average.

Goal 6. Reduce the weight of the informal economy to levels at least similar to those of EU-8 countries by 2050.

Table of indicators and objectives

Indicators	Place	Average 2015-2019 or latest data available*	Targets		
			2030	2040	2050
46 Gini Index (income inequality) ¹⁴⁹	Spain	34	32	31	29 ¹⁵⁰
	EU-27	30	-	_	-
	EU-8	27	-	_	-
 47 Population at risk of poverty (% of total)¹⁵¹ 	Spain	22%	18%	15%	10%
	EU-27	17%	-	_	-
	EU-8	14%	-	_	_
10 Importance of socio-econo- mic differences on the probability of repetition at equal skills levels ¹⁵²	Spain	3.9*	3	2	1
	EU-22	2.0	-	_	-
	EU-8	1.5	-	_	-
48 Tax revenue (% of GDP) ¹⁵³	Spain	35%	37%	40%	43%
	EU-27	41%	-	-	-
	EU-8	44%	-	_	-
49 Public expenditure on social protection (% of GDP) ¹⁵⁴	Spain	17%	18%	19%	20%
	EU-27	20%	-	_	-
	EU-8	21%	-	_	-
6 Shadow economy (% of GDP) ¹⁵⁵	Spain	20%	15%	12%	10%
	EU-27	17%	-	_	-
	EU-8	11%	-	_	-

Achieving these goals is feasible, but to do so **Spain** will have to undertake **far-reaching reforms** and launch ambitious initiatives on a multitude of fronts. A number of these are recommended below:

Front 1: Increase the revenue-raising and redistributive capacity of our tax system

For decades, Spain has had a significant public revenue-public expenditure gap, which limits the redistributive capacity of the welfare state. To correct this situation, Spain will have to make a **series of changes to its tax system, progressively over time**, which will also affect the taxes transferred to the autonomous communities and local administrations. In addition to helping to solve the problem of insufficient revenue, these changes should be aimed at improving the equity of the system, both vertically (increasing its redistributive scope) and horizontally (ensuring equal tax treatment in identical circumstances), adapting or anticipating the socio-economic effects of megatrends such as technological change, climate change and demographic ageing.

Under these premises, between now and 2030, it will be necessary to:

 Broaden tax bases, the main cause of the low revenue-raising capacity of the tax system. This will require greater scrutiny of tax benefits, retaining only those that follow principles of effectiveness, efficiency and equity. From a criterion of horizontal equity, the current systems of objective assessment by modules or coefficients in personal income tax, which do not have equivalents in the benchmark countries, should move towards taxation systems based on real income, maintaining the simplicity and ease of management that they entail. The digitisation of the tax administration can contribute to this goal.¹⁵⁶

- Rationalise corporate taxation and promote its harmonisation at international level. The reform should mitigate, insofar as possible, the distortions caused by Corporate Income Tax (CIT) tax benefits that end up skewing the burden towards small companies and traditional and less mobile sectors. At international level, efforts should be made to achieve an equitable allocation of revenue between countries. If no agreement is finally reached in the OECD (BEPS Inclusive Framework),¹⁵⁷ Spain should promote, within the EU, the implementation of the Common Consolidated Corporate Tax Base system, in addition to a multilateral solution to tax large digital services companies and the implementation of a minimum effective rate in the CIT.¹⁵⁸
- Deliver comprehensive reform of income, wealth and inheritance and gift taxes to remove tax incentives for investment in real estate-related assets, raising the effective taxation of capital to bring it into line with other EU countries¹⁵⁹ and boosting its contribution to the progressivity of the system.¹⁶⁰ Likewise, the role of wealth tax and inheritance and gift tax in the regional treasuries should be reconsidered in order to avoid undesirable tax competition strategies, which undermine the revenue-raising and progressive scope of these taxes and the principle of equality that prevails in Spain.
- Amend excise taxes, raising tax rates on alcohol, tobacco and petroleum-based fuels to converge with those in the main EU countries; and creating a framework of incentives and fiscal instruments to promote a green, efficient and socially just transition,¹⁶¹ through instruments such as climate rent [see chapter 4]
- Reduce tax fraud and the weight of the black economy to at least bring it into line with the most advanced EU-8 countries [see chapter 1]. Continued strengthening of instruments in the fight against the shadow economy, tax avoidance and evasion, and the increasing use of tax havens,¹⁶² should be a priority line of action.¹⁶³ This strategy is required not only for reasons of revenue adequacy, but also for reasons of equity, efficiency and competitiveness, and public morality. To reduce fraud and encourage voluntary compliance, it is essential to increase the resources of tax administrations and to improve the efficiency and co-ordination between them. Exchanges of information, both between public administrations and between countries, should also be enhanced and tax amnesties should be prohibited by law.
- Improve tax education and information for citizens. This policy would have two components: an educational component, which proposes the inclusion of content related to the functions of the tax system and tax social awareness in secondary education; and an informational component, which proposes a combination of informational policies and behavioural interventions to increase tax morale and compliance [see chapter 1].¹⁶⁴
- Establish a medium- and long-term action plan for taxation based on the recommendations
 of the committee of experts for the reform of the tax system.

In addition, by 2050, it will be necessary to:

- Reconsider the bases and rates of taxation on labour through Personal Income Tax (IRPF), adapting them according to the effects of technological change on the labour market and wage inequality over the coming decades.
- Similarly, if technological change is relatively beneficial to the owners of capital, as has been the case over recent decades in many advanced economies, capital taxation must be updated to tax capital returns more heavily. For example, the tax burden on non-productive revenue associated with technological change (e.g. those arising from the exercise of market power by digital platforms) could be increased, something that would not necessarily be a source of inefficiency, given the non-productive nature of this revenue.

Front 2: Extend social benefits and adapt them to new labour and demographic realities

Social benefits are the cornerstone of the welfare state and the most important redistributive tool our country has. It is therefore essential to ensure universal and quality access to them over the coming decades, in line with the recent creation of the Minimum Living Income (IMV).¹⁶⁵ To achieve this, it will be necessary to gradually and continuously adapt the benefit system, with the aim of moving towards a welfare state model that is more focused on people's needs than on their work history [see chapter 7]. To achieve this, it will be necessary to:

- Increase public spending on social protection to converge with the EU-8 average by 2050.
 Funding must be sufficient in all the autonomous communities, without any of them being weighed down by their lower tax collection capacity.
- Ensure that the IMV and other non-contributory benefits act as a powerful redistribution mechanism for groups with limited contribution histories, and integrate these benefits with accompanying measures to ensure the full inclusion of these groups in society.
- Extend the coverage and amount of non-contributory benefits in the framework of the IMV and beyond, adapting them to the needs of specific groups, such as families with dependent children. By design, the IMV will have a limited redistributive effect, although it will play a key role in reducing extreme poverty. Other instruments will therefore be needed to expand income coverage. In this regard, it is proposed, for example:
 - To reform family benefits, which in Spain have very little effect on income redistribution. The economic support policies for households with dependent children are basically concentrated in the personal income tax treatment of the family institution. These have no effect on lower income and lower income households, which are clearly insufficiently protected. In particular, those individuals and families who do not file a personal income tax return because they do not earn income cannot benefit from the tax savings corresponding to the charges for descendants.¹⁶⁶ In the medium to long term, the tax treatment of child support should be changed so that, as with the maternity deduction, it could be refunded to the taxpayer in the case of households that are not liable for tax but whose annual income is above the IMV threshold.
 - To create a new child benefit for children under the age of 18. In the first instance, this benefit should be targeted at all families who are at risk of poverty but do not

qualify for the IMV. Subsequently, it should be extended to the rest of the country's families, as is already the case in most European countries.¹⁶⁷

— To preserve the efficiency of public spending on social protection through the integration of non-contributory benefits which, while respecting the competences of the different administrations, jointly meets the objectives of eradicating extreme poverty and minimising the risk of poverty in Spain. To this end, it is proposed to strengthen the Minimum Living Income Monitoring Commission as a framework for dialogue and interterritorial coordination on poverty reduction policies.

Front 3: Incorporate specific goals for the reduction of inequality and poverty into national strategies, and strengthen transparency and evaluation policies

- Include explicit inequality and poverty reduction targets in national reform plans, and allocate resources to specific programmes to achieve them. In the case of Spain, only very general mentions have been made in the drafting of the National Action Plans for Social Inclusion. It is proposed to incorporate this type of objective into the macroeconomic framework on which the General State Budgets are drawn up, so that there is a more explicit definition of the allocation of funds and a design of public policies aimed at the pre-distribution and redistribution of income.
- Improve information systems to monitor progress and setbacks in meeting redistributive objectives. On the one hand, the main surveys that measure the evolution of inequality should be strengthened, improving their territorial representativeness and extending their longitudinal information in order to be able to properly interpret their dynamics. One way to achieve this, and to avoid the usual time lag between the period of information collection and the date of publication of the data, could be to take advantage of the richness of the administrative registers, so that advances of the distribution of some income sources could be produced on a monthly or quarterly basis. Another way is through the implementation of a system of National Distributive Accounts to allow longterm analysis of the distribution of national income and wealth, as is being done in other countries.¹⁶⁸
- Continue to promote pay transparency laws in companies and public institutions, which, as several studies have shown, help reduce the gender gap without harming corporate profits.¹⁶⁹

Front 4: Promote the social economy, cooperativism and worker participation in enterprises

Another avenue to be explored is the development of mechanisms of economic democracy, which are protected by Article 129.2 of the Constitution and which constitute a clear example of *pre-distributive* measures. To this end, one could:

- Promote cooperative entrepreneurship linked to the social economy, in which Spain already has a great track record. The aim is to establish support and advice programmes from the public administration that put entrepreneurs in contact with each other to create cooperatives collectively, thus generating synergies between them and contributing to overcoming barriers to the creation of cooperatives.¹⁷⁰
- Consider the creation of mechanisms to encourage workers' participation in the capital of their companies, something that is already being done in several European countries such as Sweden.¹⁷¹ The aim is to promote co-determination systems through, "employee funds", i.e. collective investment funds of the workforce in company ownership, which reinvest the dividends obtained in their capitalisation. These mechanisms can generate important distributional benefits. Firstly, as opposed to short-term measures that sometimes hinder corporate governance, they can help to boost long-term investment in the territory and, with it, job creation. Secondly, they can help reverse the growing trend towards concentration of ownership by rebalancing the distribution between capital and labour income.

If these reforms are implemented, Spain could drastically reduce its levels of poverty and inequality, making it one of the most egalitarian, cohesive and fair countries in Europe.



Challenge #9

BROADEN THE FOUNDATIONS OF OUR FUTURE WELL-BEING

EXECUTIVE SUMMARY

- A country's economic, scientific and institutional progress only makes sense if, ultimately, it serves to increase the well-being of its citizens. Spain's progress over the last four decades has contributed to this purpose: according to the latest available data, more than 85% of the population considers themselves to be "satisfied" with their life, ranking us above the EU average and among the "happiest" countries in the world.
- Our strengths include our good health, the quality of our leisure time and our personal relationships. However, we still have an issue to be resolved - namely, the high levels of economic and job-related dissatisfaction, which stems from high levels of unemployment and job insecurity. Dissatisfaction in these areas is creating a notable gap among the population and is preventing us from converging with the most advanced countries in Europe.
- Between now and 2050, the evolution of how satisfied we are with our lives will depend on our ability to face the social, economic, environmental and technological challenges and opportunities set out in this Strategy. To secure our place among the happiest countries in Europe, we will have to move towards a pattern of economic growth based on productivity gains, the creation of quality jobs and the sustainable use of natural resources. Only in this way, we will be able to finance the social safety nets and public services we need to ensure that the population is satisfied with its life.
- Among other things, the quality and coverage of health and care services will need to be further expanded and aligned to new social realities such as increasing longevity, the prevalence of mental disorders and loneliness. We should also focus on education as a way to teach basic socio-emotional skills and tackle problems such as smoking, consumption of antidepressants and obesity early on. Similarly, redistributive and social protection mechanisms should continue to be strengthened to mitigate phenomena such as poverty and inequality.
- New technologies and the ecological transition will be key allies in this process. Well used, they will serve to improve our health, facilitate the work-leisure balance, better assist the elderly, and allow us to enjoy greener and more liveable spaces.

THE PAST: ACHIEVEMENTS

Enjoying a good life is one of the main aspirations of human beings and facilitating it should be the ultimate goal of any government.¹ This was recognised under the first *Spanish Constitution* (drafted in Cadiz in 1812), Article 13 of which states: "The object of Government is the happiness of the Nation, since the purpose of every political society is none other than the well-being of the individuals who compose it."² Economic growth, technological development and legislative advances are tools to achieve that purpose. For this reason, more and more people are calling on governments to go beyond indicators such as Gross Domestic Product (GDP)³ or the United Nations *Human Development Index*⁴ when defining the progress of nations, and instead place **the well-being of citizens at the heart of designing, implementing and evaluating public policies.**

Today, many of the goods and services that are essential to our daily lives - such as instant messaging applications, email and Wikipedia - have little impact on the calculation of GDP, although they provide us with considerable personal well-being.⁵ Similarly, GDP does not incorporate dimensions such as environmental protection and sustainability or inequality,⁶ which have very significant impacts on the well-being of present and future generations. In fact, in recent years, proposals for alternative measures to GDP have, in addition to income, looked at consumption, inequality, life expectancy, leisure, care, environmental quality, public safety, political freedoms, social cohesion, generosity, social support, and corruption, as variables that represent the well-being of citizens.⁷

The first challenge in placing well-being at the centre of public policies consists in defining the population's "subjective well-being" in a specific and functional way. This is not easy,⁸ since it is a complex experience that relates to present issues (what we experience today), but also to future issues (such as expectations about tomorrow). Furthermore, it has to do with emotions (emotional reactions - positive or negative) as well as **the extent to which people are satisfied with their life**, when we assess the progress of our lives, compare ourselves with others and analyse how we are doing in achieving our goals.⁹ In this chapter, we will take levels of satisfaction with life as the main point of reference, as it is a reliable indicator of people's experience of well-being. It is also sensitive to factors that public policies can influence.

In this light, we ask ourselves: **Are the citizens of Spain satisfied? According to the available data, most of them are.** In 2019, more than 85% of people in our country considered themselves satisfied with their lives,¹⁰ compared to 15% who said they were not. This represents **a notable improvement compared to previous decades, despite the deterioration noted during the years of economic crisis.** It highlights the real impact of the social and economic progress experienced by the country since the transition to democracy [Fig. 1].

Fig. 1. Proportion of people satisfied with their life in Spain according to different sources



Source: Authors' own, based on data from the European Commission, World Values Survey, European Social Survey and INE.11

As discussed in previous chapters of this Strategy, over the last 40 years, Spain's per-capita income has doubled, the employment rate has risen by more than 15 points, the educational level of the population has improved significantly, public benefits and services have greatly increased their coverage and quality, and life expectancy has continued to grow [Figs. 2 and 3]. Society has also reached very high levels of freedom, tolerance and security, and has strengthened its institutions, all of which have a positive impact on the well-being of its citizens.



Fig. 2. Per-capita income and satisfaction with life

Source: Authors' own, based on data from the World Values Survey and the World Bank. $^{\rm 12}$




Source: Authors' own, based on data from the World Values Survey and the World Bank. $^{\rm 13}$

As a result, Spain is today among the "happiest" countries in the world, with levels of satisfaction with life that are above the European average (EU-27) and neighbouring countries such as France and Italy [Fig. 4].





Source: Authors' own, based on European Commission data.¹⁴

THE PRESENT: WAYS TO IMPROVE

In spite of the progress recorded over the last four decades, there are still many **material and immaterial issues that negatively affect the well-being of citizens** in Spain and which prevent the country from catching up with the EU's most developed countries - grouped here under the label "EU-8" ¹⁵ [Fig. 4]. Here we point out three issues to be resolved.

The first is to do with the proportion of people who still say that they are dissatisfied with their life: in 2019, 10% of the population considered themselves to be "not very satisfied" and 2% "not at all satisfied". Reducing these figures is a challenge in itself, especially if we are to catch up with European countries that have higher levels of well-being.

The second issue to be resolved has to do with the fragility of subjective well-being in Spain - something that is very sensitive to economic crises. They impact both the magnitude of recessions when they occur and the time it takes to recover to previous levels. Thus, levels of satisfaction with life prior to the 1992 crisis did not recover until 5 or 6 years later, whereas in 2016 (8 years after the 2008 financial crisis), satisfaction levels were still far below those at the beginning of the decade. The destruction of employment and the reduction of income, together with an increase in uncertainty about the future brought about by economic recessions in our country, explain this deterioration in subjective well-being and is something that particularly affects people in insecure and low-skilled jobs.¹⁶

Our third issue to be resolved is closely linked to the previous one and is to do with the heterogeneity among the Spanish population's level of satisfaction with the different areas that explain it. These are grouped here into 1) economic and labour situation, 2) physical and mental health, and 3) social capital.¹⁷ The latter refers both to the relational environment closest to the person (family, friends) and to aspects linked to society's general behaviour (norms and values, spirit of cooperation and trust in institutions).¹⁸ Although many of the factors that make us more or less happy are still unknown, it is known with certainty that the following three domains are key to how satisfied people are with life: the countries with the greatest well-being are those in which the majority of the population have a good job, good health and good social relations with their nearest environment and community.

In Spain, a positive scorecard in these three domains is not achieved - mainly due to people's dissatisfaction with their economic and labour situation, which offsets the better ratings for health and personal relationships and is to a certain extent conditioned by those in leisure ¹⁹ [Fig. 5]. If by 2050 we want to converge in terms of satisfaction with the happiest countries in Europe, we will need to register significant improvements in the areas of income and employment.





Source: Author's own, based on Iglesias de Ussel et al data.²⁰

I. Economic and labour situation

If the Spanish population is not as satisfied with their lives as their equivalents in Scandinavian countries, it is mainly because of their economic and labour situation. In Spain, structural unemployment is high, temporary employment rates are unusually high [see chapter 7] and labour productivity growth is lower than in more advanced countries [see chapter 1]. This translates into comparatively low wages and longer working hours than our European neighbours. If we add to this the impact that economic crises have in terms of job destruction and deterioration of the business sector, it is not surprising that their economic and employment situation is the main source of dissatisfaction for Spanish citizens. Raising our per-capita income and at the same time improving working conditions are essential for increasing our population's levels of satisfaction with life in the future.

Whilst it is true that money cannot buy happiness, **income is one of the key factors for people's subjective well-being - especially when it is low and uncertain.**²¹ Uncertainty is especially important for the middle classes. For people on low incomes, the total amount of income is the determining variable. People with higher income tend to be more satisfied with their lives than those with lower income.²² In Spain, **37% of people earning less than 1,000 euros per month are dissatisfied with their lives, while among those earning 2,500 euros or more, the proportion of dissatisfied people falls below 12%** [Fig. 6].



Fig. 6. Monthly household income and percentage level of satisfaction with life, on average, in Spain

Source: Author's own, based on Iglesias de Ussel et al data. $^{\rm 23}$

This positive relationship between income and subjective well-being hides some issues that are closely related to each other and which are fundamental to designing public policies.

First issue: differences in levels of satisfaction with life are greatly reduced between people with high and very high income.²⁴ For example, among those earning 4,500 and 6,000 euros per month in Spain, the level of dissatisfaction is practically the same. This suggests that, beyond a certain point, more money does not bring more happiness and that, if we want to increase wellbeing of society as a whole, it may be more efficient to direct income increases to the poorest segments of the population in order to reduce the risk of poverty.²⁵

Second issue: the economic situation creates asymmetrical effects in terms of satisfaction with life. Where income falls, perceived well-being levels fall sharply, as it is often accompanied by job losses, increases in poverty and greater uncertainty. However, when income rises, well-being rises relatively little. The latter is, on the one hand, due to the fact that, above a certain level of income, subjective well-being does not increase ("satiety" effect); and, on the other hand, to the fact that the population is adapting to the new income situation and other aspects that are equally important for their quality of life begin to come into play.²⁶ This particular phenomenon can also be seen when people assess whether or not their income is sufficient.²⁷ Thus, Spaniards who are dissatisfied with their financial situation display a lower level of well-being than those who are satisfied with it.²⁸

Third issue: for gains in well-being to be sustained, it is not only income gains that matter, but also how those gains are achieved (whether they are socially and environmentally sustainable) and where the additional resources go. This last point is directly related to the way in which public policies are oriented.²⁹

Beyond people's economic situation, their employment situation is equally key to satisfaction with life.³⁰ Employed people in Spain are more satisfied with their lives.³¹ Satisfaction drops among those who perform household chores and are retired, and falls markedly among the unemployed [Fig. 7]. This is because unemployment not only determines current income³² and future income expectations, but also affects other issues that are fundamental to well-being, such as health (lack of routines and greater propensity to loss of self-esteem, anxiety, depression or alcoholism³³) and leisure (the unemployed tend to opt for more passive leisure activities).³⁴



Fig. 7. Employment situation and levels of satisfaction with life in Spain (% of total), 2016-18

Even if job stability is a determining factor for how satisfied people are with life, by reducing uncertainty about future income, this does not invalidate the fact that **work can and should be a source of satisfaction in itself,** insofar as it fosters learning, personal development, self-esteem and social interactions.³⁶ However, in our country, employment insecurity and long working hours mean that it is perceived by a significant part of the population as a "necessary evil", and **more than half of employed people suffer stress in their jobs (a higher proportion than the EU and OECD average).**³⁷ Therefore, if Spain wants to achieve well-being levels similar to those of the most advanced countries in Europe, it must significantly improve the levels of motivation³⁸ and job satisfaction among its population. These levels are currently lower than those of the EU-8 [Fig. 8].



Fig. 8. Percentage of people satisfied with their job, 2016

Source: Authors' own, based on Eurofound data.39

Source: Authors' own, based on European Social Survey data.35

II. Physical and mental health

Health (physical and mental)⁴⁰ **and subjective well-being are closely linked:** the former has a direct impact on the latter and, conversely, well-being contributes to improved health and perception of health.⁴¹ In general, **satisfaction with health in our country is quite high** [Fig. 9].⁴²



Fig. 9. Percentage of people satisfied with their health, 2016

The data support this. Spain is today one of the countries in the world with the highest life expectancy at birth, enjoys more years in good health⁴⁴ at older ages, and has one of the most advanced health care systems,⁴⁵ in spite of the cuts in public health expenditure in over the last decade and the shortcomings evident during the Covid-19 pandemic. This does not, of course, mean that the health of the Spanish population is perfect, nor that there is not much to be done to reduce inequalities between different groups [see chapter 5]. Physical illnesses such as back and neck pain, cardiovascular problems, Alzheimer disease and cancer (to name but a few) reduce the quality of life of hundreds of thousands of Spaniards every day.

As do **mental disorders such as depression and anxiety**.⁴⁶ **Several studies suggest that these reduce our satisfaction with life to a greater extent than physical illnesses**.⁴⁷ In 2017, 13% of the Spanish population was diagnosed with some type of mental disorder: 5.3% suffered from anxiety, 3.5% from depression, and 1.5% had disorders associated with consumption of drugs.⁴⁸ However, the incidence of these problems and their manifestations varies greatly between groups and is substantially higher among women (the data show that they suffer from depression and anxiety twice as much as men of the same age), people who are unable to work and are unemployed, and people with a low level of education.⁴⁹

The prevalence of this type of disorder and psychological problems in Spain is not higher than it is in other European states. Nor is the number of deaths due to alcohol, drugs or suicide (in fact, suicide rates are substantially lower than in EU-8 countries such as Denmark, Belgium and Austria) [Fig. 10]. However, it should be noted that **our consumption of antidepressants and anti-anxiety drugs has sky-rocketed in recent years**, ⁵⁰ placing Spain above the OECD average in the use of these drugs [Fig.11].

Source: Authors' own, based on Eurofound data.43



Fig. 10. Deaths due to suicide, alcohol and drug abuse, 2016



Source: Author's own based on data from the OECD.⁵¹

Changes in our lifestyle, loneliness⁵³ and the greater frustration we feel in the face of everyday problems may explain part of this increase, although **the way in which mental disorders are treated in our country also has a great influence.** In most cases, medication⁵⁴ prescribed by primary care doctors (rather than by professionals with expertise in mental health)⁵⁵ is used instead of other methods such as psychotherapy or positive psychology techniques. The excessive consumption of these drugs and the potential side effects they cause when they are not correctly administered constitute **a source of risk for the health and future well-being of our citizens.** And it is one that should be corrected.

III. Social capital

Satisfaction with life does not come exclusively from material goods. Human are social beings and need people around them to provide emotional support, approval, a sense of belonging and affection.⁵⁶ **Subjective well-being has**, therefore, **a relational dimension**⁵⁷ that is nourished by two sources: on the one hand, the satisfaction that comes from the interpersonal relationships (family, friends, work colleagues); and, on the other hand, the satisfaction that comes from the society in which we live. In Spain, citizens seem to obtain a great deal of satisfaction from the former and somewhat less from the latter, although close relationships have a greater impact on well-being than general social capital.⁵⁸

Our closest social circle is a great source of satisfaction with life for Spaniards, and is one of Spanish society's unique strengths. More than 85% of citizens are satisfied with their family and social life [Fig. 12], and 93% have a friend or relative they can confide in when they need to - one of the highest percentages among OECD countries [Fig. 13]. These good data, however, should not lead us to downplay the need to continue improving them in the future, and focusing, above all, on people who still obtain a low level of satisfaction in their close relationships.



Fig. 12. Percentage of people satisfied with family and social life, 2012

Source: Authors' own, based on Eurofound data.59



Fig. 13. Percentage of people with relatives or friends they trust, 2018

Source: Author's own based on data from the OECD.60

An essential issue that **we must focus on** is the **persistence of old gender roles** that negatively affect the way people see themselves and relate to each other.⁶¹ They perpetuate archaic prejudices and stereotypes, transform sexual difference into social inequality, and lead to all kinds of social phenomena that dent happiness. One of the most serious is violence against women. This takes various forms - from psychological violence (harassment, threats) to physical and sexual violence.⁶² It is estimated that, in Spain, half of women (57.3%) aged over 16 have suffered some of these forms of violence during their lives.⁶³ In fact, in 2019 alone, more than 4 million women

in Spain suffered from it.⁶⁴ These kinds of violence have all kinds of consequences: depression, shame, fear, anxiety, frustration, and even changes in the way people use public spaces.⁶⁵ Although to a less severe extent, the persistence of old gender roles also affects thousands of men, victims of a traditional vision of masculinity associated with glorifying competitiveness, toughness, aggressiveness and physical strength⁶⁶ that often limits the development of good self-esteem and prevents healthy management of emotions.⁶⁷

In clear contrast with the high levels of satisfaction gained from those closest to them, **Spaniards show a relatively high degree of disaffection with society**,⁶⁸ which has worsened in recent decades. This trend, which is shared by other countries in Southern Europe,⁶⁹ is reflected in indicators relating to general confidence and relating to people's involvement in civic life. For example, less than half of Spaniards believe that most people can be trusted, which places Spain in an intermediate position in terms of "social trust" - far below countries such as Denmark, Finland and Sweden, where trust levels are between 60% and 70%.⁷⁰ With regard to social participation, the percentage of people who involved in an association in our country barely reaches 31%, whereas at the beginning of the 1990s it was over 70% [Fig. 14]. This proportion places us far behind countries such as Denmark, the Netherlands, Germany and Finland, where more than 70% of the public participate in associations.⁷¹ In fact, the OECD's *Civic Commitment Index* - which, in addition to electoral participation, incorporates citizens' involvement in government decision-making - ranks Spain among OECD countries that have a low level of civic engagement.⁷²

73% 58% 45% 39% 35% 32% 1990 1995 2000 2007 2011 2018

Fig. 14. Percentage of Spaniards who belong to at least one association

Low levels of trust and civic engagement have crucial repercussions for a country's development, as they impact citizens' willingness to put the general interest before their own interests and to accept far-reaching economic and social reforms. But they also have a direct influence on social cohesion and well-being, resulting in people being less satisfied with their lives and more frustrated with the world. Their disaffection means that they do not feel the need to take part in processes of change.⁷⁴

Source: Authors' own, based on World Values Survey data. 73

Well-being synergies

It is important to bear in mind that **subjective well-being is not just "the result" of issues such as economic and employment status, health and social capital. It is also a catalyst that affects these situations, and transforms them**. For example, empirical evidence shows that students who are satisfied with their lives perform better academically and tend to stay in school longer, thus contributing to a more skilled workforce and a better educated, more involved and less unequal population.⁷⁵ It has also been shown that satisfied workers generate increased customer loyalty, take less time off work, tend to be more creative and are also more productive.⁷⁶ People with a high level of subjective well-being live longer and are ill less often, which helps to reduce pressures on health spending.⁷⁷ They also tend to take part more in the life of their community,⁷⁸ fostering a greater sense of belonging and social cohesion.⁷⁹ More broadly, the data show that countries that have a higher quality of life tend to attract more foreign investment and talent. This, in turn, affects their ability to innovate and grow over the long term.⁸⁰

This means that **there is a symbiotic relationship between the major challenges facing our country and achieving national well-being**. The social and economic improvements achieved in recent decades are the basis on which Spain's well-being is based. At the same time, well-being is an essential aspect of ensuring that these improvements are consolidated and continue to expand in the future.

For this symbiotic relationship to be strengthened over the coming decades, Spain will have to implement far-reaching reforms that will enable substantial progress to be made in the main areas of life that define how satisfied the population is with life. Among other things, we will need to address our economic and work-related weaknesses, strengthen health gains, resolve emerging health challenges, and continue to strengthen social ties to consolidate Spain's position as a prosperous, sustainable and socially cohesive country.

THE FUTURE: POSSIBLE OUTCOMES

The short term: subjective well-being in the time of coronavirus

Although we will need to wait years to ascertain the true nature and magnitude of the impact of the coronavirus pandemic on the well-being of the Spanish population, incoming data allow us to anticipate its effects.⁸¹ Some studies refer to **considerable psychological damage**⁸² that could have affected all age groups - although older people were the hardest hit by the virus. It is estimated that **1 in 3 people in Spain had significant symptoms of anxiety, depression or posttraumatic stress disorder during the March 2020 lockdown**. This was seen more frequently among women, young people⁸³ and people who already had underlying psychological problems.⁸⁴ Spanish children also suffered the effects of social isolation. In fact, a third of parents picked up a greater sense of irritability, nervousness, feeling of loneliness and, above all, a greater absentmindedness⁸⁵ among their children during the months of lockdown.

A year after the start of the pandemic, there are two results that lead us to anticipate a decline in well-being over the medium term. First: a significant loss of trust among the general public ("social trust") has been detected. Second: there is a significant deterioration in people's mood ("pandemic fatigue") - especially among **young people**, who have seen their routines greatly disrupted and have been through three economic crises in a relatively short period of time.⁸⁶

How long-lasting will these psychological effects be? That will depend on the use and effectiveness of vaccines, and on whether or not the pandemic leads to drastic and permanent changes in how people interact socially. Previous studies suggest that human beings have a great capacity for recovery, and that we tend to overcome very traumatic episodes (such as terrorist attacks) within about six months.⁸⁷ In any event, this information refers to the general population. Victims or people who had to deal with the issue more directly often experience significantly slower recoveries. For example, **two and a half years after the 2003 SARS crisis, 1 in 3 patients who survived the virus still showed some kind of psychiatric disorder** (mostly post-traumatic stress disorder and depression).⁸⁸ Similarly, hospital staff who fought the virus on the front line reported more emotional problems and increases in alcohol consumption.⁸⁹ In the case of Covid-19, initial studies in Spain reveal rates close to 50% of hospital staff manifesting significant symptoms of depression, anxiety, post-traumatic stress and emotional exhaustion, and with a greater impact among female healthcare workers.⁹⁰

The duration of the psychological damage from coronavirus will also depend on how severe and prolonged the effects of the economic downturn turn out to be. The main risk is that the increase in unemployment and inequality ⁹¹ will become chronic, and the education gap will not be corrected [see chapters 2, 7 and 8]. In that case, the negative effects on our country's long-term well-being will be very high. On the one hand, the degree of public dissatisfaction with their economic and labour situation will grow. And, on the other, the state of health of the most vulnerable groups will deteriorate sharply.⁹² This was indeed the case **following the 2008 crisis, which had severe psychological effects on a significant portion of the population, raising rates of depression and reducing levels of satisfaction with life in Spain for years.⁹³**

Spain's population will, in any case, eventually overcome the setback and may even emerge stronger from it. There are studies that show how some of the most traumatic episodes of the past contributed to an improvement in the society, strengthening individuals and institutions, and

resulting in an increase in behaviour that is empathetic, altruistic and philanthropic.⁹⁴ Although we cannot anticipate what will happen in this case, it is possible that the pandemic will have a similar effect over the medium and long term, instilling among the public a greater desire for that which is public and collective; the need to rethink urban spaces; the connection between cities and the rural areas; improve the care system for the elderly; tackle the issue of climate change forcefully; and begin to prepare for similar crises.

The medium and long term: the challenges for increasing our country's well-being

When Spaniards are asked about their expectations for living conditions over the next 15 years, only 21% expect them to be better than they are now [Fig. 15]. This pessimism about the future is shared by most countries in Western Europe and, although it is partly explained by a distorted perception typical of the most developed countries around the world, it may also reflect a legitimate concern on the part of people regarding the evolution of some essential issues for well-being.



Fig. 15. The citizens' views on how living conditions will evolve in the future, 2017

As we have seen, people's satisfaction is affected by a range of objective realities (employment, health) without which it is more difficult to be happy. The data reveal that, over the last two decades, access to many of these material realities has deteriorated in our country. In fact, an **OECD report released prior to the pandemic ranked Spain among the countries with the greatest challenges for future generations' well-being,** precisely because of the potential losses on these fronts⁹⁶ [Fig.16].

Source: Authors' own based on Ipsos data.95

Fig. 16. Gains and losses relating to resources for future well-being compared to the current situation



Source: Author's own based on data from the OECD.97

What are these challenges? Here, we highlight five:

First, there are concerns about the future of our economy and, along with it, of our welfare state. As we have already discussed, unless there are deep changes in the next decade, Spain could experience reduced economic growth in the long term [see chapter 1]. Although economic growth *per se* is no guarantee of higher levels of well-being, the fact is that if income generation were to be greatly reduced, public revenues would decline also, which would make it more difficult to maintain current social benefits. Social transfers (e.g. retirement pensions, Minimum Living Income, unemployment benefits), and access to and quality of public services could be compromised, leading to an increase in inequality [see chapter 8] and a loss of well-being among the population. This would be particularly intense among the most vulnerable groups and those who at a greater risk of poverty.

The second challenge for our future well-being is related to weaknesses in our labour market.

If over the coming decades we fail to resolve current issues such as high levels of structural unemployment and employment insecurity (temporary and part-time work) and long working hours, technological changes and new forms of work could lead to a further deterioration in working conditions in our country [see chapter 7]. This would further increase job dissatisfaction, which is, as we have seen, already the key source of frustration in Spain.

The third challenge for the future well-being of the Spanish people may be due to population ageing. Older age does not necessarily imply a substantial increase in dissatisfaction with life - even though people at older ages suffer from greater health problems or are more likely to feel lonely [Fig. 17]. This is partly explained by their greater maturity and the improvements seen in their quality of life over the years, but also by material issues such as the economic and psychological support provided by the pension system. Or the fact that the vast majority of Spaniards over 65 own the home in which they live. However, these material realities could change in the future [see chapters 5 and 6]. If the necessary reforms are not carried out, the quality of our social protection could experience a significant setback, insofar as many of the social benefits of our welfare state are linked to employment. It is not out of the question that future working careers will become more erratic and discontinuous [see chapter 7]. Similarly, the difficulty many young people face today in accessing housing could mean that, by 2050, the proportion of older people owning a home will fall considerably [see chapter 6]. Rental payments would reduce their availability of income for other expenses or savings, and this could result in lower levels of satisfaction with their economic situation.

Fig. 17. The Spanish population's satisfaction with life, by age, 2018



Source: Authors' own, based on European Social Survey data.98

Furthermore, although life expectancy in "good health" is expected to continue to increase over the coming decades [see chapter 5], the prevalence of certain diseases - and especially common mental disorders - could become a source of dissatisfaction among our population (both for those suffering from them and for their families). The changes in certain social patterns (for example, smaller households and greater inter-territorial mobility) and the population's distribution across the country (such as the depopulation of rural areas) could also lead to a decrease in social interactions and a possible increase in loneliness caused, among other reasons, by families' geographical remoteness.

The fourth challenge for the future well-being of the Spanish population is climate change and environmental degradation. If we do nothing, the environmental impacts that occur in the coming decades will worsen our quality of life.⁹⁹ In fact, air pollution in Spain is already among the top ten risk factors for health,¹⁰⁰ and the evidence shows that rising temperatures and deteriorating air quality do indeed reduce well-being.¹⁰¹ Spain in 2050 will be warmer and more arid. There will be more droughts, more fires, more heat waves, more torrential rains and more disease transmission through food, water and animals [see chapter 4]. These are all issues that could reduce the well-being of our citizens.

Finally, the well-being of the Spanish people could be diminished by the changes that will occur in the way the population is distributed around the country between now and 2050. On the one hand, depopulation and the loss of economic and employment dynamism in many rural areas could negatively affect the well-being of the 12% of the Spanish population who will reside in them [see chapter 6]. This is especially true for the elderly in small towns, who will have difficulty accessing certain services (banking, health and transport) and will see their social interactions and capacity for personal and family development reduced. On the other hand, the growth of large cities and the possible intensifying of current challenges such as access to housing and social segregation could reduce the satisfaction among the urban population, prolonging and extending elsewhere a trend that is already visible in some large cities.¹⁰²

Opportunities in the future to increase citizens' life satisfaction levels

The threats described above can of course be avoided or mitigated if we carry out the necessary transformations that will enable us to guarantee a prosperous and sustainable tomorrow, **thus bequeathing the potential for greater well-being to future generations**. The key is to convert these challenges into opportunities, as explained in this *Strategy*.

If we are able to base our economic growth on sustained productivity gains, we will not only be able to avoid a scenario of reduced growth, but also minimise our vulnerability during times of economic recession; generate better working conditions; have more time for leisure and human relations; and preserve and expand our welfare state, ensuring the provision of quality public services and greater social equality. One of the keys to increasing our future well-being is to achieve socially inclusive growth that reduces our high levels of poverty risk and income inequality. This will also require a profound reorganising of public revenues (the tax system) and expenditure (social benefits and public services). We will need to collect more and better in order to spend more and better on items that are essential to our future well-being, such as health and long-term care services [see chapter 8].

Technological change can be a key ally in this process of economic modernisation. If properly managed, the development and spread of technologies such as Artificial Intelligence and advanced robotics could translate into significant productivity gains (this, in turn, would boost government revenues) and deliver a dramatic improvement in working life. Such innovations could eliminate repetitive and physically erosive jobs; make working hours more flexible; expand the opportunity for teleworking; and reduce working hours, freeing up time for leisure, rest, personal development and social relations. All of this would have a very positive impact on the satisfaction of our population. We will need, however, to pay attention to the possible perverse effects that new technologies can have on the mental health of our population - such as stress caused by excessive use of social networks and being online 24/7, which blur the boundaries between work and private life.

Training and re-skilling our population will also be fundamental. Not only because improving education is the most effective way of increasing a country's productivity and quality of employment,¹⁰³ but also because - if approached holistically - education can enhance individuals' level of satisfaction with life by developing psychosocial and emotional skills such as empathy, critical thinking and introspection, as well as the acquisition of the knowledge necessary to lead a healthy life and establish positive relationships with others. For example, domestic violence, smoking, alcohol consumption, abusing antidepressants, and childhood obesity¹⁰⁴ - all of which are serious threats to the future health of Spain's population - can be corrected from an early age through educational programmes. For this reason, **schools should be viewed not only as places where knowledge is acquired, but also as places for socialisation**, where skills are taught and the necessary tools are offered to be happy in adult life¹⁰⁵ [see chapter 2].

To avoid a deterioration in older people's levels of satisfaction with life, it will be essential to strengthen the National Health System and social services. Over the last few years, Spain's public spending on health has stagnated: in terms of GDP, it has remained at around 6.5% since 2012, and in per-capita terms in 2018 it was at similar levels to 2009 [see chapter 5]. This has occurred despite the increase in the health needs of the population¹⁰⁶ as a result of (among other things) progressive demographic ageing and the incorporation of new technologies and the latest generation of drugs. In the coming decades, we will need to break this trend: our health spending must be adapted to incorporate medical and therapeutic innovations as they emerge, to offer a quality service to the population as a whole and thus become another means of increasing life expectancy in "good health". We must also commit to creating a leading system, which meets the growing needs of a long-living society and which increasingly prioritises autonomy, personalised care and the "home" model in residential care homes services [see chapter 5]. Strengthening professional and guaranteed social services and promoting interpersonal relationships in the community will also be essential to reduce loneliness and dissatisfaction among the population.

The green transition could also result in a less polluted country, with greener and more liveable cities, and citizens with better health and with access to more alternatives for leisure. The natural environment has a direct impact on well-being,¹⁰⁷ meaning that all the improvements that occur within it will result in greater levels of satisfaction with life. For example, the availability of natural spaces and green areas helps to reduce stress, encourages physical exercise, and facilitates social interaction and a sense of community.¹⁰⁸ To minimise the potential impacts of climate change and move towards a carbon-neutral and resource-sustainable economy, we will need to change the way we move around, produce goods and services, and consume. If the green transition is executed well, fairly and equitably, these changes should not result in increased public dissatisfaction, but rather the opposite.

The changes anticipated in our country could also result in greater well-being. Technology will help to close part of the service gap that exists today between cities and rural areas, bringing employment, training, medical and leisure opportunities to even the smallest villages. This could lead to a significant improvement in opportunities and quality of life in rural areas, along with improved levels of life satisfaction. At the same time, the proposed reforms could result in an increase in the number of cities that are more liveable, community-oriented and cohesive, leading to improved well-being, especially among the elderly and the most vulnerable households [see chapter 6].

How can we make these improvements happen? In the following pages we suggest a number of measures to supplement those described in previous chapters.

WHAT CAN BE DONE TO ACHIEVE GREATER WELL-BEING

Spain's main medium- and long-term goal must be to preserve the levels of subjective wellbeing that have been achieved in recent decades and to continue increasing them, to ensure its position as one of the "happiest" countries in the world in 2050. To achieve this, it will be essential to successfully overcome the challenges set out in this Strategy, developing a pattern of growth based on increased productivity, environmentally sustainability and an inclusive society, strengthening income redistribution mechanisms, and adapting our welfare state to megatrends such as technological change and demographic ageing, so that it can continue to promote social cohesion. Improving levels of economic and job satisfaction [see chapters 1 and 7] is crucial to raising Spanish citizens' levels of life satisfaction, while preserving the high levels of satisfaction achieved in other areas of life such as close social relations and preventing low levels of satisfaction among some groups from becoming chronic.

Goal 50. Progressively raise the extent to which the Spanish population is satisfied with life, to approach the current levels seen among the EU-8 by 2050.

Indicators	Place	Average 2015-2019 or latest data available*	Targets		
			2030	2040	2050
50 Percentage of people satisfied with their life ¹⁰⁹	Spain	83%	86%	89%	92%
	EU-27	82%	-	-	-
	EU-8	92%	-	-	-

Table of indicators and targets

Below we offer some recommended measures to complement those set out in previous chapters and enhance their impact on subjective well-being:

Front 1: Put well-being at the heart of public policy and develop new tools to measure it

The State must ensure that decisions at all times, and above all, pursue the well-being of citizens. We therefore suggest:

- Introducing the protection and expansion of citizens' well-being as an explicit and fundamental objective when designing, implementing and evaluating all public policies. A decisive step in this direction would be to establish a "well-being budget," similar to the way New Zealand has recently done.¹¹⁰
- Improve measurement tools. Several countries (such as Germany,¹¹¹ Austria,¹¹² the UK,¹¹³ and New Zealand¹¹⁴) have started to develop metrics and new tools to quantify and track the well-being of their populations more closely.¹¹⁵ Spain should do the same, expanding the availability of data¹¹⁶ and longitudinal studies associated with well-being, and creating a dashboard that is regularly updated,¹¹⁷ so that there is a system of national well-being measurements that complement the traditional metrics of GDP and national income.

Front 2: Improve job satisfaction among citizens

This involves correcting the major deficiencies of our labour market (unemployment and temporary jobs) and improving working conditions for the entire population, so that work is not an impediment to good physical and mental health, family life, leisure and participation in the community. In this regard, the following will be important:

- Being more rigorous about combatting practices such as overwork and encouraging greater flexibility in regard to working hours, harmonising the criterion of productivity with workers' well-being. We need once and for all to overcome the culture of having to be present, and promoting an efficient use of working time as well as supporting the idea of setting aside time for leisure activities and/or social and family relations.¹¹⁸ An interesting example of this is the UK's *Flexible Working Act*¹¹⁹.
- Promoting practices among companies (including SMEs) that incorporate well-being into human resources management and the value that is placed on the private sector's contribution to society.¹²⁰

Front 3: Ensure the quality of the National Health System by improving the prevention and treatment of physical illnesses and mental disorders that undermine people's well-being. In addition to the measures proposed in chapters 4 and 5, we highlight the following:

- Strengthen the provision of mental health services delivered by primary care and by care services that are accessible to the general population (such as social services) and special groups (for example, people in prisons) - with a view to:
 - Reduce waiting times for mental health diagnosis and care. Although there are notable variations between regions, it is common for waiting times to exceed 30 days for the first consultation in the National Health System's specialist centres. We need to reduce this waiting time and bring it into line, at least, with that of other primary care health services.
 - Provide minimally adequate mental health treatments to reduce the use of psychotropic drugs. Today, only 25% of people with a clinical problem of depression receive "minimally adequate" treatment. The goal should be that at least 2 out of 3 people receive these effective treatments to comply with international recommendations.¹²¹
 - Substantially reduce the percentage of people who do not receive any treatment within 12 months.
 - Reduce health inequalities between different social groups.

To achieve these changes, it will be necessary **to strengthen the integration of mental health care into the "National Health System Portfolio of Services"**,¹²² incorporating staged procedures for psychological intervention ranging from low-intensity interventions to interventions that require specialist mental health services.¹²³ At present, all that exists are pilot projects or projects of limited scope for providing psychological care within some health centres in certain regions. Most of these show good results in terms of cost and outcomes.¹²⁴

- Introduce training programmes for teachers and health personnel to identify mental health issues early on.¹²⁵ Half of the most common mental health problems arise before the age of 15 and 75% start before the age of 25.¹²⁶ Proactive policies are therefore needed for prevention, detection and effective treatment of these problems from childhood,¹²⁷ within educational and health environments as well as in the community.
- Increase the number of mental health professionals in the National Health System. The Spanish system's psychological care in mental health is still in its early stages. In clinical psychology, there are 6 professionals per 100,000 inhabitants compared to 18 per 100,000 inhabitants in the rest of Europe.¹²⁸ The number of psychiatrists (10.9 per 100,000 inhabitants) is also among the lowest in the EU-27 (above only Poland and Bulgaria).¹²⁹

Front 4: Promote "education for well-being" within our educational plans

Over the next few years, **our schools and colleges** (primary, secondary and tertiary) **will need to introduce the acquisition of socio-emotional and humanistic knowledge and skills** into their curricula to help students better manage their emotions, deal with phenomena such as failure, success, and pain, to lead healthy lives,¹³⁰ maintain positive interpersonal relationships, and "be happy". This type of training is already being used in Spain, but is not formally or extensively included in educational plans. Research shows that it not only improves the quality of teaching and student outcomes and engagement,¹³¹ but also helps foster a sense of community in schools, reduces conflict (such as bullying) and reduces teacher dissatisfaction.¹³² We therefore suggest the following:

- Introduce socio-emotional skills into autonomous communities' education legislation and teacher training so that education offers skills for quality human relations, greater enjoyment of leisure time, responsible exercise of citizenship, respect for and appreciation of diversity, health care, sensible eating habits, and environmental conservation, among other things.
- Include these programmes in school curricula and teaching programmes, education faculty curricula and training for active teaching staff through teacher training centres (including management teams).

- In line with the recommendations of the Council of Europe,¹³³ introduce and apply positive parenting programmes, preferably in school or social/health care settings,¹³⁴ to include teaching effective communication skills, positive reinforcement, conflict management based on non-violence, and problem solving, with educational content adapted to different educational stages.
- Implement programmes to encourage peaceful coexistence and training on non-sexist values aimed at the population as a whole, with greater emphasis on the adolescent population. This would involve developing coeducation programmes based on values, in which schools and families themselves should participate. It is also necessary to reflect on the role models conveyed by the media (for example, different attitudes adopted when presenting the same event, and hyper-sexualisation) and look at the behavioural models portrayed in new media (such as Twitch and Instagram).



Epilogue

REDISCOVERING OPTIMISM

The notion of the *future* is, along with those of equality and freedom, one of the most powerful ever conceived by Western culture. It wasn't always there. For centuries, our European ancestors professed a deterministic view of the future marked by religious creed. In the Middle Ages and much of the Modern Age, history was understood as an inexorable decline *(mundus senescit)* and the future as a terrible and inevitable outcome predefined by the Scriptures (the Apocalypse) from which humanity could not escape.

From the 16th century onwards, this view began to change. Scientific advances and historiographical discoveries gradually gave rise to a different vision, which conceived of human history not as a decline, but as a slow and arduous flowering, no longer the fruit of divine work, but of the efforts of men and women living in society. It was then that the notion of *progress* emerged (with the Enlightenment) and the first ideologies that dreamed of a better, fairer, freer and more egalitarian world. It was then, too, that the first utopian and science fiction texts appeared which, unlike the works of More, Campanella and Bacon, saw utopia not as a place on Earth, but as a better placed time period of tomorrow.¹

This replacement of "prophecies of the inevitable" with "prognoses of the possible" brought about a fundamental change. With it, **our ancestors moved from determinism to voluntarism, from waiting to planning, from passive acceptance of change to being the drivers of change**.² The concepts of progress and the future permeated much of Western thought and became the main driving force behind the great social changes that took place in Europe in the 18th, 19th and 20th centuries.

Today, faith in progress seems more contested than ever. The data speak of a wave of pessimism that is taking hold of the European and Spanish population. Asked whether future generations will live better than their parents, the majority of our citizens say no [Figs. 1 and 2].







Commission.³

Source: Drafted by the authors based on Stokes.⁴

This pessimism towards the future is understandable. Past progress, while impressive, has not always been sufficient or benefited all of society equally. Moreover, the present is full of trends - technological transformation, political polarisation, changes in the global order - that cast long shadows of uncertainty into the future and remind us that **progress is neither linear nor inevitable**. Between here and 2050, many things could get worse. In fact, we can be sure that some will. **But this should not make us forget another incontestable truth: over the last four decades, Spain, like the rest of Europe, has improved enormously on practically all fronts and there is nothing to suggest that it cannot continue to do so in the future.**

Spaniards today live, on average, 36 years longer than our grandparents.⁵ We do so in better health and with a better quality of life, thanks to advances in science, the development of the welfare state and changes in our habits. We have less dangerous, repetitive or physically eroding jobs; shorter working hours; and a level of per capita income that is double what we had when we established our Democracy in 1978. This allows us to access goods and services more easily than the vast majority of people on this planet.

Moreover, we live in a freer and more inclusive Spain than before, with more social rights and greater citizen security. We have quieter streets, more efficient and transparent institutions, a cutting-edge infrastructure network and an infinitely greater capacity for access to information and education than existed when the Transition began. Even on the environmental front, we have

made remarkable improvements. So far in the 21st century, Spain has reduced the volume of waste it generates by 27%,⁶ expanded its protected areas to cover a third of the total land area⁷ and increased electricity generation from renewable sources to 100,000 gigawatt hours, enough to supply more than half of the country's households.

Of course, we have not improved in all areas and not all improvements have benefited the whole population equally. Our economy retains a fragile and unsophisticated growth pattern, failing to generate sufficient wealth and quality employment and is neither socially nor environmentally sustainable. We have a disproportionate level of unemployment for a country like ours, an education system that is less advanced than that of our European neighbours, and a huge shadow economy. Our public administrations still suffer from severe inefficiencies that limit the quality of public services and the progress of private sector productivity. It is more difficult for our young people to access stable work and housing than it was for their parents, and poverty still affects an unacceptably high proportion of our population.

These are serious problems that condition much of our lives. **Understandably, we are frustrated by them and demand much more: from the state, from politicians, from companies and from ourselves.** But in doing so, we must not succumb to blindness and pessimism. The existence of these problems should not lead us to completely overhaul everything, to ignore the valuable progress made so far, or to return to the passive resignation to the future from which the Enlightenment freed us. We can continue to make progress. All three statements are empirically true at the same time:

- Spain has improved a lot since the Transition.
- Spain faces great challenges, present and future.
- Spain can overcome them and consolidate its position as one of the most advanced countries in Europe before the middle of the century.

Any reflection on the present and future challenges facing Spain must start from the recognition of this threefold assertion.

What do we need to improve? Unfortunately, there is no mathematical formula and no template that we can follow. Every era, every territory, is different. In any case, history points to some ingredients that should be there. The first, to be precise, is confidence in progress. A confidence that we must find not in blind faith in the system or in uniform optimism, but in empirical analysis of Spain's past trajectories, present capacities and projects for the future.

This is, in fact, one of the main propositions we have tried to achieve with this study. We believe that the results are conclusive and that they show that, if we take the right measures, Spain will be able to close or significantly reduce the gaps in social, economic and environmental progress that separate it from the EU-8 by 2050, and thus consolidate its position as one of the most advanced countries in Europe.

To achieve this, we will need to make effective use of European recovery funds, seize the opportunities offered by megatrends such as demographic ageing, digitalisation and the ecological transition, and undertake far-reaching reforms over the next three decades. Reforms that, in many cases, will be similar in difficulty and magnitude to those already implemented in the recent past. If we could do it then, we can do it again, aided by the socio-economic transformations accelerated by the pandemic and the ambitious recovery funds and plans articulated by the European Union.

Consider, for example, the economic and employment challenge. To catch up with the EU-8 countries and close the per capita income gap with them, Spain will have to increase its productivity by 50% by the middle of the century [Fig. 3], while increasing its employment rate by 15 points [Fig. 4]. It may sound like a lot, but the fact is that several Western countries (including our own) have already made similar progress in recent decades. The fact that Spain is starting from lower levels of productivity and employment, and that there are favourable trends underway such as digitalisation and the development of Artificial Intelligence, the equalisation of education and employment for women, increased training and the green transition, increase the chances of achieving this [see chapters 1 and 7].



Source: Drafted by the authors, based on Eurostat and OECD data.8

Source: Drafted by the authors, based on Eurostat and OECD data.9

The same sense of possibility should permeate our approach to human capital challenges. To catch up with the EU-8, Spain must do two things: improve its learning levels (e.g. with a 20-point increase in the PISA standardised tests) and increase the proportion of the population aged 25-34 obtaining education beyond compulsory by some 23 percentage points. Can it be done? There are two powerful reasons to think so. The first is the fact that Spain has already made similar learning and coverage gains in the recent past [Figs. 5 and 6]. The second is the possibility that the demographic and technological transformations already underway will serve as a tailwind to achieve this. By 2050, Spain will have almost one million fewer students between the ages of 3 and 24. This could allow us to double our expenditure per student to the level of Denmark without incurring a significant increase in public expenditure. This increase in resources, coupled

with the spread of technologies such as 5G, sensor technology and *big data*, will allow us to more effectively combat phenomena such as school dropout and segregation, to discover and better harness the potential of our young population, and to reap the gains in coverage and learning that we need to be at the cutting edge of education [see chapters 2 and 3].



Fig. 5. Spain's PISA results in mathematics

Fig. 6. Population aged 25-34 with education beyond compulsory second level in Spain

As far as the training of the working population is concerned, the fact is that Spain already has the institutions, the infrastructure and the human resources necessary to implement the comprehensive requalification system it needs. What is needed is a series of gradual regulatory and cultural changes, which are, to some extent, already underway. If Spain was able to create almost 2 million training places in higher education and university between 1980 and 2020, it will be able to create 1 million places for much shorter training programmes by 2050, especially if it relies on new technologies and hybrid learning systems [see chapter 3].

In the environmental field, the challenges we will have to overcome in the future are particularly significant. To curb climate change and avoid its most harmful effects, Spain, like the rest of the world, will have to carry out profound transformations that will allow it to become a carbon neutral and resource efficient society with sustainable consumption and production patterns. At the same time, it will need to become more resilient to climate change, adapting to emerging risks and changing the way we relate to the natural environment. Doing so will not be easy, and the track record to date warns of the need for strong and immediate action in the coming years [Figs. 7 and 8]. In any case, the changes that have taken place since the beginning of the century (in terms of recycling, efficiency in the use of materials, water and energy, or the expansion or organic crops) and the plethora of legislative, economic and technological initiatives that are already underway, offer reasons to be optimistic. So much so that most experts agree that Spain will play a leading role in the green transition on a European level [see chapter 4].



Source: Drafted by the authors, based on MITECO data.¹²

Source: Drafted by the authors, based on Eurostat and OECD data¹³

We should also be optimistic about the challenges posed by increasing life expectancy. The key is to understand that what determines a person's expenditure for the state is not only the number of years they live, but also the degree of health they enjoy until the moment of their death, and the level of labour and social participation enjoyed over their lifetime. The ageing of the future will not be the ageing of the past. It will start much later, will be more dynamic, and will not be as associated with phenomena such as inactivity or dependency. This means that, if we make the necessary institutional and cultural changes, the coming decades could see the employment rate of older Spaniards increase considerably and of their own free will. This, together with a series of reforms in our health system and the increase in public revenues that will be achieved through the channels described in this *Strategy*, would mean that, by 2050, public spending in Spain on pensions, health and care services would increase, but would remain at an affordable level of no more than 25% of GDP, which is similar to what countries such as Austria and France already have today [see chapter 5].

Another of the great challenges facing Spain is to guarantee the habitability, social cohesion and environmental sustainability of its cities, while ensuring territorial balance and mitigating the depopulation of smaller municipalities. From here to 2050, the proportion of the Spanish population living in cities will rise by more than 8 percentage points, which could put additional pressure on current challenges such as access to housing, social segregation and environmental sustainability. However, we should not lose sight of the fact that, the last four decades have seen Spain already record a similar increase in urbanisation and that, even so, its levels of residential quality, access to housing, public safety and environmental pollution have improved or remained stable and in line with the European average [Figs. 9 and 10]. If Spain was able to manage the urbanisation process relatively successfully in the past, it should be able to continue to do so in the future, aided now by new technologies, phenomena such as remote work or shared mobility, the increase in public housing stock, the spread of new forms of access to and ownership of housing, and a much more sophisticated and comprehensive knowledge of urban planning and socio-economic dynamics than existed at that time.









Source: Drafted by the authors based on data from MITECO and the European Committee of the Regions.¹⁴

These same instruments, together with a greater willingness to distribute economic opportunities throughout the territory, will help us to halt the depopulation of Spain's medium-sized cities and many small municipalities. In some cases, the hollowing out of rural Spain will not be halted. But if we can take advantage of the changes that are coming, the opportunities and quality of life for the people who will live in rural areas could improve substantially. Advances in technology and social innovation will allow us to bring employment and services (health, education and transport) to places where they did not reach before; the *silver economy* will boost economic and social activity in many municipalities; and the green transition will provide clean energy and new job opportunities even in the most remote parts of our geography. In 2050, fewer people will live in rural Spain, but those who do could live better than they today.

The adaptation of our labour market to the new social, economic and technological realities should also be approached positively. Demographic change will substantially reduce our labour force, but if we can raise the employment rate to the current levels of the most advanced countries in Europe (that is, a 15 point increase to 80%), we will be able to largely neutralise the negative effects of ageing. From losing 2.5 million potential employees, we will create 1.5 million by 2050. The same will happen with the technological transformation. History teaches us that technology always ends up creating more jobs than it destroys. If we are able to take advantage of all its benefits, we will create new jobs, reduce unemployment, increase productivity, and improve working conditions for the majority of the working population.

Another aspiration must be to reduce our inequality and poverty rates. So far, Spain's progress on this front has been particularly fragile. But that does not mean that the situation cannot change from here on. If we achieve the gains in productivity, employment and education that this *Strategy* calls for, we will greatly reduce the effects of economic crises on inequality and poverty, and generate the public revenues needed to raise social spending and reduce our levels of inequality and poverty to those of the most advanced countries in Europe by 2050.

Source: Drafted by the authors based on data from the European Environment Agency and the European Commission.¹⁵

The social improvements envisioned by this Strategy are ambitious. But they are also technically and economically feasible. Together, they would lead to an increase in public expenditure on the items concerned of about 8 GDP points by 2050. This is not an excessive increase. In fact, it would bring us closer to the level of public spending that the most developed countries in Europe already have today (the EU-8 average is 50% of GDP)¹⁶ [Fig. 11].



Fig. 11. Public expenditure in Europe, 2018

Source: Drafted by the authors, based on Eurostat data.17

The bulk of the proposed increase would be concentrated on five items: education,¹⁸ R&D,¹⁹ health,²⁰ long-term care,²¹ and social protection.²² This reflects the opinions of most of the experts consulted and coincides with the priorities of the majority of citizens, who, according to the most recent studies, support prioritisation of spending on these items.²³

Of course, this does not mean that increasing public spending is enough to guarantee the future welfare of Spain. It will be equally important to improve the efficiency of this spending by implementing the many reforms in public administration that have been described throughout this study.

It should also be noted that this increase in public spending would not necessarily lead to an increase in the deficit.²⁴ The increase in tax revenue²⁵ alone that this *Strategy* proposes (as a result of both the suggested regulatory changes and the reduction of the shadow economy and the fight against tax fraud) would be enough to offset this increase in public spending. To this should be added the many efficiency gains and savings that would be made in other expenditure items as a result of the other proposed reforms (e.g. the digitalisation of public administrations or gains in labour productivity) and the structural changes they would bring, such as the consolidation of a sustainable and socially inclusive pattern of economic growth, which would help improve the long-term dynamics of public debt, with positive effects on financing costs.²⁶ Although difficult to quantify in advance, the analysis of this *Strategy* suggests that these reforms will be instrumental in helping to reduce the current public²⁷ deficit and ensure the long-term sustainability of the public finances [Fig. 12]. In any case, it should be noted that this process of consolidation of Spain's public finances should go hand in hand with European recommendations in this area.

Fig. 12. Variations in public expenditure and revenue items by 2050 in line with the quantitative targets set



Source: Drafted by the authors.28

To summarise: Spain has severe problems and will face significant obstacles between now and 2050. Even so, it is true that, since the arrival of democracy, Spain has not stopped progressing, and there is not a single item of data that would suggest Spain would cease to progress now. The future is often brighter than we think.

Naturally, progress will not happen by itself. To further improve and consolidate our position as one of the most advanced countries in Europe, the generations that live in this country today will have to carry out profound reforms and implement **bold initiatives** in this very decade. **This study suggests more than 200** actions aimed at generating a more competitive and resilient pattern of economic growth; developing a circular and carbon neutral economy; improving the training of our population; strengthening our capacity to innovate; modernising our economy and our entrepreneurial culture; making our public administrations more efficient and transparent; increasing revenues and progressiveness of our tax system; guaranteeing the sustainability of our welfare state; closing the gender gap; improving the integration of legal immigration; and supporting our youth, who are, after all, the embodiment of the better tomorrow we want to build.

This view is shared by those who have worked on this study and, we suspect, by millions of Spaniards. In any case, we do not present it as a complete and closed Strategy, but rather as an initial, incomplete and open proposal, which will need to be expanded and improved through constant and reiterated dialogue involving all social and economic stakeholders in Spain. A dialogue that should go beyond the institutional boundaries of the state government and enter Congress; the regional parliaments; the management committees of companies; trade union assemblies; the agendas of NGOs, think tanks and foundations; the classrooms of our universities and institutes; and, ideally, our homes.

That is, ultimately, the real goal of this exercise: to **help Spain think a little more about the long term and to do so with more ambition, less tension and more willingness to reach consensus**. We humans cannot predict the future, but we can dream it, plan for it and make it a reality. **Let's be optimistic. Let's regain confidence in progress, in Spain, and in ourselves.**



50 OBJECTIVES FOR 2050: SCOREBOARD
	Representación gráfica		5% -10% -10% -20% -20% -1980 1990 2000 2010 2030 2040 2050	70 60		$\frac{20}{1980} \frac{1}{1990} \frac{1}{2000} \frac{1}{2010} \frac{1}{2020} \frac{1}{2040} \frac{1}{2050}$	90% 80% 70%	60% 50% 40% 40%	30% 1980 1990 2000 2010 2020 2030 2040 2050	5%	3% 2% 1%	0% 0% 2030 2010 2020 2030 2040 2050	50% Gandes	25%	0% 0 1980 1990 2000 2010 2020 2030 2040 2050	50% Medianas	25%	0% 1980 1990 2000 2010 2020 2030 2040 2050	20% Pequeñas	60%	100% 1980 1990 2000 2010 2020 2030 2040 2050	0% 10%	20% • • • • • • • • • • • • • • • • • • •	40% 1980 1990 2000 2010 2020 2030 2040 2050
	2050		-10%	63			80% ⁴	,		4,0%	I		35%	30%	35%	ı			ı	,	ı	10%	ı	
Futuro	2040		-15%	53			72%	ı	ı	3,5%	ı	ı	33%	28%	38%	ı	ı	ı	1	,		12%	1	
	2030		-18%	46			68%		ı	3,0% ⁶	ı		32%	25%	42%							15%		
	2015-2019 o último dato disponible*		-22%	42	43	53	62%	68%	73%	1,2%	2,2%	2,8%	31%*	23%*	45%*	33%*	28%*	39%*	36%*	29%*	35%*	20%	17%	11%
	2010- 2019		-23%	41	42	52	60%	67%	72%	1,3%	2,1%	2,7%	27%	24%	49%	32%	28%	40%	36%	29%	35%	22%	18%	12%
Pasado	2000- 2009		-16%	37	38	48	63%	64%	67%	1,1%	1,8%	2,5%	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	p.n	n.d.	23%	19%	13%
	1990- 1999	ejor	-22%	35	33	43	50%	61%	64%	0,8%	n.d.	2,2%	21%	13%	66%	n.d.	n.d.	n.d.	34%	13%	53%	27%	n.d.	15%
	1980- 1989	a crecer m	-27%	29	.p.u	n.d.	48%	%09	62%	0,5%	n.d.	n.d.	8%	14%	78%	n.d.	n.d.	n.d.	.p.u	.p.u	.p.u	n.d.	.p.u	n.d.
	Lugar	ictivos para	España	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8		España			UE-27			UE-8		España	UE-27	UE-8
	Indicadores	Desafío 1: Ser más produ	 Brecha en renta per cápita con la UE-8¹ 	2 Miveles de productividad	laboral (euros constantes,	PPA 2015) ²		3 Tasa de empleo ³			 4 Gasto total en I+D (% del PIB)⁵ 				5 Empresas por tamaño	(según % de empleo) ⁷	Grandes (+250 empleados)	Medianas (20-249) Pegueñas (1-19)					6 Economía sumergida ۱۹۸۸ del PTR)8	(11 10)

	Representación gráfica		0% 10%	20%	40% 1980 1990 2000 2010 2020 2030 2040 2050	0%	40% 60%	80% 1980 1990 2000 2010 2020 2030 2040 2050	90% 70%	50%	10% • 1980 1990 2000 2010 2020 2030 2040 205 0	0400	0 4 W	6 1980 1990 2000 2010 2020 2030 2040 2050	0% Lectura	10% 20%	30% 1980 1990 2000 2010 2020 2030 2040 205 0	0% Matemáticas	10% 20%	30% 1980 1990 2000 2010 2020 2030 2040 2050	0% Ciencia	20%	30% 1980 1990 2000 2010 2020 2030 2040 2050
	2050		5%	I	I	3%	I	I	93%	I	I	1,0	I	I	<15%	<15%	<15%	I	I	I	I	I	I
Futuro	2040		10%	I	I	6%	ı	ı	86%	I	I	2,0	ı	ı	15%	18%	15%	I	I	I	I	I	I
	2030		18%	ı	ı	$10\%^{11}$	1	ı	78%	ı	ı	3,0	ı	ı	18%	20%	18%	I	I	I	I	I	I
	2015-2019 o último dato disponible*		29%*	12%*	14%*	17%*	10%*	8%*	70%*	85%*	87%*	3,9*	2,0*	1,5*	20%	23%	20%	20%	21%	20%	19%	18%	19%
	2010- 2019		31%	12%	14%	22%	12%	%6	66%	83%	86%	3,9	1,9	1,4	19%	24%	18%	19%	21%	19%	18%	18%	18%
Pasado	2000- 2009		n.d.	n.d.	n.d.	31%	15%	11%	62%	78%	85%	2,4	n.d.	1,1	20%	24%	19%	19%	20%	17%	16%	16%	15%
	1990- 1999	_	n.d.	n.d.	n.d.	36%	n.d.	12%	47%	74%	81%	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
	1980- 1989	educativa	n.d.	n.d.	n.d.	55%	n.d.	n.d.	19%	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
	Lugar	anguardia	España	UE-22	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-22	UE-8		España			UE-22			UE-8	
		onquistar la v	lumnado	al menos			0 ¹⁰		25 v 34	ción		as diferencias	s en la repetición a	petencias ¹³	Lectura	Matemáticas	Ciencia	Lectura	Matemáticas	Ciencia	Lectura	Matemáticas	Ciencia
	Indicadores	Desafío 2: Co	7 Porcentaie del al	que ha repetido	un curso a los 1;		8 Tasa de abandor escolar tempran		9 Pohlación entre	años con educac	superior a la Esu	10 Importancia de la	socioeconómica: probabilidad de r	igualdad de com			11 Porcentaje del	alumnado de 15 años con	rendimiento	Dajo en PISA (inferior al	nivel 2) ¹⁴		

	Representación gráfica	15% Lectura 10%	5%	0% 1980 1990 2000 2010 2020 2030 2040 2050	20% Matemáticas •	10%	0% 1980 1990 2000 2010 2020 2030 2040 205 0	15% Ciencia	5%	0% 1980 1990 2000 2010 2020 2030 2040 205 0	6% 5% 2%	2%	0% 1980 1990 2000 2010 2020 2030 2040 2050
	2050	10%	16%	10%	I	I	I	I	I	I	$5,5\%^{17}$	I	I
Futuro	2040	8%	13%	8%	I	I	I	I	I	I	5,3%	I	I
	2030	6%	10%	6%	I	I	I	I	I	I	5,1%	I	I
	2015-2019 o último dato disponible*	5%	7%	5%	8%	11%	7%	10%	13%	%6	4,3%	5,0%	6,1%
	2010- 2019	5%	8%	5%	8%	12%	7%	10%	14%	%6	4,4%	5,2%	6,3%
Pasado	2000- 2009	4%	8%	4%	%2	13%	8%	10%	18%	11%	4,5%	5,0%	6,1%
	1990- 1999	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4,3%	4,9%	5,6%
	1980- 1989	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4,2%	4,7%	5,5%
	Lugar		España			UE-22			UE-8		España	UE-27	UE-8
		Lectura	Matemáticas	Ciencia	Lectura	Matemáticas	Ciencia	Lectura	Matemáticas	Ciencia	-	i educación	
	Indicadores			12 Porcentaje del	alumnado de 15 años con	rendimiento	alto en PISA (nivel 5 o	superior) ¹⁵				13 Gasto público er (% del PIB) ¹⁶	

Desafío 3: Mejorar la formación y la recualificación de nuestra población

60%	40%	20% 1980 1990 2000 2010 2020 2030 2040 2050	100%	•	40% 1980 1990 2000 2010 2020 2030 2040 2050	0% 20%	40%	60% 1980 1990 2000 2010 2020 2030 2040 2050	100% 80%	60% 40%	20% 1980 1990 2000 2010 2020 2030 2040 2050
50%	I	ı	100%	ı	·	25%	ı	ı	%06	1	I.
42%	ı	ı	100%	I	1	30%	1	ı	70%	I	I
35%	T	ı	70% ²⁰	I	ı	40%	ı	ı	50% ²³	ı	1
28%	31%	29%	55%	55%	%69	46%*	32%*	16%*	30%*	37%*	51%*
28%	31%	28%	55%	55%	%69	47%	33%	18%	30%	37%	51%
n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	47%	37%	22%	n.d.	n.d.	n.d.
.b.n	.p.u	n.d.	n.d.	n.d.	n.d.	.p.u	.p.u	n.d.	n.d.	n.d.	n.d.
n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8
14 Mujeres estudiantes	matriculadas en educación terciaria en ámbito STEM	(% del total) ¹⁸	15 Proporción de población	adulta (16 a 74 años) que tiene al menos habilidades	digitales básicas ¹⁹	16 Población adulta (25-64	años) que reconoce no hablar ninguna lengua	extranjera (% del total) ²¹	17 Proporción de población	auuua (22-04 anos) que uice haber participado en algún	programa de recualincacion en el último año ²²

2019 0 UITIMO dato 2030			1990- 2000-	1980- 1990- 2000-
cot of disponible [*]		2009	1999 2009	1989 1999 2009
33% 32%* 35%		25%	n.d. 25%	n.d. n.d. 25%
28% 29%* -		23%	n.d. 23%	n.d. 23%
41% 42%* -		37%	n.d. 37%	n.d. 37%
0,14% 0,11% 0,25%	0	0,16%	0,16% 0,16%	0,12% 0,16% 0,16%
0,17% 0,15% -	0	0,19%	0,25% 0,19%	0,23% 0,25% 0,19%
0,29% 0,27% -	0	0,31%	0,39% 0,31%	0,27% 0,39% 0,31%
92% 92% 95%		79%	n.d. 79%	n.d. 79%
81% 82% 88%		54%	n.d. 54%	n.d. 54%
54% 51% 60%		24%	n.d. 24%	n.d. 24%
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29.000 ²⁹ (-90%)	I	I	26.335 (-15%)	I	I	42 ³⁵ (-63%)		
126.000 (-57%)	I	I	27.885 (-10%)	I	I	56 (-51%)		
223.000 ²⁸ (-23%)	I	I	29.434 ³¹ (-5%)	I	I	73 ³⁴ (-36%)	ı	,
330.640	n.d.	n.d.	30.983*	n.d.	n.d.	115^{33}	125	122
337.276	n.d.	n.d.	30.983	n.d.	n.d.	123	132	129
413.553	n.d.	n.d.	31.000	n.d.	n.d.	144	155	152
320.693	n.d.	n.d.	30.750	n.d.	n.d.	149	174	173
n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8
	21 Emisiones GEI (miles de toneladas de CO, 2000)	- ha- v		22 Demanda de agua (hm³/año) ³⁰	~	23 Intensidad energética primaria	(kilogramos equivalentes de	

	Representación gráfica	100% 80%	60% 40% 21%	0.0 1980 1990 2000 2010 2020 2030 2040 2050	0% 19% 24%	350 356 4% 6%	0% 1980 1990 2000 2010 2020 2030 2040 2050	80% 60% 60%	40% • • • • 20%	0% 1980 1990 2000 2010 2020 2030 2040 2050	00:000 U	55.000 00.000 6.00.000			70%	50% 40%	30%	12% 10% 8%	6% • • • • • • • • • • • • • • • • • • •	0% 1980 1990 2000 2010 2020 2030 2040 2050	8,0% 7,0%	5.0% 5.0% 4.0%	3.0% 1980 1990 2000 2010 2020 2030 2040 2050	3.0% 2.5% 2.0%	1,156
	2050	100% ³⁸	I	I	5,0% ⁴⁰	I	I	%09	I	I	20.000	I	I		67%	I	I	11%	I	I	7,0%	I	I	2,5%	I
Futuro	2040	87%	I	I	4,0%	I	I	43%	I	I	20.000	I	I		64%	I	I	%6	I	I	7,0%	I	I	2,0%	I
	2030	74% ³⁷	I	I	2,6%	I	I	25% ⁴²	I	I	20.00045	I	I		63%	I	I	7%	I	I	7,0%	I	I	1,5%	I
	2015-2019 o último dato disponible*	36%	31%	40%	1,8%	2,4%	2,6%	10%*	8%*	12%*	15.10344	n.d.	.p.u	eva	62%*	62%*	68%*	5%*	$11\%^{*}$	$11\%^{*}$	5,7%	5,1%	6,6%	0,8%	1,1%
	2010- 2019	35%	28%	36%	1,8%	2,4%	2,7%	8%	7%	%6	13.537	n.d.	n.d.	d más long	56%	55%	61%	4%	10%	10%	5,8%	5,2%	6,5%	0,8%	1,1%
Pasado	2000- 2009	22%	18%	26%	1,9%	2,5%	2,9%	3%	n.d.	%9	66.888	n.d.	n.d.	na socieda	45%	44%	48%	3%	8%	%9	5,1%	n.d.	5,9%	0,4%	n.d.
	1990- 1999	n.d.	n.d.	n.d.	2,1%	2,6%	2,9%	n.d.	n.d.	n.d.	178.941	n.d.	n.d.	tar para ur	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4,9%	n.d.	5,7%	0,1%	n.d.
	1980- 1989	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	.p.u	de bienes	n.d.	.p.u	.p.u	n.d.	n.d.	n.d.	4,2%	.p.u	n.d.	.p.u	.p.u
	Lugar	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	tro estado	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27
	Indicadores	24 Energía eléctrica generada	mediante fuentes	renovables (% del total)**		25 Recaudación ambiental (% del PIB) ³⁹		06 Producción agrícola	ecológica (% del total	del area cultivada)⁺⊥	27 Tasa de	reforestación anual	(hectáreas/año) ⁴³	Desafío 5: Preparar nues		Entre 55 y 64 años (%)	28 Tasa de	actividad ⁴⁶	años (%)		29 Gasto público en salud (% PTB)	sin incluir el gasto sanitario en	cuidados de larga duracionir		30 Gasto público en cuidados de larga duración (% del PIB) ⁴⁸

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Representación gráfica	0% • • • • • • • • • • • • • • • • • • •	20%	40% //		2% 4%	0% 8% 10%	12%	2.0%	1.0% 0.5%	0,0% • 2000 2010 2020 2040	0%	40% 60%	80%	0% 20% 40%	60% M 80% M	1980 1990 2000 2010 2020 2030 2040 2050	0% 5.%	10%	15%	micas y tecnológicas	0%	20%
2050	%0	I	I		4,5% ⁵¹	I	I	2,0%	I	I	%0	I	I	2% ⁵⁶	I	I	0,0% ⁵⁹	I	I	ales, econó	7%	I
2040	%0	I	I		6,5%	I	I	1,8%	I	I	5%	I	I	15%	I	I	3,0%	I	I	dades soci	10%	I
2030	%0	I	I		8,0%	I	I	1,5%	I	I	10% ⁵⁴	I	I	25%	I	I	6,0% ⁵⁸	I	I	evas realic	12%	I
2015-2019 o último dato disponible*	17%*	n.d.	n.d.		9,5%	9,2%	9,4%	0,1%	n.d.	n.d.	55%	25%	4%	51%	73%*	63%*	7,5%*	8,2%*	3,0%*	lo a las nu	18%	8%
2010- 2019	24%	n.d.	n.d.	ostenible	%6'6	9,6%	6,9%	0,1%	n.d.	n.d.	57%	28%	6%	67%	n.d.	n.d.	8,8%	10,9%	3,3%	o y adaptar	20%	%6
2000- 2009	35%	n.d.	n.d.), justo y so	9,4%	8,8%	9,7%	0,2%	n.d.	n.d.	55%	43%	18%	n.d.	n.d.	n.d.	8,4%	13,4%	4,6%	de trabajo	11%	%6
1990- 1999	n.d.	n.d.	n.d.	quilibrado	n.d.	n.d.	n.d.	0,1%	n.d.	n.d.	57%	56%	33%	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	o mercado	20%	11%
1980- 1989	n.d.	n.d.	n.d.	erritorial e	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	de nuestra	18%	10%
Lugar	España	UE-27	UE-8	esarrollo t	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	eficiencias	España	UE-27
Indicadores	31 Porcentaje de personas	que tienen reconocido el derecho a prestación del	SAAD y no la perciben ⁴⁹	Desafío 6: Promover un d	32 Porcentaje de población	que sufre sobrecarga financiera asociada al	pago de la vivienda ⁵⁰	33 Pronorción de viviendas	rehabilitadas al año	(% del parque total) ³²	3.1 Baciduos municinalas	enviados a vertedero	(% del total generado) ⁵³	35 Población expuesta a niveles	(partículas PM _{2.5}) por encima	OMS (% del total) ⁵⁵	36 Pobreza energética (% de la	población que no puede mantener su vivienda a una	temperatura adecuada) ⁵⁷	Desafío 7: Resolver las de		37 Tasa de desempleo ⁶⁰

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	Representación gráfica	100% 80%	60%	20%	0%	20%	60% • • • • • • • • • • • • • • • • • • •	80% 70% 60%	50% 40% 30%	20%	0% 10%	20%	40% 1980 1990 2000 2010 2020 2030 2040 2050	0% 2% 4%	6% 8% 10%	12%	32 34 34		44 1980 1990 2000 2010 2020 2030 2040 2050	0% 5% 5%	10% 15% 20%	25% 1980 1990 2000 2010 2020 2030 2040 2050	95% 90% 050%	8038 8038 75%	70%
	2050	82%	I	I	14%	I	I	68%	I	I	15%	I	I	3%	I	I	35,0	I	I	%0	I	I	93%	I	I
Futuro	2040	75%	I	I	21%	I	I	62%	I	I	18%	I	I	5%	I	I	36,0	I	I	5%	I	I	%06	I	I
	2030	65%	I	I	30%	I	I	56%	I	I	23%	I	I	7%	I	I	37,0	I	I	10%	I	I	87%	I	I
	2015-2019 o último dato disponible*	57%	63%	70%	40%	18%	13%	51%	56%	62%	26%	15%	14%	%6	5%	5%	37,7	37,1	35,4	14%	15%	15%	85%*	83%*	88%*
	2010- 2019	55%	61%	68%	45%	21%	14%	48%	52%	58%	25%	15%	14%	%6	5%	5%	38,0	37,3	35,5	16%	15%	16%	82%	82%	88%
Pasado	2000- 2009	50%	56%	61%	23%	19%	14%	42%	39%	43%	31%	15%	14%	3%	4%	4%	39,6	38,2	36,3	18%	n.d.	19%	n.d.	n.d.	n.d.
	1990- 1999	34%	51%	%09	38%	20%	12%	34%	34%	37%	33%	12%	11%	2%	n.d.	3%	40,6	38,9	36,8	.p.u	.p.u	n.d.	n.d.	n.d.	n.d.
	1980- 1989	28%	47%	56%	39%	20%	12%	39%	37%	38%	22%	10%	10%	2%	n.d.	3%	41,3	39,9	38,4	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
	Lugar	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8	España	UE-27	UE-8
	Indicadores		38 Tasa de empleo de las mujeres ⁶¹			39 Tasa de desempleo iuvenil ⁶²			40 Tasa de empleo (55-64 años) ⁶³			41 Tasa de temporalidad ⁶⁴			42 Tasa de parcialidad involuntaria ⁶⁵			43 Horas trabajadas a la semana ⁶⁶		-	44 Brecha salarial de género ⁶⁷		45 Personas	satisfechas con su	אונעמרוטוו ומטטיומו

Indicadores	Lugar	1980- 1989	1990- 1999	2000- 2009	2010- 2019	2015-2019 o último dato disponible*	2030	2040	2050	Representación gráfica
Desafío 8: Reducir la po	breza y la d	esigualdac	l y reactiva	ır el ascens	sor social					
	España	31	32	32	34	34	32	31	29 ⁷⁰	20
46 Índice de Gini (desigualdad de la renta) ⁶⁹	UE-27	26	28	29	30	30	I	ı		
	UE-8	24	25	26	27	27	I	1		45 1980 1990 2000 2010 2020 2030 2040 205 0
	España	n.d.	19%	20%	21%	22%	18%	15%	10%	0.06
47 Población en riesgo de pobreza (% del total) ⁷¹	UE-27	n.d.	n.d.	.p.u	17%	17%	I	I	I	10% 20%
	UE-8	n.d.	12%	12%	14%	14%	I	I	I	30% 1980 1990 2000 2010 2020 2030 2040 20 50
	España	27%	32%	34%	34%	35%	37%	40%	43%	4596 4096
48 Recaudación fiscal אל לאן PTR\72	UE-27	n.d.	41%	40%	41%	41%	I	I	I	35%
	UE-8	41%	43%	43%	44%	44%	I	I	I	20% 2010 2000 2010 2020 2030 2040 2050
49 Gasto público en	España	n.d.	14%	13%	17%	17%	18%	19%	20%	2296 1996
protección social	UE-27	n.d.	n.d.	18%	20%	20%	I	I	I	16% 13%
	UE-8	n.d.	21%	20%	21%	21%	I	I	I	10%
Desafío 9: Ampliar las b	ases de nue	stro biene	star futuro							

2

100% 95% 90%		70% 1980 1990 2000 2010 2020 2030 2040 2050
92%	I	•
89%	·	•
86%	I	ı
83%	82%	92%
79%	80%	92%
84%	80%	89%
76%	80%	87%
75%	78%	.p.u
España	UE-27	UE-8
	50 Porcentaje de personas satisfechas con su vida ⁷⁴	

Futuro

Pasado



METHODOLOGICAL Notes

THE EU-8 [ALL CHAPTERS]

This study addresses Spain's challenges from a comparative perspective, both in terms of examining and understanding Spain's historical evolution and its current position with respect to other European countries, and in determining the feasibility of the proposed reforms, establishing realistic convergence paths for the future.

In most cases, two comparison groups are used as benchmarks: the EU-27 (or, alternatively, the EU-22, comprising all EU Member States that are members of the OECD) and the EU-8, a category created for this exercise and comprising the eight most advanced EU countries: Austria, Germany, Belgium, Denmark, Finland, France, The Netherlands and Sweden.

Eight are chosen, to divide the 27 countries into three groups of 9 (8 and Spain). The selection is based on a set of economic, social and environmental indicators considered representative of a country's future prosperity [Fig. 1]. The EU-8 countries present:

- higher levels of per capita income and labour productivity than the EU-27 average (17% and 23%, respectively, in 2019);
- better innovation results;
- employment rates among the highest in Europe and above the EU-27 average (5 points higher in 2019);
- a higher quality of human capital, with higher skill levels (e.g. reading comprehension and mathematical ability) and a higher proportion of people with education levels above compulsory secondary education than the rest of the EU-27 and the OECD;
- inequality rates among the lowest in Europe (e.g. the Gini index for the EU-8 average is 27 points compared to 30 points for the EU-27 average in 2019);
- more efficient and transparent institutions than neighbouring states; and
- a strong commitment to the green transition and environmental protection.

Although in some indicators there are European countries that may have a more favourable position than some of the EU-8, on average and in the most representative indicators of long-term economic and social progress, these eight countries show the most positive relative performance, which is why they are used as the benchmark to which Spain should aspire.





PROSPECTIVE ANALYSIS AND THE SELECTION OF THE SAMPLE PERIOD

The prospective analysis has been carried out following a predominantly quantitative approach, based on empirical evidence and through a descriptive prism of how each challenge may evolve in the future under certain conditions. This quantitative approach has been complemented and enriched by a qualitative view of the trends identified in the *Strategy*, resulting from the conclusions reached by the expert group and an exhaustive review of the available literature, both at national and international level.

The quantitative approach to the prognosis has a double dimension:

- on the one hand, it incorporates simulation exercises of baseline or reference scenarios in the medium- and long-term, which assume that the dynamics observed in the past are replicated in the future in the absence of public policy changes (no policy change);
- on the other hand, it contemplates several counter factual and/or impact exercises aimed at determining both some of the effects of these baseline scenarios and the reference paths and effects associated with alternative scenarios linked to the implementation of structural reforms.

In order to draw up the base or reference scenarios, we have taken as a starting point the projections of the main variables that define each challenge provided by official sources widely accepted by the research community (e.g. Eurostat for demographic projections; the INE for the formation of new households in Spain; United Nations for urbanisation rates). When there are several official sources for the same variable, the selection decision is made taking into account, firstly, the criterion of European and international comparability when this is essential for the analysis of the challenge; secondly, the criterion of prudence, i.e. those sources that yield more conservative projection results for the purposes of the prognosis exercise; and finally, the availability of granular information for Spain. An example is the selection of population projections.

In those cases in which official projections are not available or those that do exist, despite being framed in a baseline scenario, imply changes in the projected pathways with respect to what has been observed in the past, the decision was taken to extrapolate the trends recorded over recent decades to the medium and long term, assuming that, under a *no policy change scenario*, the economic and social variables perform, on average, as they did in the recent past (e.g. labour productivity, employment rate). It should be clear, therefore, that these baseline scenarios are neither what we "think will happen" nor necessarily the "most likely scenario", but rather theoretical artifacts of reference that serve to illustrate the cost of inaction and the potential long-term consequences of not positively changing the variables that determine each challenge.

In order to eliminate any possible sample bias in the selection of the sample period, a sufficiently representative time horizon has been taken for of the performance of the Spanish economy. In fact, where the results differ significantly depending on the representative period considered, the different options are included and a range of results are provided. There is an exception to this general rule of applying past trends to future developments. This refers to those variables that are bounded, i.e. that have an upper limit, in which case the projection is made by holding constant the latest available value or by taking a representative average of the recent past (e.g. employment rates by age group).

The approach to some of the potential effects arising from the materialisation of the *base* scenarios (impacts on secondary or *auxiliary* variables) and those resulting from the implementation of structural changes (*alternative* scenarios) has also been undertaken from a dual perspective: firstly, based on the results of impact studies of the most rigour and international recognition in each field (e.g. IPCC and PESETA IV in the analysis of climate change; the European Commission's *Ageing Report* for impacts on health spending and long-term care; and the OECD's *How's Life?* 2020: *Measuring Well-being* for the future performance of well-being, to mention but a few); and, secondly, through the completion of *counterfactual* exercises based, fundamentally, on the establishment of convergence paths for Spain's *main* variables with the levels of the most advanced countries or groups of countries in each area ("ambition target"). In most chapters of the *Strategy*, the EU-8 constitutes this reference group of countries. The convergence paths for Spain are made taking into account, in turn, the projected evolution under a base or reference scenario for the main variables of these countries or group of reference countries between now and 2050, following the same principles explained above for Spain.

With regard to the time horizon used for the analysis of trends observed in the past, we have taken as a reference the period from 1980 (the beginning of the democratic transition) to 2019, the last year of complete information available for both Spain and the rest of the countries under comparison at the closing date of the *Strategy*. The potential impact of the shock caused by the COVID-19 pandemic in 2020 and 2021 is addressed from a qualitative point of view, and only when available information allows us to do so, from a quantitative point of view, in detail and separately from the historical period 1980-2019 in each of the challenges.

In addition, in order to isolate the effect of COVID-19 on the medium and long-term projections, the reference horizon for the reflection of possible future scenarios has been taken as 2023 to 2050. The consensus of international and national agencies establishes that Spain could recover its pre-pandemic level of activity between late 2022 and 2023, depending, among other things, on the pace of vaccination, the improvement in global activity and the impact of the stimulus measures in place. Even when many of the effects of the crisis will be felt beyond this date, the nature of the pandemic shock and the response of the authorities suggest that, in key economic and social variables, near-full recovery will be achieved between 2022 and 2023.¹⁰ Regardless of the exact timing of this recovery, and in order to avoid any dispute in relation to it, we have deliberately taken 2023 as the starting point for the drafting of the *Strategy*'s medium and long term scenarios.

DEMOGRAPHIC PROJECTIONS ICHAPTERS 1-81

Our ability to anticipate demographic change has improved greatly in recent decades and, although it is not and never will be an exact science, we now have effective models that can project future trends with a high degree of confidence.¹¹

In the case of Spain, there are three series of projections, produced by AIReF, Eurostat and the INE.¹² The latter two envisage a similar total population by 2050: 49.3 million people according to Eurostat, and almost 50 million according to the INE. AIReF, for its part, puts the figure at 54 million. The three agencies agree that the proportion of the population aged 65 and over will surpass 30% of the total population by 2050. However, there are discrepancies with regard to the size of the population in what has traditionally been considered the "working age" (between 16 and 64): AIReF's projections are between 1.7 and 2.6 million higher than the projections made by Eurostat and the INE. This discrepancy is mainly explained by the (minor) differences in birth rates and, above all, by the differences in the average migration balance forecast by the different organisations. In this respect, it should be borne in mind that migration is a multifaceted phenomenon that responds to a multitude of causal mechanisms and is difficult to anticipate.¹³ In the specific case of Spain, the absence of a clear trend in the past makes future projection even more difficult [Fig. 2]





Source: Drafted by the authors based on data from Airef, Eurostat and the INE.14

For the analysis of Spain 2050, we have opted to use Eurostat data for two reasons:

- They are the only ones that allow an international comparison, as they contain harmonised projections for all EU countries and other neighbouring countries.
- They are the most consistent with the average of the last decades [Fig. 3]. They do not assume major improvements in either the birth rate or the migration balance, making them more suitable for designing a conservative strategy. When preparing to meet a challenge, one should assume as a baseline scenario the most prudent projections within the realms of probability and not base assumptions on the most optimistic projections, as these may not come to fruition. In the particular case of immigration, Eurostat's demographic baseline scenario anticipates an annual net migration balance of 197,000 persons, on

average, between 2021 and 2050, a slightly higher balance than that observed between 1990 and 2019 and which is similar to that projected by the INE. AIReF puts this migration balance at over 300,000 people.



Fig. 3. Average net immigration flow in Spain (inflows minus outflows)

Source: Drafted by the authors based on data from Airef, Eurostat and the INE.¹⁵

HISTORICAL BREAKDOWN OF GDP PER CAPITA ICHAPTER 11

A country's GDP per capita is defined as the ratio of its Gross Domestic Product (GDP) to its population (POB). This indicator can be disaggregated into five factors according to the following identity:

$$\frac{\text{PIB}}{\text{POB}} = \frac{\text{PIB}}{\text{H}} \mathbf{x} \frac{\text{H}}{\text{OCU}} \mathbf{x} (1 - \frac{\text{PAR}}{\text{ACT}}) \mathbf{x} \frac{\text{ACT}}{\text{POB15-64}} \mathbf{x} \frac{\text{POB15-64}}{\text{POB}} \text{ where}$$



Fig. 4. Hours worked per employee

Fig. 5. Unemployment rate





Source: Author's own based on data from the OECD.17

Fig. 6. Activity rate

Fig. 7. Working-age population over total population



Spain's GDP per capita is lower than that of benchmark countries mainly due to a lower level of labour productivity [see chapter 1] and a higher unemployment rate [see chapter 7]. The labour force participation rate increased significantly between 1980 and 2008, but has stagnated in recent years due to the recent crises. In terms of hours worked per employed person, the trend in Spain is on the decrease, although they are still high in relation to the most advanced countries in Europe. Finally, the working-age population as a share of the total population increased sharply until the mid-1990s, stabilised until the 2008 crisis and has since declined to 1990 levels in 2018 [Figs. 4, 5, 6 and 7].

— UE-28 — EE. UU.

The series used for this exercise include:

- GDP: OECD. Level of GDP per capita and productivity. GDP, USD, constant prices, 2015 PPPs. https://stats.oecd.org/.https://stats.oecd.org/.
- Total population: OECD. Historical population. Total. https://stats.oecd.org/.
- Number of hours worked: OECD. Level of GDP per capita and productivity. Hours worked for total employment. https://stats.oecd.org/.
- Employed population: OECD. Annual Labour Force Statistics. Employment. https://stats.oecd.org/.
- Unemployed population: OECD. Annual Labour Force Statistics. Unemployment. https://stats.oecd.org/.
- Active population: AMECO. OECD. Annual Labour Force Statistics. Labour force. https://stats.oecd.org/.
- Working age population: OECD. Historical population. 15 to 64. https://stats.oecd.org/.

FORWARD-LOOKING SCENARIOS OF GDP PER CAPITA AND ITS DETERMINANTS ICHAPTERS 1 AND 7]

To project GDP per capita, we have performed a growth accounting exercise that disaggregates the growth rate of GDP per capita between the contribution of the factors of production (capital and labour, the latter adjusted for educational attainment) and what cannot be accounted for by observed changes in the use of these factors. This residual part of GDP per capita growth is what economists group under the concept of "total productivity of factors" (getting more output from the same quantities of inputs), which is understood as a measure of technological progress, in a broad sense.

Under the assumption of constant returns to scale and a competitive market, the growth accounting exercise is independent of the exact form of the production function. Therefore, given any production function with constant returns to scale we can write:

$$y = a f(k_T, k_T, h),$$

where y is GDP, k_{τ} is physical capital, k_{I} is intangible capital, h is average human capital and a is total productivity of factors. This means:

$$\frac{dy}{y} = \mathbf{\theta}_{T} \frac{dk_{T}}{k_{T}} + \mathbf{\theta}_{I} \frac{dk_{I}}{k_{I}} + \mathbf{\theta}_{h} \frac{dh}{h} + \frac{da}{a} ,$$

where θ_{τ} is the share of the tangible capital factor in GDP, θ_{I} is the share of the intangible capital factor in GDP and θ_{h} is the share of the labour factor in GDP. GDP growth can thus be approximated as the sum of the growth of factors of production (weighted by their share in GDP) plus the growth of total productivity of factors.

The series of capital stock (physical and intangible) and labour and capital shares in GDP are from Aum, Koh and Santaeulàlia-Llopis,²⁰ available from 1996 and up to 2018 and 2019, respectively. Average hours worked per employed person and the human capital index are from Feenstra, Inklaar and Timmer²¹ and are available up to 2019. Specifically, the latter is a synthetic measure that includes years of schooling of the adult population and educational attainment. Data on total population and employed population are from Eurostat.

The *baseline* scenarios are based on Eurostat's demographic projections for the population variables, extrapolating into the future the trends observed on average over the last decades for the rest of the factors that determine GDP per capita growth.²² In particular, the lower range of the baseline scenario presented in Fig. 26 in chapter 1 is obtained by calculating these trends for the period 1996-2018 (2019), while the upper range of the baseline scenario is the result of calculating these trends since 2010. The reason for this lies mainly in the differences in the pattern of performance of total productivity of factors (critical variable) in both periods, which is more favourable in more recent years. In particular:

- Eurostat demographic projections are used to establish paths for the total population and the working age population (16-64 years) up to 2050.
- For the capital stock and total productivity of factors, the trend observed, on average, between 1996 (or 2010) and 2018 (as this is the latest year available) is extrapolated to the projection period.
- For the share of labour and capital in GDP, the average of the period 1996 (or 2010) -2019 is considered and extended to the whole forecast period.
- The employment rate (total employed / population aged 16-64), hours worked per employed person and the human capital index are projected by applying the average trends for the period 1996 (or 2010) - 2019 to the forecast horizon.

PROSPECTIVE SCENARIOS FOR THE EDUCATIONAL ATTAINMENT OF THE POPULATION ICHAPTERS 2 AND 3]

To project the distribution of the Spanish population by level of education, we take as a starting point Eurostat's demographic baseline scenario to establish the population that, by 2050, will be in the age cohorts that could potentially receive training in our education system. Next, we consider the estimates of educational attainment by age group provided by the *International Institute for Applied Systems Analysis*, both for Spain and for the EU-8, which is the reference to which our country should approach between now and 2050. In particular, we consider the estimates for the 24-65 age group of the *Global Education Trend Scenario (SSP2)*.²³

Given that the educational structure of the Spanish population over the next three decades will, to a great extent, be conditioned by the evolution of early education (primary and compulsory secondary), we have checked that the above estimates are compatible with the school dropout rate and the percentage of the population aged 25-34 with education beyond compulsory secondary, that we set as targets in the table of indicators in chapter 2. This allows us to reconcile the training structure established for 2050 for the 24-65 age group with the training acquired by the younger age cohorts over the next three decades. This is particularly relevant given that the resulting educational structure in 2050 will be conditioned by both the educational improvements of the new generations and the level of education of current generations.²⁴

From the result of applying the education structure by age segment to the population projections of the Eurostat baseline scenario, the number of potential students in each educational stage, from 0 to 24 years old, is obtained. However, in order to calculate the actual training needs we must take into account that:

- in the 0-2 age group, the enrolment rate in 2018 is 38%;²⁵
- of the population aged 16-24, there is a part that is not in school (in 2018, 36% of the total in this age group), either because it is neither studying nor working or because it is part of the active population (employed or unemployed).²⁶

With regard to school enrolment in 0-2 segment, we assume that it increases by 2050 to the levels of the Spanish region with the highest rate today, i.e. to 55%.²⁷

As far as the population aged 16-24 is concerned, we find, on the one hand, that the proportion of people neither in education nor in employment is progressively decreasing from current levels to the EU-8 average ²⁸. On the other hand, the labour force evolves in line with the youth employment rate and the youth unemployment rate set as targets in chapter 7.²⁹

In the intermediate age group between 3 and 15 years, we assume, for the purpose of the simplification of analysis, that school enrolment is 100%. Currently, the average enrolment rate in primary and lower secondary education is 97%.³⁰

Once the potential number of students with each educational level has been defined, we proceed to calculate the potential expenditure on education under the ambition scenario, in which the educational structure of the Spanish population between 25 and 64 years of age in 2050 is close to that of the EU-8. For this purpose, we assume that Spain's expenditure per student increases at all stages of education to the levels of Denmark today. The reason we take Denmark as a reference is because, among the EU-8 countries, it has a similar level of per capita income to that of Spain in 2050 under this ambition scenario.

In any case, it should be noted that these estimates of public spending on education are cautious for a number of reasons, including the following: 1) we assume that all training needs are covered by the public sector, when currently a part of them are covered by the private sector;³¹ 2) we do not include students over 24 years of age who are studying;³² and 3) we do not include the potential increase in postgraduate studies compared to the current situation and, therefore, the increase in funding in this segment, even above the levels of spending per student that we consider when we refer to Denmark.

In particular, the Eurostat series used for this exercise include:

- Population: Eurostat. Population on 1 January by age and sex [demo_pjan]; y Population on 1st January by age, sex and type of projection [proj_19np]. https://ec.europa.eu/ eurostat/data/database.
- Employees (15-24 years): Eurostat. Employment by sex, age and citizenship (1 000) [lfsa_egan]. https://ec.europa.eu/eurostat/data/database.
- Active population(15-24 years): Eurostat. Active population by sex, age and citizenship (1 000) [lfsa_agan]. https://ec.europa.eu/eurostat/data/database.
- Youth unemployment (15-24 years): Eurostat. Unemployment rates by sex, age and citizenship (%) [lfsa_urgan]. https://ec.europa.eu/eurostat/data/database.
- Young people neither studying nor working (15-24 years old): Eurostat. Young people neither in employment nor in education and training by sex, age and labour status (NEET rates) [edat_lfse_20]. https://ec.europa.eu/eurostat/data/database.
- Public expenditure per student: Eurostat. Public expenditure on education per pupil/ student based on FTE by education level and programme orientation [educ_uoe_fine09]. https://ec.europa.eu/eurostat/data/database.
- Nominal GDP in PPP: Eurostat. GDP and main components (output, expenditure and income) [nama_10_gdp]. https://ec.europa.eu/eurostat/data/database.

SYNERGY MAP BETWEEN THE NATIONAL LONG TERM STRATEGY AND THE RECOVERY, TRANSFORMATION AND RESILIENCE PLAN [ALL CHAPTERS]

Spain 2050 and the *Recovery, Transformation and Resilience Plan* are two distinct and independent exercises that, nevertheless, share a common purpose (to boost Spain's economic prosperity and social well-being) and have therefore engaged in intensive dialogue during their parallel preparation.

When designing the *Recovery Plan*, the diagnoses and ideas generated by the experts within the framework of Spain 2050 and included in this study have been taken into account. They have also taken into account the *NextGenerationEU* and *Recovery Plan* action and funding lines. There is, therefore, a degree of coherence and affinity between the two exercises [Figs. 8, 9, 10 and 11], although there are also notable differences in their objectives, time horizons, contents and working methodologies:

	Plan de Recuperación, Transformación y Resiliencia	España 2050: Estrategia Nacional de Largo Plazo
Objetivos	Plan de inversiones y reformas, construido en torno a 4 ejes transversales, 10 políticas palanca y 30 componentes. Incluye un calendario concreto de reformas y una asignación específica de inversiones destinadas a recuperar la senda de crecimiento económico anterior a la pandemia y a crear un modelo productivo más moderno, justo y sostenible.	Análisis estratégico de las oportunidades y los desafíos a los que se enfrentará España durante las próximas tres décadas y búsqueda de objetivos comunes que guíe la toma de decisiones en el largo plazo.
Horizonte temporal	Énfasis inicial en el periodo 2021-2023.	Énfasis en el periodo 2023-2050.
Naturaleza del contenido	Ejecución de 110 inversiones por valor de 69.500 millones de euros y aprobación de 102 reformas. Coordinado con el resto de estados miembros de la UE y los ejes y requerimientos marcados por la Comisión Europea.	Marco de análisis con propuestas abiertas y grandes líneas de actuación. Independiente del resto de los estados miembros de la UE, aunque alineado con los ejes marcados por las directivas europeas.
Metodología de trabajo	Elaborado por el Gobierno en consulta con el resto de administraciones y los principales actores sociales y negociado con la Comisión Europea.	Elaborado por la Oficina Nacional de Prospectiva y un grupo de expertos y expertas independientes, con el apoyo de la AIReF, el Banco de España, y el <i>Joint</i> <i>Research Centre</i> de la Comisión Europea.

Fig. 8. Recovery Plan and National Long-Term Strategy

Source: Drafted by the authors and the Government of Spain.33

Fig. 9. Synergies between the components of the *Recovery Plan* and the challenges and objectives of the *National Long-Term Strategy*

		Desafío 1 Crecer mejor	Desafío 2 Vanguardia educativa	Desafío 3 Seguir aprendiendo	Desafío 4 Transición ecológica	Desafío 5 Vejez futura	Desafío 6 Desarrollo territorial	Desafío 7 Futuro del empleo	Desafío 8 Menos desiguales	Desafío 9 Bienestar futuro
1	Plan de choque de movilidad sostenible, segura y conectada en entornos urbanos y metropolitanos				•		•			•
2	Plan de rehabilitación de vivienda y regeneración urbana				•		•			
3	Transformación ambiental y digital del sistema agroalimentario pesquero				•		•			
4	Conservación y restaura- ción de ecosistemas y su biodiversidad				•					•
5	Preservación del espacio litoral y los recursos hídricos				•					•
6	Movilidad sostenible, segura y conectada	•			•		•			•
7	Despliegue masivo del parque de generación renovable	•			•		•			
8	Infraestructuras eléctricas, promoción de redes inteligentes y despliegue de la flexibilidad y el almacenamiento	•			•		•			
9	Hoja de ruta del hidrógeno renovable y su integración sectorial	•			•					
10	Estrategia de Transición Justa				•				•	•
11	Modernización de las administraciones públicas	•						•	•	
12	Política Industrial España 2030	•			•		•			
13	Impulso a la pyme	•						•		
14	Plan de modernización y competitividad del sector turístico				•		•			
15	Conectividad Digital, impulso de la ciberseguri- dad y despliegue 5G	•					•			

	Desafío 1 Crecer mejor	Desafío 2 Vanguardia educativa	Desafío 3 Seguir aprendiendo	Desafío 4 Transición ecológica	Desafío 5 Vejez futura	Desafío 6 Desarrollo territorial	Desafío 7 Futuro del empleo	Desafío 8 Menos desiguales	Desafío 9 Bienestar futuro
16 Estrategia Nacional de Inteligencia Artificial	•								
17 Reforma institucional y fortalecimiento de las capacidades del sistema nacional de ciencia, tecnología e innovación	•			٠					
18 Renovación y ampliación de las capacidades del Sistema Nacional de Salud					•			•	•
19 Plan Nacional de Competencias Digitales	•	•	•				•		
20 Plan estratégico de impulso de la FP	•		•				•		
21 Modernización y digitalización del sistema educativo, incluida la educación temprana de 0 a 3 años	•	•	•						
22 Plan de choque para la economía de los cuidados y refuerzo de las políticas de inclusión					•			٠	•
23 Nuevas políticas públicas para un mercado de trabajo dinámico, resilient e inclusivo	e						•	•	•
24 Revalorización de la industrial cultural									
25 España <i>hub</i> audiovisual de Europa	2								
26 Plan de fomento del secto del deporte	r								
27 Medidas y actuaciones de prevención y lucha contra el fraude fiscal	•						•	•	
28 Adaptación del sistema impositivo a la realidad de siglo XXI	l 🌒						•	•	
29 Mejora de la eficacia del gasto público	•							•	
30 Sostenibilidad a largo plazo del sistema público de pensiones en el marco del Pacto de Toledo					•			•	•

Source: Drafted by the authors and the Government of Spain. $^{\scriptscriptstyle 34}$

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Fig. 10. Synergies between the *Recovery Plan's* key investment programmes and the challenges and objectives of the *National Long-Term Strategy*

		Desafío 1 Crecer mejor	Desafío 2 Vanguardia educativa	Desafío 3 Seguir aprendiendo	Desafío 4 Transición ecológica	Desafío 5 Vejez futura	Desafío 6 Desarrollo territorial	Desafío 7 Futuro del empleo	Desafío 8 Menos desiguales	Desafío 9 Bienestar futuro
1	Estrategia de Movilidad Sostenible, Segura y Conectada				•		•			•
2	Programa de Rehabilita- ción de Vivienda y Regeneración Urbana				•		•			•
3	Hoja de Ruta del 5G	•					•			
4	Nueva Política Industrial España 2030 y Estrategia de Economía Circular	•			٠		•			
5	Plan Nacional de Competencias Digitales	•	•	•				•		
6	Modernización y Competitividad del Sector Turístico				•		•			
7	Plan de Digitalización de PYMEs	•						•		
8	Desarrollo del Sistema Nacional de Ciencia e Innovación	•			•					
9	Ampliación del Parque de Renovables	•			•		•			
10	Modernización de las Administraciones Públicas	•						•	•	
11	Modernización de las Políticas Activas de Empleo	•		•				•	•	•
12	Nueva Economía de los Cuidados					•			•	•
13	Preservación del Litoral y Recursos Hídricos				•					•
14	Plan Estratégico de Formación Profesional	•		•				•	•	•
15	Conservación y restaura- ción de ecosistemas y biodiversidad				•					•
16	Modernización y Digitalización del Sistema Educativo	•	•	•			•	•	•	•
17	Hoja de Ruta del Hidrógeno Verde	•			•					
18	Infraestructuras Eléctricas, Redes Inteligentes, Almacenamiento	•			•		•			
19	Renovación y Moderniza- ción del Sistema Sanitario					•			•	•
20	Estrategia Nacional de Inteligencia Artificial	•								

Source: Drafted by the authors and the Government of Spain. $^{\mbox{\tiny 35}}$

Fig. 11. Synergies between the main reforms envisaged in the *Recovery Plan* and the challenges and objectives of the *National Long-Term Strategy*

		Desafío 1 Crecer mejor	Desafío 2 Vanguardia educativa	Desafío 3 Seguir aprendiendo	Desafío 4 Transición ecológica	Desafío 5 Vejez futura	Desafío 6 Desarrollo territorial	Desafío 7 Futuro del empleo	Desafío 8 Menos desiguales	Desafío 9 Bienestar futuro
1	Ley de cambio climático y transición energética	•			•		•			•
2	Desarrollo de un sistema energético, robusto y flexible, despliegue e integración de renovables	•			•		•			
3	Hoja de Ruta del Hidrógeno Renovable	•			•					
4	Resiliencia y Adaptación de Ecosistemas, Desarrollo y Conectividad de Infraestructuras Verdes	٠			٠		•			•
5	Ley de Aguas y Plan Nacional de Depuración, Saneamiento, Eficiencia, Ahorro y Reutilización				•		•			
6	Modernización de la Política Agrícola y Pesquera				•		•			
7	Política de Residuos e Impulso de la Economía Circular	•			٠		•			
8	Modernización del Sistema Nacional de Ciencia y Apoyo a la Innovación	•			٠			•		
9	Estrategia de Movilidad Sostenible y Conectada	•			•		•			•
10	Nueva Política de Vivienda						•		•	•
11	Modernización de la Justicia									
12	Modernización y Digitalización de la Administración	•						•	•	
13	Mejora de la Calidad Regulatoria y Clima de Negocios - Reforma concursal	•								
14	Modernización y Refuerzo del Sistema Nacional de Salud					•			•	•
15	Modernización y Refuerzo del Sistema Educativo, de FP y de la universidad	٠	•	•				•		•
16	Nuevas políticas públicas del Mercado de Trabajo	٠						•		•
17	Nueva Economía de Los Cuidados					•			•	•
18	Refuerzo de las Políticas de Inclusión y Servicios Sociales								•	
19	Modernización y Progresivi- dad del Sistema Fiscal							•	•	
20	Refuerzo del Sistema de Pensiones					•			•	•

Source: Drafted by the authors and the Government of Spain.³⁶

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FOREWORD

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INTRODUCTION: TOWARDS A LONG-TERM NATIONAL STRATEGY

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²⁷ Puntuación obtenida en el *Global Freedom*. For further details, see: Freedom House. "Total Global Freedom Scores." Freedom House, https://freedomhouse.org/countries/freedom-world/scores.

²⁸ Ranking of countries by GDP at current prices adjusted for purchasing power differences in 2019 or latest available year. For further details, see: International Monetary Fund. *World Economic Outlook, October* 2020. Washington D.C., 2020. https://bit.ly/30YhuNO.

²⁹ Ranking of countries by their weight in world exports of goods, services and primary income in 2019 or latest available year. For further details, see: Banco Mundial. *Exports of goods, services and primary income (BoP, current US\$*). https://data.worldbank.org/indicator/BX.GSR.TOTL.CD.

³⁰ Score obtained in the *Global Competitiveness Index 4.0.* For further details, see: World Economic Forum. *The Global Competitiveness Report*

2019. Geneve, 2019. http://www3.weforum.org/docs/WEF_TheGlobal CompetitivenessReport2019.pdf.

³¹ Score obtained in the *Travel & Tourism Competitiveness Index 2019*. For further details, see: World Economic Forum. *The Travel & Tourism Competitiveness Report 2019: Travel and Tourism at a Tipping Point*. Geneve, 2019. http://www3.weforum.org/docs/WEF_TTCR_2019.pdf.

³² The indicator "Quality of transport infrastructure" represents the score obtained in the second pillar, *infrastructure*, of the *Global Competitiveness Index 4.0*. For further details, see: World Economic Forum. *The Global Competitiveness Report 2019*. Geneve, 2019. http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019. pdf.

³³ Scored obtained in the*Healthcare Access and Quality Index*. For further details, see: GBD 2016 Healthcare Access and Quality Collaborators. "Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016." *The Lancet* 391, n.º 10136, 2018. https://doi.org/10.1016/ S0140-6736(18)30994-2.

³⁴ Percentage of the population living in overcrowded conditions in 2019 who also experienced at least one of the housing deprivation measures (leaking roof, no bath/shower, no indoor toilet, too dark). See: Eurostat. *European Union Statistics on Income and Living Conditions. Severe housing deprivation rate by age, sex and poverty status - EU-SILC survey [ilc_mdho06a].* https://ec.europa.eu/eurostat/data/database.

³⁵ Score obtained in the *Inclusive Internet Index 2020.* For further details, see: The Economist Intelligence Unit. "The inclusive internet Index 2020." The Economist Intelligence Unit, https://theinclusiveinternet. eiu.com/explore/countries/performance.

³⁶ Score obtained in the *Global Gender Gap Index 2020.* For further details, see: World Economic Forum. *Global Gender Gap Report 2020.* Geneve, 2020. http://www3.weforum.org/docs/WEF_GGGR_2020.pdf. Other rankings offer similar results: CFR. "Women's Workplace Equality Index." CFR, https://www.cfr.org/legal-barriers/; European Institute for Gender Equality. "Gender Equality Index." European Institute for Gender Equality. "Gender Equality Index." European Institute for Gender Equality. "Gender Equality Index." European Institute for Gender Equality. https://eige.europa.eu/gender-equality-index/compare-countries; y Georgetown Institute for Women, Peace and Security, y Peace Research Institute Oslo. *Women Peace and Security Index.* Washington D.C., 2019. https://giwps.georgetown.edu/wp-content/uploads/2019/12/WPS-Index-2019-20-Report.pdf.

³⁷ Score obtained in the overall indicator. The EU-27 only includes Spain, Germany, Poland, Ireland, France, Sweden and Italy due to data availability. For further details, see: HSBC. "Expat Explorer Survey Overall Score." HSBC, https://expatexplorer.hsbc.com/survey/.

³⁸ Score obtained in the *Environmental Performance Index 2020*. For further details, see: Environmental Performance Index. "EPI Score." Environmental Performance Index, https://epi.yale.edu/epiresults/2020/component/epi.

³⁹ Ranking of countries by electricity capacity (megawatts) of renewable energy in 2019. For further details, see: International Renewable Energy Agency. *Electricity capacity (MW) Total Renewable Energy*. https://www. irena.org/Statistics/View-Data-by-Topic/Capacity-and-Generation/ Statistics-Time-Series. ⁴⁰ Percentage of terrestrial protected area over total area for each country in 2018. For further details, see: Banco Mundial. *Terrestrial protected areas (% of total land area)*. https://data.worldbank.org/ indicator/ER.LND.PTLD.ZS?most_recent_value_desc=true.

⁴¹ Number of World Heritage sites. For further details, see: UNESCO. "World Heritage List." UNESCO, https://whc.unesco.org/en/list/.

⁴² Score obtained in the *Cultural Influence*. The EU-27 does not include Malta, Belgium, Ireland, Hungary and Cyprus due to lack of data. For the same reason, the EU-8 does not include Belgium. For further details, see: US News. "Countries Ranking: Cultural Influence US News, https:// www.usnews.com/news/best-countries/influence-rankings.

⁴³ Percentage of people over the age of 16 who are not alone and have someone to count on in 2015. For further details, see: Eurostat. Persons who have someone to discuss personal matters by sex, age and educational attainment level [ILC_SCP17]. https://ec.europa.eu/ eurostat/data/database.

⁴⁴ Ranking of countries by GDP per capita at current prices in 2019 or latest available year. For further details, see: International Monetary Fund. *World Economic Outlook, October 2020*. Washington D.C., 2020. https://bit.ly/2GrDhfD.

⁴⁵ Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. In this case, the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *GDP and main components* (*output, expenditure and income*) [*nama_10_gdp*]; *Employment by A*10 industry breakdowns* [*nama_10_a10_e*]; *y Purchasing power parities* (*PPPs*), *price level indices and real expenditures for ESA 2010 aggregates* [*prc_ppp_ind*]. https://ec.europa.eu/eurostat/data/database.

⁴⁶ Score of thel *Economic Complexity Index* for the year 2018. For further details, see: Atlas of Economic Complexity. *Country & Product Complexity Rankings. Economic Complexity Index.* https://atlas.cid. harvard.edu/rankings.

⁴⁷ It represents the score obtained in the *European Innovation Index* scoreboard 2020 fot the year 2019. For further details, see: European Commission. *European Innovation Index* scoreboard 2020. https:// ec.europa.eu/growth/industry/policy/innovation/scoreboards_en.

⁴⁸ Investment in intellectual property is represented as a percentage of GDP for the year 2018. In this case, instead of the EU-27 the EU-22 is represented, which is constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD. This excludes Bulgaria, Croatia, Cyprus, Malta and Romania. For further details, see: OECD. *Gross domestic product (GDP); y Capital formation by activity ISIC rev4*. https://stats.oecd.org/.

⁴⁹ The human capital index calculates the contributions of health and education to worker productivity. Data for the year 2020 are represented. For data, see: World Bank. *The Human Capital Index 2020 Update: Human Capital in the Time of COVID-19.* Washington D.C., 2020. http://hdl.handle.net/10986/34432.

⁵⁰ Data for the year 2019 are represented for persons aged 18-24 years. In this case, the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Early leavers from education and training by sex and labour status [edat_lfse_14]*. https://ec.europa.eu/

eurostat/data/database.

⁵¹ Data for the year 2019 are represented for persons aged 25-64 years. EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Population by educational attainment level, sex and age (%) - main indicators [edat_lfse_03]*. https://ec.europa.eu/eurostat/data/database.

⁵² Average score for reading comprehension and mathematics for people aged 16-65 are represented. Data have been taken from Figure 1.1. of the report mentioned below. Instead of the EU-27, the OECD average informed in the same report is represented. For further details, see: OECD. *Skills Matter: Further Results from the Survey of Adult Skills*. París: OECD Publishing, 2016. https://doi.org/10.1787/9789264258051-en.

⁵³ Data for the year 2018 are represented for persons aged 15-64 years. The EU-8 is constructed as the weighted average of the values of the individual countries, with working age population being the reference for the calculation of weights. The EU-28 is constructed from the aggregates reported by the OECD. For further details, see: OECD. *Historical population y Annual Labour Force Statistics summary tables.* https://stats.oecd.org/.

⁵⁴ Data for the year 2019 are represented for persons aged 15-24 years. In this case, the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Unemployment by sex and age – annual data [une_rt_a]*. https://ec.europa.eu/eurostat/data/database.

⁵⁵ Data for the year 2019 are represented. In this case, the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Gini coefficient of equivalised disposable income [ilc_di12]*. https://ec.europa.eu/eurostat/data/database.

⁵⁶ The poverty rate is the proportion of people (in a given age group) whose income is below the poverty line, in this case calculated as half the average household income of the total population Data for the year 2018 are represented. In this case, the EU-27 is the aggregate indicator reported by Eurostat. See: Eurostat. *At-risk-of-poverty rate by poverty threshold [ilc_li02].* https://ec.europa.eu/eurostat/data/database.

⁵⁷ The overall score obtained in the Global Social Mobility Index in 2020 is represented. For further details, see: World Economic Forum. *Global Social Mobility Index 2020: why economies benefit from fixing inequality.* Colonia, Ginebra, 2020. http://www3.weforum.org/docs/ Global_Social_Mobility_Report.pdf.

⁵⁸ Data average from 2008 to 2017 is represented. See: European Environment Agency. *Development of the water exploitation index plus (WEI+)*. https://www.eea.europa.eu/data-and-maps/daviz/waterexploitation-index-plus#tab-chart_2_filters=%7B%22rowFilters%22% 3A%7B%7D%3B%22columnFilters%22%3A%7B%22pre_config_cou ntry%22%3A%5B%22Spain%22%5D%7D%7D.

⁵⁹ The percentage of municipal waste sent to landfill has been calculated on the basis of the annual per capita kilograms of municipal waste sent to landfill and the annual per capita kilograms of municipal waste generated.. Data for the year 2018 are represented. In this case, the EU-27 is the aggregate indicator reported by Eurostat. See: Eurostat. *Municipal waste by waste management operations [ENV_WASMUN]. Disposal - landfill and other (D1-D7, D12), Kilograms per capita. Waste generated, kilograms per capita.* https://ec.europa.eu/eurostat/data/ database. ⁶⁰ Percentage of population living in households where expenditure on housing represents at least 40% of total household disposable income in 2019. Refer to: Eurostat. *European Union Statistics on Income and Living Conditions. Housing cost overburden rate by tenure status - EU-SILC survey [ilc_lvho07c]*. https://ec.europa.eu/eurostat/data/database.

⁶¹ The average of the indicators of corruption control, government effectiveness, accountability and compliance with the law for the year 2018 is represented. For further details, see: Banco Mundial. *Worldwide Governance Indicators*. https://databank.worldbank.org/source/ worldwide-governance-indicators.

⁶² Data for the year 2017 are represented. For further details, see: Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" *IMF Working Papers*, n.º 18/17, 2018. https://www.imf.org/en/Publications/WP/ Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last-20-Years-45583.

⁶³ Score obtained in the *Ranking of Happiness 2017-2019*. For further details, see: Helliwell, John F., Haifang Huang, Shun Wang, and Max Norton. "Social Environments for World Happiness." In Helliwell, John F., Richard Layard, Jeffrey Sachs, and Jan-Emmanuel De Neve (eds.). *World Happiness Report 2020*. New York: Sustainable Development Solutions Network, 2020. 17-50. https://happiness-report.s3.amazonaws. com/2020/WHR20.pdf.

⁶⁴ Foresight studies often tend to be pessimistic. On this issue, see: Cazes, Bernard. *Histoire des futurs: les figures de l'avenir, de saint Augustin au XXIe siècle*. París: Seghers, 1986; Hecht, David. "The Neural Basis of Optimism and Pessimism." *Experimental Neurobiology* 22, n.º 3, 2013. https://doi.org/10.5607/en.2013.22.3.173; y Tertrais, Bruno. *L'apocalypse n'est pas pour demain: pour en finir avec le catastrophisme*. París: Denoël, 2011.

⁶⁵ Wilson, Timothy, *et al.* "Focalism: A source of durability bias in affective forecasting." *Journal of Personality and Social Psychology*, *78*, n° 5, 2000. https://doi.org/10.1037/0022-3514.78.5.821.

⁶⁶ The income per capita gap measures the relative differences in GDP per capita between Spain and the EU-8. GDP per capita is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total population. The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. For further details, see: Eurostat. *GDP and main components (output, expenditure and income) [nama_10_gdp]; Population on 1 January by age and sex [demo_pjan]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https:// ec.europa.eu/eurostat/data/database.*

⁶⁷ Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. For further details, see: Eurostat. *GDP and main components* (*output, expenditure and income*) [*nama_10_gdp*]; *Employment by A*10 industry breakdowns* [*nama_10_a10_e*]; *y Purchasing power parities* (*PPPs*), *price level indices and real expenditures for ESA 2010 aggregates* [*prc_ppp_ind*]. https://ec.europa.eu/eurostat/data/database.

⁶⁸ Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. For further details, see: Eurostat. *Employment by sex, age and* citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan]. https://ec.europa.eu/eurostat/data/database.

⁶⁹ It should be noted that among the headline targets of the EU 2020 strategy, 75% of men and women aged 20-64 should be in employment. In 2019, this employment rate for Spain was 74% for men and 62% for women, below the target. For further details, see: European Commission. *Europe 2020: A European strategy for smart, sustainable and inclusive growth*. Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf; and INE. *Tasas de empleo según niveles de educación. Brecha de género.* https://www.ine.es/ss/Satellite?L=es_ES&c=INESeccion_C&cid=12599 25461647&p=1254735110672&pagename=ProductosYServicios/PY SLayout¶m1=PYSDetalle¶m3=1259924822888.

⁷⁰ Total R&D expenditure includes expenditure by the General Government, higher education, the business sector and non-profit institutions. In the case of Spain, R&D expenditure by General Government and higher education represents 0.5% of GDP for the period 2015-19, i.e. about 45% of the country's total R&D expenditure. For further details, see: *Eurostat. Intramural R&D expenditure (GERD)* by sectors of performance [rd_e_gerdtot]. https://ec.europa.eu/eurostat/data/database.

⁷¹ he 2020 European Strategy sets an R&D investment target of 3% of GDP. For further details, see: *European Commission. Europe 2020: A European strategy for smart, sustainable and inclusive growth.* Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROS0%20%20%20%2007%20-%20 Europe%202020%20-%20EN%20version.pdf.

⁷² Data available is from 2018. For further details, see: Eurostat. *Persons employed in the non-financial business economy by size class of employment [tin00148]*. https://ec.europa.eu/eurostat/data/database.

⁷³ The available data is the average from 2015 to 2017. For further details, see: Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" *IMF Working Papers*, no. 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last-20-Years-45583.

⁷⁴ Data available is from 2018. For further details, see: Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad*. Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/dossier_ pisa2018_espanadatos.pdf; and OECD. *PISA 2018*. https://www.oecd. org/pisa/.

⁷⁵ The early school drop out rate is defined as the percentage of the population between 18 and 24 years of age whose highest educational level is secondary education or lower, and who are not currently in formal education. Data available is from 2019. For further details, see: Eurostat. *Early leavers from education and training by sex and labour status [edat_lfse_14]*. https://ec.europa.eu/eurostat/data/database.

⁷⁶ The European Strategy set a target of 10% for 2020. For further details, see: European Commission. *Europe 2020: A European strategy for smart, sustainable and inclusive growth*. Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20 EN%20BARROSO%20%20%20007%20-%20Europe%202020%20 -%20EN%20version.pdf.

⁷⁷ The population aged 25-34 with a qualification higher than secondary education is defined as the percentage of people in this age range whose highest level of education is the second stage of secondary education (*Bachillerato* or Intermediate Level Vocational Training) or tertiary education (University or Higher Level Vocational Training). Data available is from 2019. For further details, see: Eurostat. *Population by educational attainment level, sex and age* (%) - *main indicators [edat_ lfse_03]*. https://ec.europa.eu/eurostat/data/database.

⁷⁸ The *odds ratio*, i.e. at equal mathematics and science proficiency, how many times higher is the probability of repeating an academic year for a student from a more disadvantaged background compared to a student with more resources. For example, a value of 4 means that, with equivalent skills in mathematics and science, a student with fewer resources (25% of students with fewer resources) is four times more likely to have repeated an academic year than a student from a more favourable background (25% of students with more resources). Data available is from 2018. For further details, see: Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad*. Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/dossier_pisa2018_espanadatos.pdf; and OECD. *PISA 2018*. https://www.oecd.org/pisa/.

⁷⁹ The percentage of low-achieving 15-year-olds in PISA is defined as the percentage of students below level 2 (below 406 points). The figure corresponds to the average of 2015 and 2018. For further details, see: Department of Education and Vocational Training. *PISA* 2018 Resultados de lectura en España. Madrid, 2020. https://www. educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/pisa-2018/pisa-2018-informes-es.html; and OECD. *PISA 2018 Results* (Volume I): What Students Know and Can Do. Tables I.B1.7, I.B1.8, and I.B1.9. https://doi.org/10.1787/5f07c754-en.

⁸⁰ The percentage of high-achieving 15-year-olds in PISA is defined as the percentage of students at level 5 or above (over 625 points). The figure corresponds to the average of 2015 and 2018. For further details, see: Ministry of Education and Vocational Training . *PISA 2018 Resultados de lectura en España*. Madrid, 2020. https://www. educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/pisa-2018/pisa-2018-informes-es.html; and OECD. *PISA* 2018 Results (*Volume I*): What Students Know and Can Do. Tables I.B1.7, I.B1.8, and I.B1.9. https://doi.org/10.1787/5f07c754-en.

⁸¹ Public expenditure on education includes both expenditure on preprimary, primary and secondary education and expenditure on postcompulsory education (*Bachillerato*, vocational training and university). In 2018 (latest year available), pre-primary, primary and secondary education accounted for around 60% of total public spending on education in our country. The latest data available for Spain is from 2018. For further details, see: Department of Education and Vocational Training. *Gasto Público en educación en relación al P.I.B. por cobertura económica, tipo de administración y periodo*. http://www.educacionyfp. gob.es/servicios-al-ciudadano/estadisticas/economicas/gasto.html; y UNESCO Institute for Statistics. *Government expenditure on education as a percentage of GDP (%)*. http://data.uis.unesco.org/#.

⁸² Public expenditure on education of 5.5% of GDP is the result of increasing expenditure per student to current Danish levels and assuming a GDP evolution in line with the EU-8 convergence objective [see chapter 1]. The difference compared to the EU-8, which currently spends 6.1% of its GDP on education, is that the reduction in the number of students will be very sharp in the coming decades, allowing us to increase funding per student significantly without such a sharp increase as a percentage of GDP.

⁸³ The STEM series is constructed from the data on *Natural sciences*, mathematics and statistics, Information and Communication Technologies, y Engineering, manufacturing and construction. The observed figure is the average from 2015 to 2018. For further details, see: Eurostat. Students enrolled in tertiary education by education level, programme orientation, sex and field of education [educ_uoe_enrt03]. https://ec.europa.eu/eurostat/data/database.

⁸⁴ The observed figure is the average from 2015 to 2018. For further details, see: Eurostat. *Individuals who have basic or above basic overall digital skills by sex [TEPSR_SP410]*. https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I/default/table?lang=en.

⁸⁵ 2025 target of the European Skills Agenda. For further details, see: European Commission. "European Skills Agenda." European Commission, https://ec.europa.eu/social/main. jsp?catId=1223&langId=en.

⁸⁶ Data Observed is from 2016. For further details, see: Eurostat. *Number of foreign languages known (self-reported) by sex [edat_aes_ l21].* https://ec.europa.eu/eurostat/data/database.

⁸⁷ Guided on-the-job training is excluded. The observed figure is from 2016. For further details, see: CIRCABC. *Participation in education and training (excluding guided on-the-job training)*. https://circabc.europa.eu/ui/group/d14c857a-601d-438a-b878-4b4cebd0e10f/library/ac6f3889-ab25-4f75-9c7a-de997f65e2db?p=1&n=10&sort=modified_DESC%E2%80%A6.

⁸⁸ Objetivo para 2025 de la *European Skills Agenda*. For further details, see: European Commission. "European Skills Agenda." European Commission, https://ec.europa.eu/social/main. jsp?catId=1223&langId=en.

⁸⁹ The observed figure is from 2016. For further details, see: Eurostat. *Participation rate in education and training by labour status [trng_aes_103].* https://ec.europa.eu/eurostat/data/database.

⁹⁰ Spending on active training policies includes the spending aimed at both the employed and unemployed population. The observed figure is the average from 2015 to 2018. For further details, see: OECD. *Public expenditure as a percentage of GDP. 20: Training.* https://stats.oecd.org/.

⁹¹ For further details, see: FUNDAE. *Formación en las empresas. Informe anual 2016.* Madrid, 2017. https://www.fundae.es/docs/default-source/publicaciones-y-evaluaciones/publicaciones-estad%C3%ADstica/formaci%C3%B3n-en-las-empresas-2016.pdf; y FUNDAE. *Formación para el empleo: Balance de la situación 2019.* Madrid, 2019. https://www.fundae.es/docs/default-source/publicaciones-y-evaluaciones/publicaciones-estad%C3%ADstica/balance-de-situación-2019.pdf.

⁹²Direct greenhouse gases estimated in the inventory are: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF₆). For further details, see: Department for Ecological Transition and Demographic Challenge *Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2018*. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/

Inventario-GEI.aspx.

⁹³ Target of 23% reduction from the 1990 level according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge *Plan Nacional Integrado de Energía y Clima 2021-2030*. Madrid, 2020. https://www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410. pdf.

⁹⁴ Target of 90% reduction from the 1990 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge. *Long Term Decarbonisation Strategy*. Madrid, 2020. https://www.miteco. gob.es/es/prensa/documentoelp_tcm30-516109.pdf.

⁹⁵ Total annual demand for consumptive uses (water, once used, is not returned to the environment where it was abstracted or is not returned in the same way as it was abstracted): supply, agricultural use, industrial use and other consumptive uses. The observed figure is from 2013/2014. See: Department for Ecological Transition and Demographic Challenge *Informe de seguimiento de Planes Hidrológicos y Recursos Hídricos en España. Año 2018.* Madrid, 2019. https://www. miteco.gob.es/es/agua/temas/planificacion-hidrologica/memoria_ infoseg_2018_tcm30-482594.pdf.

⁹⁶ To compensate for the reduction in average water resources availabilities estimated by CEDEX, an average reduction in water demand of 5% by 2030 would be necessary, and of and 15% by 2050.. This would result in a decrease in demand of 1,000 hm³ for each planning cycle (6 years). See: Centro de Estudios y Experimentación de Obras Públicas. *Evaluación del impacto del cambio climático en los recursos hídricos y sequías en España*. Madrid: Centro de Estudios Hidrográficos, 2017. http://www.cedex.es/NR/rdonlyres/3B08CCC1-C252-4AC0-BAF7-1BC27266534B/145732/2017_07_424150001_ Evaluaci%C3%B3n_cambio_clim%C3%A1tico_recu.pdf.

⁹⁷ LPrimary energy intensity is defined as the ratio between the energy consumption and the gross domestic product (equivalent kilogram oil / thousands of euros). See: Eurostat. *Energy intensity [nrg_ind_ei]. Energy intensity of GDP in chain linked volumes (2010).* https://ec.europa.eu/eurostat/data/database.

⁹⁸ This figure corresponds to the year 2015 as reported in the ELP. For further details, see: Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/ documentoelp_tcm30-516109.pdf.

⁹⁹ Target of 37% reduction from the 2015 level according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge *Plan Nacional Integrado de Energía y Clima 2021-2030*. Madrid, *2020*. https://www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410. pdf.

¹⁰⁰ Target of 63% reduction from the 2015 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge. *Long Term Decarbonisation Strategy*. Madrid, 2020. https://www.miteco. gob.es/es/prensa/documentoelp_tcm30-516109.pdf.

¹⁰¹ This percentage is calculated in accordance with the rules set out in Directive 2009/28/EC. See: Eurostat. *Share of energy from renewable sources* [*NRG_IND_REN*]. *Renewable energy sources in electricity.* https://ec.europa.eu/eurostat/data/database.

¹⁰² Target for 2030 according to the PNIEC. See: Department for

Ecological Transition and Demographic Challenge *Plan Nacional Integrado de Energía y Clima 2021-2030*. Madrid, *2020*. https://www. miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf.

¹⁰³ Target for 2050 according to the ELP. See: Department for Ecological Transition and Demographic Challenge *Long Term Decarbonisation Strategy*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/ documentoelp_tcm30-516109.pdf.

¹⁰⁴ Environmental tax revenues include taxes on energy, transport, pollution and resource use. See: Eurostat. *Environmental Tax Revenues [env_ac_tax]*. *Percentage of gross domestic product (GDP)*. https:// ec.europa.eu/eurostat/data/database.

¹⁰⁵ This level of environmental revenue collection was achieved by countries such as Denmark between 1996 and 2007. See: Eurostat. *Environmental Tax Revenues [env_ac_tax]. Percentage of gross domestic product (GDP).* https://ec.europa.eu/eurostat/data/database.

¹⁰⁶ It is defined as the proportion of the total utilised agricultural area occupied by organic farming (includes existing organically farmed areas and areas under conversion). The observed figure is from 2019. See: Eurostat. Area under organic farming [SDG_02_40]. Percentage of total utilised agricultural area. Utilised agricultural area excluding kitchen gardens. Total fully converted and under conversion to organic farming. https://ec.europa.eu/eurostat/data/database.

¹⁰⁷ Target for 2030 according to the European Commission. See: European Commission. Farm to Fork Strategy: for a fair, healthy and environmentally-friendly food system. Brussels, 2020. https://ec.europa. eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_strategyinfo_en.pdf.

¹⁰⁸ The value corresponds to the sum of hectares resulting from protective afforestation, productive afforestation and afforestation of agricultural land. Annual average over the decade 2009-2018. On this question, see: Department for Ecological Transition and Demographic Challenge Anuario de Estadística Forestal. Resultados Estadísticos Principales de 2018. https://www.miteco.gob.es/es/biodiversidad/ estadísticas/aef_2018_resumen_tcm30-521680.pdf.

¹⁰⁹ The value corresponds to the sum of hectares resulting from protective afforestation, productive afforestation and afforestation of agricultural land. Annual average over the decade 2009-2018. On this question, see: Department for Ecological Transition and Demographic Challenge *Anuario de Estadística Forestal. Resultados Estadísticos Principales de 2018.* https://www.miteco.gob.es/es/biodiversidad/ estadísticas/aef_2018_resumen_tcm30-521680.pdf.

¹¹⁰ According to the ELP, the annual reforestation rate is set at 20,000 hectares per year. See: Department for Ecological Transition and Demographic Challenge *Long Term Decarbonisation Strategy 2050. Anexos.* Madrid, 2020. https://www.miteco.gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf.

¹¹¹ The activity rate is defined as the ratio between the active population in each of the represented age cohorts and the population in that age group. The observed figure is from 2019. For further details, see: OECD. *LFS by sex and age – indicators*. https://stats.oecd.org/.

¹¹² The health expenditure reported here does not include long-term care services The observed figure is the average from 2015 to 2018. For further details, see: OECD. *Health expenditure and financing.*

Government/compulsory schemes. Long-term care (health) and long-term care (social). https://stats.oecd.org/Index.aspx?DataSetCode=SHA.

¹¹³ Public expenditure on long-term care includes health and social care components. The observed figure is the average from 2015 to 2018. For further details, see: OECD. *Health expenditure and financing. Government/compulsory schemes. Current expenditure on health (all functions) and long-term care (health).* https://stats.oecd.org/Index. aspx?DataSetCode=SHA.

¹¹⁴ The numerator includes the beneficiaries of the System for Autonomy and Care for Dependency (SAAD) who, although they have the right to a benefit, are not receiving it. The denominator includes all the beneficiaries of the Sistema para la Autonomía y Atención a la Dependencia who have been recognised as entitled to a benefit. The data observed is the situation as of December 2020. For further details, see: Instituto de Mayores y Servicios Sociales. *Estadísticas. Sistema para la Autonomía y Atención a la Dependencia. Histórico. Informes publicados.*https://www.imserso.es/imserso_01/documentacion/ estadisticas/info_d/estadisticas/est_inf/inf_gp/2020/index.htm.

¹¹⁵ Se define como el porcentaje de población que vive en hogares en los que el gasto en la vivienda representa al menos el 40% de la renta disponible total del hogar. Refer to: Eurostat. *European Union Statistics on Income and Living Conditions. Housing cost overburden rate by tenure status - EU-SILC survey [ilc_lvho07c].* https://ec.europa.eu/eurostat/ data/database.

¹¹⁶ Today, several European countries such as Ireland, Finland, Slovenia or Estonia have similar levels. Assuming a halving of the proportion of the population experiencing rent overburden, recent values of overburden in the case of home ownership and a progressive change in tenure status (greater importance of renting as opposed to owning), the aggregate overburden target of 4.5% of the population for 2050 is feasible.

¹¹⁷ The proportion of dwellings refurbished per year is estimated by dividing the number of building management permits for the refurbishment and/or restoration of dwellings (Building management permits of the Technical Architects' Associations. Building work in progress) (average 2015-2019), by the total number of dwellings from the estimated housing stock (average 2015-2019). See: Department of Transport, Mobility and Urban Agenda. *Estimated housing stock Total de viviendas por comunidades autónomas y provincias*. https:// apps.fomento.gob.es/BoletinOnline2/?nivel=2&orden=33000000; and Department of Transport, Mobility and Urban Agenda. *Building management permits Obra nueva, ampliación y/o reforma de viviendas*. *Número de viviendas a reformar y/o restaurar*. https://www.fomento.gob. es/BE/?nivel=2&orden=09000000.

¹¹⁸ The percentage of municipal waste sent to landfill has been calculated on the basis of the annual per capita kilograms of municipal waste sent to landfill and the annual per capita kilograms of municipal waste, see: Eurostat. *Municipal waste by waste management operations [ENV_WASMUN]*. *Disposal - landfill and other (D1-D7, D12), Kilograms per capita. Waste generated, kilograms per capita.* https://ec.europa.eu/ eurostat/data/database.

¹¹⁹ Target for 2035 according to the European Parliament and the Council of the European Union. See: European Parliament and the Council of the European Union. *Directiva (UE) 2018/850 del Parlamento Europeo y del Consejo de 30 de mayo de 2018 por la que se modifica la Directiva*

1999/31/CE relativa al vertido de residuos. Brussels, 2018. https://eur-lex.europa.eu/legal-content/es/TXT/?uri=CELEX%3A32018L0850.

¹²⁰ Percentage of population exposed to an annual average concentration of particulate matter (PM2.5) above 10 micrograms per cubic metre (WHO recommended limit). The observed data corresponds to the year 2018. In this regard: European Environment Agency. "ECT/ATNI reports." European Topic Centre or Air Pollution, transport, noise and industrial pollution, https://www.eionet.europa.eu/etcs/etcatni/products/etc-atni-reports; and WHO. Air quality guidelines for particulate matters, ozone, nitrogen dioxide and sulphur dioxide. Global update 2005. Geneva: World Health Organisation, 2005. http://www. who.int/phe/health_topics/outdoorair/outdoorair_aqg/en/index.html.

¹²¹ The goals for years 2030-2050 are in line with the analysesl *included in the European Union's* Second Clean Air Outlook presented in 2021. See: European Commission. *Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The Second Clean Air Outlook.* Brussels: European Commission, 2021. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A3%3AFIN.

¹²² We establish this indicator to monitor fuel poverty although it is necessary to analyse the joint evolution of the four indicators established by the European Observatory on Fuel Poverty: 1) percentage of the population unable to maintain an adequate temperature at home; 2) percentage of the population in arrears with bill payments; 3) percentage of households whose energy expenditure is excessively low (hidden fuel poverty) and 4) percentage of households whose expenditure on energy supplies is disproportionate to the level of: Eurostat. *Inability to keep home adequately warm - EU-SILC survey [ILC_MDES01]*. Https:// ec.europa.eu/eurostat/data/database;; and Department for Ecological Transition and Demographic Challenge Actualización de indicadores de *la Estrategia Nacional contra la Pobreza Energética*. 2020. https://www. miteco.gob.es/es/prensa/20201106_actualizaciondeindicadores2020_ final__tcm30-516466.pdf.

¹²³ In line with the National Fuel Poverty Strategy, which aims to reduce to at least 6% the percentage of the population unable to keep their homes at an adequate temperature for 2025. For further details, see: Department for Ecological Transition and Demographic Challenge. *National Fuel Poverty Strategy 2019-2024*. Madrid, 2019. https://www. miteco.gob.es/es/prensa/estrategianacionalcontralapobrezaenergeti ca2019-2024_tcm30-496282.pdf.

¹²⁴ In line with the European Committee of the Regions proposal. For further details, see: Comité Europeo de las Regiones. *Dictamen: Gobernanza multinivel y cooperación intersectorial para combatir la pobreza energética*. Brussels, 2019. https://cor.europa.eu/ES/our-work/ Pages/OpinionTimeline.aspx?opId=CDR-5877-2018.

¹²⁵ The unemployment rate is defined as the ratio of total unemployed persons to the active population. For further details, see: Eurostat. Active population by sex, age and citizenship (1 000) [lfsa_agan]; y Unemployment by sex, age and citizenship (1 000) [lfsa_ugan]. https:// ec.europa.eu/eurostat/data/database.

¹²⁶ The female employment rate is defined as the ratio of total employed women to the population of women aged 16-64 For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y* *Population on 1 January by age and sex [demo_pjan].* https://ec.europa.eu/eurostat/data/database.

¹²⁷ The youth unemployment rate is defined as the ratio of unemployed persons aged 18-24 to active persons in the same age range. For further details, see: Eurostat. *Active population by sex, age and citizenship (1 000) [lfsa_agan]; and Unemployment by sex and age – annual data [une_rt_a].* https://ec.europa.eu/eurostat/data/database.

¹²⁸ The employment rate of those people aged 55-64 is defined as the ratio of employed persons to the population in that age range. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan].* https://ec.europa.eu/eurostat/data/database.

¹²⁹ The temporariness rate is defined as the ratio of employees with a temporary contract to the total number of employees aged 15-74. For further details, see: Eurostat. *Temporary employees by sex, age and educational attainment level (1 000) [lfsa_etgaed]; y Employees by sex, age and educational attainment level (1 000) [lfsa_eegaed].* https://ec.europa.eu/eurostat/data/database.

¹³⁰ The involuntary part-time rate is defined as the ratio of the total number of involuntary part-time workers (15-74 years) to the total number of employees. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; Full-time and parttime employment by sex, age and educational attainment level (1 000) [lfsa_epgaed]; e Involuntary part-time employment as percentage of the total part-time employment, by sex and age (%) [lfsa_eppgai].* https:// ec.europa.eu/eurostat/data/database.

¹³¹ Eurostat. Average number of usual weekly hours of work in main job, by sex, professional status, full-time/part-time and occupation (hours) [lfsa_ewhuis]. https://ec.europa.eu/eurostat/data/database.

¹³² The observed figure is the average from 2015 to 2018 For further details, see: Eurostat. *Gender pay gap in unadjusted form [sdg_05_20]*. https://ec.europa.eu/eurostat/data/database.

¹³³ The proportion of people satisfied with their job is defined as the percentage of people who rate their job satisfaction as medium or high. The observed figure is from 2018. For further details, see: Eurostat. *Percentage of the population rating their satisfaction as high, medium or low by domain, sex, age and educational attainment level [ilc_pw05].* https://ec.europa.eu/eurostat/data/database.

¹³⁴ The Gini Coefficient is a measure of inequality represented by a number between 1 and 100, where 1 corresponds to perfect equality (everyone has the same income) and the value 100 corresponds to perfect inequality (one person has all the income and the others, none). Therefore, the higher the coefficient, the greater the inequality. For further details, see: Eurostat. *Gini coefficient of equivalised disposable income* [*ilc_di12*]. https://ec.europa.eu/eurostat/data/database.

¹³⁵ Estimation based on the model of Rao *et al* consistent with the projections of growth, productivity improvement and education indicators proposed in chapters 1 and 2 of this Strategy. See: Rao, Narasimha D., Petra Sauer, Matthew Gidden, and Keywan Riahi. "Income inequality projections for the Shared Socioeconomic Pathways (SSPs)." *Futures* 105, 2018. https://doi.org/10.1016/j.futures.2018.07.001.

¹³⁶ The poverty risk is calculated using the cut-off point of 60% of the median equivalent income after social transfers. For further details, see: Eurostat. *At-risk-of-poverty rate by poverty threshold [ilc_li02]*. https://ec.europa.eu/eurostat/data/database.

¹³⁷ Tax revenue is the total revenue from taxes and compulsory social security contributions. For further details, see: Eurostat. *Main national accounts tax aggregates [gov_10a_taxag]*: Total receipts from taxes and compulsory social contributions after deduction of amounts assessed but unlikely to be collected. https://ec.europa.eu/eurostat/data/database.

¹³⁸ Social protection expenditure includes, among other items, public spending on pensions, unemployment benefits, active employment policies (including training and guidance policies) and other social assistance. The observed figure is the average from 2015 to 2018. For further details, see: European Commission. *Manual on sources and methods for the compilation of COFOG statistics*. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/ eurostat/documents/3859598/10142242/KS-GQ-19-010-EN-N.pdf/ ed64a194-81db-112b-074b-b7a9eb946c32?t=1569418084000; and Eurostat. *Total government expenditure on social protection [gov_10a_ exp]*. https://ec.europa.eu/eurostat/data/database.

¹³⁹ The observed figure is the average between 2015 and 2019 of the percentage of people who said they were r "*Very Satisfied*" and "*Fairly satisfied*" to the question "On the whole are you very satisfied, fairly satisfied, not satisfied or not at all satisfied with the life you lead?" For further details, see: European Commission. *Eurobarometer surveys for each year*. https://ec.europa.eu/COMMFrontOffice/publicopinion/index. cfm/Chart/getChart/themeKy/1/groupKy/1.

CHALLENGE 1: BEING MORE PRODUCTIVE TO GROW BETTER

¹Per capita income is expressed as the ratio of GDP (in constant 2015 euros and in Purchasing Power Parity, PPP) to total population. PPP makes it possible to compare income levels between countries, taking into account differences in the cost of living. For further details, see: AMECO. Gross domestic product at 2015 reference levels per head of population [RVGDP]. https://ec.europa.eu/economy_finance/ameco/ user/serie/SelectSerie.cfm; Eurostat. GDP and main components (output, expenditure and income) [nama_10_gdp]; Population on 1 January by age and sex [demo_pjan]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/database; and OCDE. "Purchasing power parities." OECD, https://data.oecd.org/conversion/ purchasing-power-parities-ppp.htm.

² The 1977-78 tax laws laid the foundations for a progressive tax system, with the creation of personal income tax and corporate income tax; they made it possible to increase public revenue over GDP by over 10 percentage points in just a decade (this ratio was below 30% in 1978, while in 1988 it was around 40%), and concrete measures to control tax fraud wereintroduced for the first time. The higher revenues allowed for an increase in social spending, which translated into substantial progress in the coverage of essential public services such as education and health, unemployment protection and pensions. Moreover, the reform of the financial system undertaken in these years involved the introduction of greater competition within the sector, the progressive liberalisation of interest rates, the strengthening of the role of the Banco de España as the central bank controlling liquidity and the cost of money, and the establishment of a rigorous monetary policy that was truly effective as a stabilising economic policy. For further details, see: Official State Gazette. Ley 50/1977, de 14 de noviembre, sobre medidas urgentes de reforma fiscal. Madrid, 1977. https://www. boe.es/boe/dias/1977/11/16/pdfs/A24945-24951.pdf; Official State Gazette. Ley 44/1978, de 8 de septiembre, del Impuesto sobre la Renta de las Personas Físicas. Madrid, 1978. https://www.boe.es/boe/ dias/1978/09/11/pdfs/A21191-21199.pdf;Official State Gazette. Ley 61/1978, de 27 de diciembre, del Impuesto sobre Sociedades. Madrid, 1978. https://www.boe.es/boe/dias/1978/12/30/pdfs/A29429-29437. pdf; Cabrera, Mercedes. "Los Pactos de la Moncloa: acuerdos políticos frente a la crisis." Historia y Política: Ideas, procesos y movimientos sociales, n.º 26, 2011. https://recyt.fecyt.es/index.php/Hyp/article/ view/41325; Comín, Francisco. "La fiscalidad del Estado del Bienestar frente a la fiscalidad del Franquismo (1940-2016)." 2017. https://www. aehe.es/wp-content/uploads/2016/01/201709_Francisco-Comin.pdf; and Malo de Molina, José Luis. "Una visión macroeconómica de los veinticinco años de la vigencia de la Constitución española." Banco de España, Documentos Ocasionales, n.º 307, 2003. https://www.bde. es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/ DocumentosOcasionales/03/Fic/do0307.pdf.

³ Malo de Molina, José Luis. "Una visión macroeconómica de los veinticinco años de la vigencia de la Constitución española." *Banco de España, Documentos Ocasionales*, n.º 307, 2003. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/ DocumentosOcasionales/03/Fic/do0307.pdf. ⁴ Beyond the economic and social effects of Spain's integration into the EU, it is worth highlighting the considerable volume of transfers, both current and capital, received in the framework of the receipt of structural and cohesion funds (e.g. ERDF, CAP). For example, in 2000, Spain's net financial balance with the EU was positive by 0.8% of GDP, a similar percentage to that of the early 1990s (the balance was 0.9% in the period 1992-1994) and somewhat lower than in the middle years of that decade, when it was close to 1.5% (1995-97). For further details, see: Jordán Galduf, Josep María. "Balance de la integración de España en la Unión Europea." *ICE*, n.º 811, 2003. http://www.revistasice.com/ index.php/ICE/article/view/573/573; and Requeijo González, Jaime. "La internacionalización de la economía española." *ICE*, n.º 811, 2003. http://www.revistasice.com/index.php/ICE/article/view/572/572.

⁵ For example, non-tourist services now account for 19% of total Spanish exports. For further details, see: Álvarez López, María Elisa, and Josefa Vega Crespo. "La fortaleza competitiva de la economía española." *Estudios de economía aplicada* 35, nº 1, 2017. https:// dialnet.unirioja.es/servlet/articulo?codigo=5798826; INE. *Contabilidad nacional trimestral de España: principales agregados (CNTR). Resultados. GDP at market prices.* https://www.ine.es/dyngs/INEbase/ es/operacion.htm?c=Estadistica_C&cid=1254736177057&menu=re sultados&idp=1254735576581; and Department of Economic Affairs and Digital Transformation. Macroeconomic indicators and reports. *50 Comercio Exterior. Total y por Grupos de Utilización (GU).* http:// serviciosede.mineco.gob.es/indeco/BDSICE/Busquedas/busquedas_ new.aspx.

⁶ As far as exports of goods are concerned, although the EU continues to be Spain's main trading partner (accounting for 60% of total sales), in the last two decades there has been an increase in the participation of non-European markets such as Asia, Africa and the USA. UU. In terms of tourism services, the origin of foreign tourists has also diversified over the last twenty years. The main source markets (Germany, the UK and France) accounted for 62% of the total in 2001, while in 2019 their share had fallen to 48%. This has been the result of stronger growth in other countries such as the USA or Russia. For further details, see: INE. Estadística de movimientos turísticos en frontera. Frontur. https://www.ine.es/dyngs/INEbase/es/operacion. htm?c=Estadistica C&cid=1254736176996&menu=ultiDatos&i dp=1254735576863; and Department of Economic Affairs and Digital Transformation. Macroeconomic indicators and reports. 50 Comercio Exterior. Total y por Grupos de Utilización (GU); y 53 Comercio Exterior: Exportaciones por Países. http://serviciosede.mineco.gob.es/indeco/ BDSICE/Busquedas/busquedas_new.aspx; Department of Industry, Trade and Tourism. Estadísticas de demanda turística. Movimientos turísticos en frontera (Frontur). http://estadisticas.tourspain.es/es-ES/ turismobase/Paginas/default.aspx; Myro, Rafael. "La diversificación de los mercados de exportación de las empresas españolas." Comité de Reflexión sobre Internacionalización, Nota técnica 8, 2020. https:// clubexportadores.org/wp-content/uploads/pdf/documentos/notascomite-reflexion/nt_diversificacion_mercados_may20.pdf; OCDE. OECD Economic Surveys: Spain 2018. Paris: OECD Publishing. 2019. https://doi.org/10.1787/eco surveys-esp-2018-en; Gutiérrez Chacón,

Eduardo, and César Martín Machuca. "Exporting Spanish Firms. Stylized facts and trends." *Banco de España, Documentos Ocasionales*, n.º 1903, 2019. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/19/Files/do1903e.pdf. On the internationalisation of companies, see: Santiso Guimaras, Javier. "La internacionalización de las empresas españolas: hitos y retos." *ICE, La Internacionalización de la Empresa Española*, n.º 839, 2007. http:// www.revistasice.com/index.php/ICE/article/view/1100/1100.

⁷ Gutiérrez Chacón, Eduardo, and César Martín Machuca. "Exporting Spanish Firms. Stylized facts and trends." *Banco de España, Documentos Ocasionales*, nº. 1903, 2019. https://www.bde.es/f/ webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/ DocumentosOcasionales/19/Files/do1903e.pdf.

⁸ Spain went from receiving foreign direct investment inflows of less than 1% of GDP per year in the late 1970s to inflows of more than 4% in some years of the 2000s. Thus, the volume (*stock*) of foreign direct investment from abroad represented 0.7% of the world total in 1980, while in 2019 it reached 2.1%, representing, between 2002 and 2011, more than 3% of the world total. For further details, see: UNCTADSTAT. *Foreign direct investment: Inward and outward flows and stock, annual.* https://unctadstat.unctad.org/wds/ReportFolders/ reportFolders.aspx?sCS_ChosenLang=en.

^o The trade openness rate is defined as the ratio between the volume of exports and imports of a country and its level of production (GDP). It measures a country's degree of external openness, i.e. how much it trades with the rest of the world. For further details, see: AMECO. *Imports of goods and services at current prices (National accounts)* [UMGS]; Gross domestic product at current prices [UVGD]; y Exports of goods and services at current prices (National accounts) [UXGS]. https:// ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm.

¹⁰ Santiso Guimaras, Javier. "La internacionalización de las empresas españolas: hitos y retos." *ICE, La Internacionalización de la Empresa Española*, n.º 839, 2007. http://www.revistasice.com/index.php/ICE/ article/view/1100/1100.

¹¹ UNCTADSTAT. Foreign direct investment: Inward and outward flows and stock, annual. https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en.

¹² Spain is, together with France and the USA, depending on the year of reference, among the top three countries in the world in terms of the number of foreign tourists per year. For further details, refer to: UNWTO. *Total international arrivals*. https://www.unwto.org/statistic/ basic-tourism-statistics.

¹³World Economic Forum *The Travel & Tourism Competitiveness Report* 2019: Travel and Tourism at a Tipping Point. Geneva, 2019 http:// www3.weforum.org/docs/WEF_TTCR_2019.pdf.

¹⁴ Engineering News-Record. "ENR's 2019 Top 250 International Contractors." Engineering News-Record, https://www.enr.com/ toplists/2019-Top-250-International-Contractors-1.

¹⁵ Spain is the second largest car producing country in the EU after Germany. See: International Organization of Motor Vehicle Manufacturers. "2019 Production Statistics." International Organization of Motor Vehicle Manufacturers, https://www.oica.net/category/ production-statistics/2019-statistics/. ¹⁶ Ali, Zarmina. "The world's 100 largest banks, 2020." S&P Global Market Intelligence, https://www.spglobal.com/marketintelligence/ en/news-insights/latest-news-headlines/the-world-s-100-largestbanks-2020-57854079..

¹⁷ International Renewable Energy Agency. *Electricity capacity (MW) Total Renewable Energy*. https://www.irena.org/Statistics/View-Databy-Topic/Capacity-and-Generation/Statistics-Time-Series.

¹⁸ The agri-food sector, which includes agriculture, livestock, forestry and fishing, food, beverages and tobacco, is one of the most representative sectors of the Spanish economy, both for its contribution to GDP and employment (around 6% in both cases) and, above all, for its international projection (exports from the sector account for 16% of our total exports of goods and 3.4% of the world total). For further details, see: García Grande, M. Josefa, and José María López Morales. "Contribución de la agroalimentación española al comercio mundial: evolución y factores explicativos." *Revista Española de Estudios Agrosociales y Pesqueros*, nº 243. 2016. https://www. mapa.gob.es/ministerio/pags/Biblioteca/Revistas/pdf_REEAP%2FPdf_ REEAP_r243_15_44.pdf.

¹⁹ World Integrated Trade Solution. *Textiles and Clothing Exports by country in US\$ Thousand 2018*. https://wits.worldbank.org/ CountryProfile/en/Country/WLD/Year/LTST/TradeFlow/Export/Partner/ by-country/Product/50-63_TextCloth#.

²⁰ For further details, see: AMECO. *Employment, persons: agriculture, forestry and fishery products (National accounts) [NET1]; Employment, persons: industry excluding building and construction (National accounts) (NET2); Employment, persons: building and construction (National accounts) (NET4); and Employment, persons: services (National accounts) (NET5).* https://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm.

²¹ UNWTO. *Inbound tourism: arrivals. Total arrivals.* https://www.unwto. org/statistic/basic-tourism-statistics.

²² The average number of years of schooling increased from 5.5 in 1980 to 10 in 2020. For further details, refer to: De la Fuente, Ángel, and Rafael Doménech. "El nivel educativo de la población en España y sus regiones: 1960-2011." *Investigaciones Regionales – Journal of Regional Research* 34, 2016. https://old.aecr.org/images/ ImatgesArticles/2016/5/04_DELAFUENTE.pdf; and United Nations Development Programme. *Mean years of schooling (years)*. http://hdr. undp.org/en/data.

²³ The 1980 figure is from De la Fuente and Domenech, while the 2019 figure is from Eurostat. For further details, see: De la Fuente, Ángel, and Rafael Doménech. "El nivel educativo de la población en España y sus regiones: 1960-2011." *Investigaciones Regionales – Journal of Regional Research* 34, 2016. https://old. aecr.org/images/ImatgesArticles/2016/5/04_DELAFUENTE.pdf; and Eurostat. *Population by educational attainment level, sex and age (%) [edat_lfs_9903].* https://ec.europa.eu/eurostat/data/database.

²⁴ Data from the Programa para la Evaluación Internacional de las Competencias de la población Adulta (PIAAC, *Programme for the International Assessment of Adult Competencies*) show that Spain is, together with South Korea and Finland, the OECD country where the differences in reading comprehension and mathematics between the young population (16-24 years) and the older population (55-65 years) are most significant. This suggests the importance of the gains in basic skills registered by the Spanish population in recent decades. For further details, see: OCDE. *The OECD Skills Outlook 2013. First results from the Survey of Adults Skills. Figure 3.2 (L).* Paris: OECD Publishing, 2015. https://www.oecd.org/skills/piaac/Skills%20volume%201%20(eng)--full%20v12--eBook%20(04%2011%202013).pdf.

²⁵ In 1980, only 50% of the Spanish active population was employed; whereas in 2019, the employment rate was 65%. See: Eurostat. *Employment by sex, age and citizenship* (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan]. https://ec.europa.eu/ eurostat/data/database; and OCDE. *Historical population and Annual Labour Force Statistics summary tables*. https://stats.oecd.org/.

²⁶ The United Nations Gender Inequality Index has halved between 1995 and 2018, ranking Spain in a more favourable position than the EU-27. On the other hand, the percentage of women in Parliament has risen from 30% of the total in 2003 to over 40% in 2019, a much higher proportion than in the EU-27. In addition, the gender pay gap has also fallen over the last decades from 20% in 2002 to 12% in 2018. For further details, see: Eurostat. *Gender pay gap in unadjusted form [sdg_05_20];* and *Seats held by women in national parliaments and governments (source: EIGE) [sdg_05_50].* Https://ec.europa.eu/ eurostat/data/database;; and United Nations. *Gender Inequality Index (GII).* http://hdr.undp.org/en/data.

²⁷ Foreign workers in Spain increased from 103,000 (1% of the total employed) in 1995 to 2,300,000 (12% of the total employed) in 2019. This increase accounted for 32% of all net employment created between 1995 and 2019. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]*. https://ec.europa.eu/eurostat/data/database.

²⁸ Eurostat. Average number of usual weekly hours of work in main job, by sex, professional status, full-time/part-time and occupation (hours) [lfsa_ewhuis]. https://ec.europa.eu/eurostat/data/database.

²⁹ Refer to: Banco de España. Indicadores estructurales de la economía española y de la UE. Madrid, 2020. https://www.bde.es/webbde/ es/estadis/infoest/si_1_4.pdf; and Serrano, Lorenzo, et al. (coords). Acumulación y productividad del capital en España y sus comunidades autónomas en el siglo XXI. Fundación BBVA, 2017. https://www. fbbva.es/wp-content/uploads/2017/05/dat/DE_2017_Ivie_Inf_ Stock_1964-2014.pdf.

³⁰ In 2018, Spain had 15,585 kilometres of dual carriageway or motorway, ranking fifth in the world. Moreover, it is the second country in the world with the most kilometres of high-speed trains after China. For further details, see: International Union of Railways. *High speed lines in the world*. 2020. https://uic.org/IMG/pdf/20200227_high_speed_ lines_in_the_world.pdf; and UNECE. *Total length of motorways*. https:// w3.unece.org/PXWeb/en.

³¹ According to the *Global Competitiveness Index 4.0* of 2019, Spain is the seventh world power in terms of supply and quality of transport infrastructures. For further details, see: World Economic Forum. *The Global Competitiveness Report 2019*. Geneva, 2019. http://www3. weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

³² COTEC. *El sistema español de innovación. Diagnostics and recommendations. Libro Blanco.* Madrid, 1998. http://personales.upv. es/igil/libro_blanco.pdf.

³³ Official State Gazette. Ley 13/1986, de 14 de abril, de Fomento y Coordinación General de la Investigación Científica y Técnica. Madrid, 1986. https://www.boe.es/boe/dias/1986/04/18/pdfs/A13767-13771.pdf.

³⁴ Buesa Blanco, Mikel. "Ciencia y tecnología en la España democrática: la formación de un Sistema Nacional de Innovación." *ICE*, n.º 811, 2003. http://www.revistasice.com/index.php/ICE/article/view/580/580.

³⁵Banco de España. Indicadores estructurales de la economía española y de la UE. Madrid, 2020. https://www.bde.es/webbde/es/estadis/ infoest/si_1_4.pdf.

³⁶ The number of companies in Spain was 1.8 million in 1986 and 2.5 million in 1998, while at the beginning of 2019 it reached 3.4 million. For further details, see: Carreras, Albert and Xavier Tafunell (coords). *Estadísticas históricas de España: siglos XIX-XX*. Fundación BBVA, 2005. https://www.fbbva.es/wp-content/uploads/2017/05/dat/ DE_2006_estadísticas_historicas.pdf; and INE. *Explotación estadística del directorio central de empresas. DIRCE.* https://www.ine.es/dyngs/ INEbase/es/operacion.htm?c=Estadística_C&cid=1254736160707& menu=ultiDatos&idp=1254735576550.

³⁷ García Delgado, José Luis. "Economía en democracia en España: Los rasgos distintivos de un cuarto de siglo." *ICE*, n.º 811, 2003. http://www. revistasice.com/index.php/ICE/article/view/569/569.

³⁸ In the mid-1980s, Spain had a business structure with an overwhelming predominance of SMEs (employing more than 92% of the employed population). Almost forty years later, SMEs still account for a high proportion of employment, but large enterprises now account for 31% of total employment. For further details, see: Carreras, Albert and Xavier Tafunell (coords). *Estadísticas históricas de España: siglos XIX-XX*. Fundación BBVA, 2005. https://www.fbbva.es/wp-content/ uploads/2017/05/dat/DE_2006_estadisticas_historicas.pdf; and Eurostat. *Persons employed in the non-financial business economy by size class of employment [tin00148]*. https://ec.europa.eu/eurostat/ data/database.

³⁹ Forbes. "Global 2000: The World's Largest Public Companies." Forbes, https://www.forbes.com/global2000/#6a5a01d4335d.

⁴⁰ Forbes. "The World's Most Valuable Brands." Forbes, https://www. forbes.com/the-worlds-most-valuable-brands/#4bd886c5119c.

⁴¹Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. For further details, see: Eurostat. *GDP and main components* (*output, expenditure and income*) [*nama_10_gdp*]; *Employment by A*10 industry breakdowns* [*nama_10_a10_e*]; *y Purchasing power parities* (*PPPs*), *price level indices and real expenditures for ESA 2010 aggregates* [*prc_ppp_ind*]. https://ec.europa.eu/eurostat/data/database; and OCDE. Level of GDP per capita and productivity. https://stats.oecd.org/.

⁴² Per capita income is expressed in euros at constant 2015 prices and adjusted for differences in purchasing power. The total employment rate is defined as the ratio of total employed persons to the population aged 16-64. Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. For further details, see: AMECO. *National consumer price index (All-items) [ZCPIN]*. https://ec.europa.eu/economy_finance/ ameco/user/serie/SelectSerie.cfm; Eurostat. *Employment by sex, age* and citizenship (1 000) [lfsa_egan]; Employment by A*10 industry breakdowns [nama_10_a10_e]; GDP and main components (output, expenditure and income) [nama_10_gdp]; Population by educational attainment level, sex and age (%) - main indicators [edat_lfse_03]; Population on 1 January by age and sex [demo_pjan]; Average number of usual weekly hours of work in main job, by sex, professional status, full-time/part-time and occupation (hours) [lfsa_ewhuis] y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/ database; and OCDE. Annual Labour Force Statistics summary tables; Historical population; y Level of GDP per capita and productivity. https:// stats.oecd.org/.

⁴³ For further details on the construction of the EU-8, see the*Apunte metodológico* número I.

⁴⁴GDP per capita is defined as the ratio of GDP (in constant 2015 dollars and adjusted for purchasing power differences) to total population. The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. The EU-28 is the aggregate indicator reported by the OECD. For further details, see: OCDE. *Level of GDP per capita and productivity*. https://stats.oecd.org/; and OCDE. "Purchasing power parities." OECD, https://data.oecd.org/conversion/purchasing-powerparities-ppp.htm.

⁴⁵ The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. The EU-28 is the aggregate indicator reported by the OECD. For further details, see: OCDE. *Level of GDP per capita and productivity*. https://stats.oecd.org/.

⁴⁶ Over the last decades, there has been a significant increase in investment in ICT tangible assets (information and communication technologies) and intangible assets (software, R&D and others). However, in the total capital stock of our country, investments related to technological development continue to have a relatively low weight. Thus, the stock of technological capital, calculated on the basis of the accumulation of R&D expenditure according to the permanent inventory methodology, as a percentage of GDP is currently 42% of the EU average in Spain. For further details, see: Banco de España. *Indicadores estructurales de la economía española y de la UE*. Madrid, 2020. https://www.bde.es/webbde/es/estadis/infoest/si_1_4.pdf; and Serrano, Lorenzo, *et al.* (coords). *Acumulación y productividad del capital en España y sus comunidades autónomas en el siglo XXI*. Fundación BBVA, 2017. https://www.fbbva.es/wp-content/uploads/2017/05/dat/ DE_2017_Ivie_Inf_Stock_1964-2014.pdf.

⁴⁷ See the Apunte metodológico number IV.

⁴⁸Labour productivity is defined as the ratio of GDP (in constant 2015 dollars and adjusted for purchasing power differences) to total hours worked. The EU-8 is constructed as the weighted average of the values of the individual countries, with total hours worked being the reference for the calculation of weights. The EU-28 is the aggregate indicator reported by the OECD. For further details, see: OCDE. *Level of GDP per capita and productivity*. https://stats.oecd.org/; and OCDE. "Purchasing power parities." OECD, https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm.

⁴⁹ The EU-8 is constructed as the weighted average of the values of the

individual countries, with total hours worked being the reference for the calculation of weights. The EU-28 is the aggregate indicator reported by the OECD. For further details, see: OCDE. *Level of GDP per capita and productivity*. https://stats.oecd.org/.

⁵⁰Lower labour productivity growth is a source of competitiveness loss for the country. This is reflected in the historical evolution of unit labour costs: an increase in wages that is not supported by productivity gains ends up translating into higher relative prices compared to competing countries and, therefore, a lower degree of external competitiveness. For further details, see: Eurostat. *Labour productivity and unit labour costs [nama_10_lp_ulc]*. https://ec.europa.eu/eurostat/data/database.

⁵¹Two simple exercises suggest that productive specialisation, biased towards construction and real estate services from the mid-1990s until 2007 and tourism services in recent years, has contributed to Spain's secular trend of low productivity, but that it has not been the only or the main explanatory factor. For the period 1995-2019, average productivity growth would have been only slightly higher than observed if Spain had maintained the 1995 production structure unchanged. Differences in growth would be minimal if, since 1995, Spain were to replicate the sectoral weights of the EU-8, although the level of productivity would have been somewhat higher. A similar conclusion is drawn by Cuadrado, Moral-Benito, and Solera. For the period 2000-16, Spain had lower productivity levels than the European benchmark countries in most activity sectors (only in 4 of the 23 sectors analysed is our productivity level higher), with the differences in the services sector being particularly significant. For further details, refer to: Andrés, Javier, et al. "Creación de empleo en España: ¿Cambio en el modelo productivo, reformar del mercado de trabajo, o ambos?" In La reforma del mercado de trabajo. Madrid: Funcas, Papeles de Economía Española, n.º 124, 2010. 28-46. https://www.funcas.es/wp-content/uploads/Migracion/ Articulos/FUNCAS_PEE/124art04.pdf; Cuadrado, Pilar, Enrique Moral-Benito, and Irune Solera. "A sectoral anatomy of the Spanish productivity puzzle." Banco de España, Documentos Ocasionales, n.º 2006, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Files/do2006e. pdf; and Eurostat. Employment by A*10 industry breakdowns [nama_10_ a10_e]; Gross value added and income by A*10 industry breakdowns [nama_10_a10]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https:// ec.europa.eu/eurostat/data/database.

⁵² Data in constant 2015 prices and adjusted for purchasing power differences. The graph does not include real estate services, whose labour productivity has been 442 euros per hour between 1995 and 2019. For further details, see: Eurostat. *Employment by A*10 industry breakdowns [nama_10_a10_e]; Gross value added and income by A*10 industry breakdowns [nama_10_a10]; and Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/database.*

⁵³ Data in constant 2015 prices and adjusted for purchasing power differences. The EU-8 is constructed as the simple average of the values of the individual countries. The graph does not include real estate services, whose (positive) productivity gap has been 9% between 1995 and 2019. For further details, see: Eurostat. *Employment by A*10 industry breakdowns [nama_10_a10_e]; Gross value added and income by A*10 industry breakdowns [nama_10_a10]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010*

aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/database.

⁵⁴ As Hanushek and Woessmann argue, good education leads to greater economic progress, and is one of the key determinants of a country's long-term economic growth: a 100-point improvement in the Programme for International Student Assessment (PISA) (a standard deviation) is associated with an average annual growth rate of GDP per capita for the countries included in PISA that is two percentage points higher from the 1960s to the present. For further details, see: Acemoglu, Daron, and James A. Robinson. Why Nations Fail. New York: Penguin Random House, 2012; Benhabib, Jess, and Mark M. Spiegel. "The Role of Human Capital in Economic Development Evidence from Aggregate Cross-Country Data." Journal of Monetary Economics 34, n.º 2, 1994. https://doi.org/10.1016/0304-3932(94)90047-7; Goldin, Claudia D. "Human Capital." In Claude Diebolt and Michael Haupert (eds.). Handbook of Cliometrics. Berlin: Springer-Verlag, 2016. 55-86; Hanushek, Eric A., and Ludger Woessmann. "The economics of international differences in educational achievement." Handbook of the Economics of Education 3, 2011. https://doi.org/10.1016/B978-0-444-53429-3.00002-8; Hanushek, Eric A., and Ludger Woessmann. "Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation." Journal of Economic Growth 17, 2012. https://link.springer.com/article/10.1007/s10887-012-9081-x; Lenihan, Helena, Helen McGuirk, and Kevin R Murphy. "Driving Innovation: Public Policy and Human Capital." Research Policy 48, n.º 9, 2019. https://doi.org/10.1016/j.respol.2019.04.015; Mankiw, N. Gregory, David Romer, and David N. Weil. "A Contribution to the Empirics of Economic Growth." The Quarterly Journal of Economics 107, n.º 2, 1992. https://doi.org/10.3386/w3541; Rossi, Federico. "Human Capital and Macroeconomic Development: A Review of the Evidence." The World Bank Research Observer 35, n.º 2, 2020. http://documents1.worldbank. org/curated/en/406251542645775821/pdf/WPS8650.pdf; Teixeira, Aurora, and Natércia Fortuna. "Human Capital, R&D, Trade, and Long-Run Productivity. Testing the Technological Absorption Hypothesis for the Portuguese Economy, 1960–2001." Research Policy 39, n.º 3, 2019. https://doi.org/10.1016/j.respol.2010.01.009; and Wößmann, Ludger. "Specifying Human Capital." Journal of Economic Surveys 17, n.º 3, 2003. https://doi.org/10.1111/1467-6419.00195.

⁵⁵ For further details, see: Aizer, Anna, and Joseph J. Doyle. "Juvenile Incarceration, Human Capital, and Future Crime: Evidence from Randomly Assigned Judges." *The Quarterly Journal of Economics* 130, n.° 2, 2015. https://doi.org/10.1093/qje/qjv003; Brain, Keeley. "Human Capital: How What You Know Shapes Your Life." *OECD Insights*, Paris: OECD Publishing, 2007. https://doi.org/10.1787/9789264029095-en; Sianesi, Barbara, and John Van Reenen. "The Returns to Education: Macroeconomics." *Journal of Economic Surveys* 17, n.° 2, 2003. https:// doi.org/10.1111/1467-6419.00192; and Yao, Yao, et al. "Human Capital and Energy Consumption: Evidence from OECD Countries." *Energy Economics* 84, 2019. https://doi.org/10.1016/j.eneco.2019.104534.

⁵⁶ OCDE. *Getting Skills Right: Spain*. Paris: OECD Publishing, 2018. https://doi.org/10.1787/9789264282346-en.

⁵⁷ Spain has a deficit in good business practices compared to neighbouring European countries. Good business practices include aspects of work organisation (teamwork, autonomy, task discretion, mentoring, job rotation, implementation of new learning practices) and management (employee involvement, incentive payments, training practices and flexible working hours). In Spain, 23% of workplaces are considered to have good organisational practices, while for the EU-8 this number rises to 34% (with figures from 2015). For further details, see: Eurostat. *Self-employment by sex, age and educational attainment level.* https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_esgaed&lang=en; and OCDE. "Distribution of High-Performance Work Practices across jobs in selected countries: Distribution of jobs by HPWP index score." *OCDE Employment Outlook 2016.* Paris: OECD Publishing, 2016. https://doi.org/10.1787/empl_outlook-2016-graph35-en.

⁵⁸ According to the *European Innovation Scoreboard*, between 2012 and 2019, Spain has improved its innovation capacity. It has done so both in absolute terms and relative to the EU average, mainly due to a better endowment of its human capital, the spread of broadband and more dynamic start-ups. In the *Innovation Output Indicator*, our country stands out for having increased the share of employment in fastgrowing firms in innovative sectors between 2013 and 2019. For further details, refer to: European Commission. "European Innovation Index scoreboard 2020." European Comission, https://ec.europa.eu/growth/ industry/policy/innovation/scoreboards_en; and Vértesy, Dániel, and Giacomo Damioli. "The innovation output indicator 2019." *JRC Technical Report*, n.º 119969, 2020. https://op.europa.eu/en/publication-detail/-/ publication/2c349428-8443-11ea-bf12-01aa75ed71a1.

⁵⁹ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Bloomberg. "Innovation Index." Bloomberg, https://www.bloomberg.com/news/articles/2020-01-18/germany-breaks-korea-s-six-year-streak-as-most-innovative-nation; European Comission. "European Innovation Index scoreboard 2020." European Comission, https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en; and Cornell University, INSEAD, and World Intellectual Property Organization. *Global Innovation Index 2019: Creating Healthy Lives-The Future of Medical Innovation*. Geneva, 2019.https://www.wipo.int/publications/es/details.jsp?id=4434.

⁶⁰ Spending on the production of intellectual property includes spending on R&D and *software*, among other components. If only R&D investment is taken into account, Spain's expenditure in 2019 was also below the target set by the European Commission for 2020 (1.3% of GDP compared to the 3% target). For further details, see: Eurostat. *Intramural R&D expenditure (GERD) by sectors of performance [rd_e_ gerdtot]*. https://ec.europa.eu/eurostat/data/database; and OCDE. Gross domestic product (GDP); andCapital formation by activity ISIC rev4. https://stats.oecd.org/.

⁶¹Spain made, on average per year, 33 patent applications per million inhabitants between 2006 and 2017. For the same period, this number amounted to 223 for the EU-8 and 113 for the EU-28. Although the gap remains wide, there has been significant progress in this field in recent years. In 2019, Spain made 1,887 patent applications, compared to 1,471 in 2014. For further details, see: European Patent Office. "Patent Index 2019." European Patent Office, https://www.epo.org/ about-us/annual-reports-statistics/statistics/2019.html; and Eurostat. *Patent applications to the European patent office (EPO) by priority year* [tsc00009]. https://ec.europa.eu/eurostat/data/database.

⁶² The EU-8 and EU-222 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD. This excludes Bulgaria, Croatia, Cyprus, Malta and Romania. For further details, see:

OCDE. Gross domestic product (GDP); and Capital formation by activity ISIC rev4. https://stats.oecd.org/.

⁶³ Flachenecker, Florian, *et al.* "High Growth Enterprises: demographics, finance & policy measures - Factsheet Spain. Annex 4.8 to the JRC technical report." *Comisión Europea JRC*, 2020. https://doi. org/10.2760/34219.

⁶⁴ The Atlas of Complexity is a project created in 2011 by Harvard and MIT, and is based on the idea that a country's economic success lies in its ability to produce an ever-widening range of goods (*diversification*) and, at the same time, increasingly complex products that few economies produce (*ubiquity*). Thus, the greater the economic complexity of a country, the higher its long-term income level can be and the lower its vulnerability to economic cycles. Refer to: Atlas of Economic Complexity. "Country & Product Complexity Rankings." Atlas of Economic Complexity, https://atlas.cid.harvard.edu/rankings.

^{e5} Data in euros, adjusted for purchasing power differences. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: European Commission. *Science, Research and Innovation Performance of the EU 2020: A fair, green and digital Europe*. Luxembourg: Publication Office of the European Union, 2020. https://ec.europa.eu/research/srip/interactive/; and Eurostat. *Intramural R&D expenditure (GERD) by sectors of performance [rd_e_ gerdtot]*. https://ec.europa.eu/eurostat/data/database.

⁶⁶ The ICT (information and communication technologies) services sector in Spain represents 3.6% of the total gross value added in 2019, compared to the EU-8 average of 5.2%. Refer to: Eurostat. *Gross value added and income by A*10 industry breakdowns [nama_10_a10]*. https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_a10&log_en.

⁶⁷ The three stages of risk capital financing are the following: 1) seed (the initial funding to test a new idea), 2) first stage (expenses associated with marketing and developing the product in its early stages) and 3) second stage (the company is already selling the product, but is not yet making a profit). The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD. This excludes Bulgaria, Croatia, Cyprus, Malta and Romania. For further details, see: OCDE. *Venture capital investments*. https://stats.oecd.org/.

⁶⁸ Haugh, David, *et al.* "Fostering innovative business investment in Spain." *OECD Economics Department Working Papers*, n.º 1387, Paris: OECD Publishing, 2017. https://doi.org/10.1787/f957c2cc-en.

⁶⁹ COTEC. "El gasto financiero lastró un año más en 2019 la ejecución del presupuesto estatal para I+D+i." COTEC. https://cotec.es/el-gasto-financiero-lastro-un-ano-mas-en-2019-la-ejecucion-del-presupuesto-estatal-para-idi/.

⁷⁰Ducal, Juan, and Raül Santaeulàlia-Llopis. "On the Inefficiency of R&D Subsidies." *Barcelona GSE Working Paper Series*, on the press.

⁷¹ Alsina Burgués, Victòria, and Eduardo González de Molina. "La colaboración público-privada como vector de innovación: casos de éxito en España." *Revista Vasca de Gestión de Personas y Organizaciones Públicas*, n.º Extra 3, 2019. https://www.ivap.euskadi.eus/contenidos/ informacion/especial_3_revgp/en_def/Alsina%20&%20Gonzalez%20 122_139.pdf. ⁷² See, among others: Fundación Alternativas. *Informe sobre la Ciencia y la Tecnología en España*. Madrid, 2017. https://www.fundacionalternativas.org/las-publicaciones/informes/informe-sobre-la-ciencia-y-la-tecnologia-en-espana; and Fundación Conocimiento y Desarrollo. *Informe CYD 2019*. Barcelona, 2020. https://www.fundacioncyd.org/publicaciones-cyd/informe-cyd-2019/.

⁷³ According to Kollmann *et al.*, the *startups* founded by universities accounted for 1% of the total in Spain in 2016, far behind some of the EU-8 countries: Germany (13%), Finland (11%), Austria (9%), France (7%) and Belgium (6%); but also from other EU countries such as Italy (14%), Portugal (9%) or Greece (6%). In addition, it is worth noting that in recent years, the creation of *startups* from Spanish universities has fallen from levels that were already very low. For example, 77 *spin-offs* were created in 2018, the lowest number observed between 2007-18. Lack of funding and poor links with the business world are the main factors explaining this behaviour. For further details, see: Fundación Conocimiento y Desarrollo. *Infome CYD 2019*. Barcelona, 2020. https://www.fundacioncyd.org/publicaciones-cyd/informe-cyd-2019/; and Kollmann, Tobias, *et al.* "European Startup Monitor 2016." *European Startup Monitor, 2016*. http://europeanstartupmonitor.com/fileadmin/esm_2016/report/ESM_2016.pdf.

⁷⁴ The EU-8 and EU-27 are constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. For further details, see: Eurostat. *Population on 1 January by age and sex [demo_pjan]*. https:// ec.europa.eu/eurostat/data/database; and Scimago Journal & Country Rank. *Published documents*. https://www.scimagojr.com/countryrank. php?year=2019.

⁷⁵ Total R&D expenditure includes expenditure by the General Government, higher education, the business sector and non-profit institutions. For this purpose, expenditure by non-profit institutions is not included, given their relatively low importance. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. See: Eurostat. *Intramural R&D expenditure (GERD) by sectors of performance [rd_e_gerdtot]*. https://ec.europa.eu/eurostat/data/database.

⁷⁶ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by the European Commission. For further details, see: European Commission. *The Digital Economy and Society Index (DESI), 2020 Spain*. Luxembourg: Publication Office of the European Union, 2020. https://administracionelectronica.gob.es/pae_Home/dam/jcr:7995e8b9-a135-4268-8a0a-1581fba1c537/DESI2020-SPAIN-ENG.pdf.

⁷⁷ Andrews, Dan, Chiara Criscuolo, and Peter N. Gal. "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy." *OECD Productivity Working Papers*, n.º 5, Paris: OECD Publishing, 2016. https://doi.org/10.1787/63629cc9-en.

⁷⁸ The EU-8 is constructed as the simple average of the values of the individual countries. Data from 2018. For further details, see: Eurostat. *Big data analysis [isoc_eb_bd]*. https://ec.europa.eu/eurostat/data/ database.

⁷⁹ A person is considered to telework if they do so on a regular or occasional basis. The EU-8 is constructed as the simple average of

the values of the individual countries. Data from 2019 for employed persons aged 15-64. For further details, see: Eurostat. *Employed persons working from home as a percentage of the total employment, by sex, age and professional status (%) [lfsa_ehomp]*. https://ec.europa.eu/eurostat/data/database; and Milasi, Santo, Ignacio González-Vázquez, and Enrique Fernández-Macías "Telework in the EU before and after the COVID-19: where we were, where we head to." *JRC Science for Policy Briefs*, n.º 120845, 2020. https://ec.europa.eu/jrc/sites/jrcsh/files/jrc120945_policy_brief_-_covid_and_telework_final.pdf.

⁸⁰ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *E-commerce sales [isoc_ec_eseln2]*. https://ec.europa.eu/eurostat/data/database.

⁸¹For further details, see: Mora-Sanguinetti, Juan S., and Andrés Fuentes. "An analysis of productivity performance in Spain before and during the crisis: Exploring the role of institutions." *OECD Economics Department Working Papers*, n.º 973, Paris: OECD Publishing, 2012. https://www. oecd-ilibrary.org/docserver/5k9777lqshs5-en.pdf?expires=160614 6179&id=id&accname=guest&checksum=61D7F70D1C3EF66F0DE A173C9B302973; Rodrik, Dani, Arvind Subramanian, and Francesco Trebbi. "Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development." *Journal of Economic Growth* 9, n.º 2, 2004. https://www.jstor.org/stable/40212696; and Rodríguez-Pose, Andrés, and Roberto Ganau. "Institutions and the Productivity Challenge for European Regions." *European economy discussion paper* 116, European Comission, 2019. https://ec.europa.eu/info/sites/info/ files/economy-finance/dp116_en.pdf.

⁸² World Justice Project. "Rule of Law Index." World Justice Project, https://worldjusticeproject.org/rule-of-law-index/global.

⁸³ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: World Bank. *Worldwide Governance Indicators*. https://databank.worldbank.org/ source/worldwide-governance-indicators.

⁸⁴ Partly as a result of these developments, Spain has improved significantly in the OECD's market regulation index (1998-2013) to levels similar to those of the EU-8 in 2018. For further details, see: OCDE. "Indicators of Product Market Regulation." OECD, https://www. oecd.org/economy/reform/indicators-of-product-market-regulation/.

⁸⁵ For example, the *Ley del Mercado Único* of 2013. See: Official State Gazette. *Ley 20/2013, de 9 de diciembre, de garantía de la unidad de mercado*. Madrid, 2013. https://www.boe.es/boe/dias/2013/12/10/ pdfs/BOE-A-2013-12888.pdf.

⁸⁶ Inefficiencies in the allocation of capital across companies tend to be greater in sectors where regulatory hurdles are more significant. For further details, see: García-Santana, Manuel, *et al.* "Growing like Spain: 1995-2007." *International Economic Review* 61, n°. 1, 2019. https://doi. org/10.1111/iere.12427.

⁸⁷ According to the *Doing Business 2020* ranking prepared by the World Bank, Spain has restrictions for starting a business, obtaining a building permit, registering property or resolving insolvency that are still higher than those of the EU-8 countries. Refer to: World Bank. "Ease of Doing Business Rankings." World Bank.https://www.doingbusiness.org/en/ rankings. ⁸⁸ Spain has higher barriers to competition in the main branches of the services sector than the EU-8 and EU-22 average. The EU-22 consists of the EU-27 member countries that are also members of the OECD. This excludes Bulgaria, Croatia, Cyprus, Malta and Romania. For further details, see: Alonso-Borrego, César. "Firm behavior, market deregulation and productivity in Spain." *Banco de España, Documentos de trabajo*, n.º 1035, 2010. https://www.bde.es/f/ webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/ DocumentosTrabajo/10/Fic/dt1035e.pdf; y OCDE. "Indicators of Product Market Regulation." OECD, https://www.oecd.org/economy/ reform/indicators-of-product-market-regulation/.

⁸⁹There are labour or tax regulations aimed at favouring SMEs but which, de facto, discourage their growth when they exceed a certain threshold, as they entail, among other things, the obligation of an external audit, a greater probability of tax inspection or lower bonuses in social security payments. For further details, see: Almunia, Miguel, and David López-Rodríguez. "Under the Radar: The Effects of Monitoring Firms on Tax Compliance." *American Economic Journal*, 2018. https://doi. org/10.1257/pol.20160229; and Fariñas, José Carlos, and Elena Huergo. "Demografía empresarial en España: tendencias y regularidades." *FEDEA, Estudios sobre la Economía Española*, n.º 2015/24, 2015. http:// documentos.fedea.net/pubs/eee/eee2015-24.pdf.

⁹⁰ García-Posada Gómez, Miguel. "Análisis de los procedimientos de insolvencia en España en el contexto de la crisis del COVID-19: los concursos de acreedores, los preconcursos y la moratoria concursal." *Banco de España, Documentos Ocasionales*, n.º 2029, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Fich/do2029.pdf.

⁹¹In addition, among the regulatory aspects that affect the Spanish labour market and that limit, to a greater or lesser extent, the progress of productivity, the following should be noted: 1) the differences in termination costs between temporary and permanent contracts; 2) the low penalties for the fraudulent use of temporary contracts; and 3) the fact that collective bargaining does not always guarantee the link between wages and productivity. For further details, see chapter 7.

⁹² In the results of the *Single Market Scoreboard* for 2019, the lower relative weight of tenders, the low rate of publication of contract notices or the requirements for bidding companies, which discourage the participation of start-ups, are some of the elements that deserve to be highlighted. For further details, see: European Commission. "Single Market Scoreboard 2019." European Comission, https://ec.europa.eu/ internal_market/scoreboard/performance_per_policy_area/public_procurement/index_en.htm.

⁹³ Although it constitutes a relevant source of income and work for many people in those countries where it has a high weight, informality tends to be associated with lower economic growth, reflecting relevant inefficiencies that affect the economy as a whole. The costs associated with informality are wide-ranging and include labour market distortions, lower public revenues, poorer provision of public goods, restricted access to finance for households and firms, and lower innovation and business productivity. For further details, see: Kelmanson, Ben, *et al.* "Explaining the Shadow Economy in Europe: Size, Causes and Policy Options." *IMF Working Paper*, n.º 19/278, 2019. https://www.imf.org/ en/Publications/WP/Issues/2019/12/13/Explaining-the-Shadow-Economy-in-Europe-Size-Causes-and-Policy-Options-48821. ⁹⁴ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Eurostat. *Electricity prices by type of user [ten00117]*. https://ec.europa.eu/eurostat/data/database.

⁹⁵ The EU-8 is constructed as the simple average of the values of the individual countries. For further details, see: Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" *IMF Working Papers*, n.º 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/ Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last-20-Years-45583.

⁹⁶ Banco de España. "La dinámica empresarial en España: características, determinantes e implicaciones." In Banco de España. Informe anual 2015. Madrid, 2016. 109-138.

97 Ibid.

⁹⁸ This could partly explain the relatively higher percentage of companies operating on the verge of non-viability in our country. Companies on the verge of non-viability are defined as companies with a low ratio of operating income to interest expense, suggesting that they do not earn enough profit to repay bank loans. In Spain, between 2014 and 2016, 11% of companies in industry and 10% in services, on average, were operating in this situation, compared to 7% and 5% in Germany, Sweden, Finland and France. For further details, see: McGowan, Müge Adalet, Dan Andrews, and Valentine Millot. "The Walking Dead?: Zombie Firms and Productivity Performance in OECD Countries." *OECD Economics Department Working Papers*, n.º 1372, 2017. https://doi. org/10.1787/180d80ad-en.

⁹⁹ Between 1995 and 2007, inefficiencies in capital allocation were exacerbated by the low interest rate environment and abundant liquidity (in those years, capital flowed to a greater extent to inefficient companies operating even in oversupplied sectors). In fact, if these favourable financing conditions had been properly exploited, Spain's productivity growth would have reached 2% per year, which would have placed our country among the most productive in the OECD. However, during the last decade, coinciding with the restructuring in the banking sector, the increase in the self-financing capacity of companies (higher savings) and the loss of weight of financingintensive sectors such as construction, a certain favourable selection has been observed in the allocation of capital, with an improvement in the flow of financing towards more productive and healthy companies. For further details, see: Fu, Chenxu, and Enrique Moral-Benito. "The evolution of Spanish total factor productivity since the global financial crisis." Banco de España, Documentos Ocasionales, n.º 1808, 2018. http://dx.doi.org/10.2139/ssrn.3272737; García-Santana, Manuel, et al. "Growing like Spain: 1995-2007." International Economic Review 61, nº. 1, 2019. https://doi.org/10.1111/iere.12427; Gopinath, Gita, et al. "Capital Allocation and Productivity in South Europe." The Quarterly Journal of Economics 132, n.º 4, 2017. https://doi.org/10.1093/qje/ qjx024; Haugh, David, et al. "Fostering innovative business investment in Spain." OECD Economics Department Working Papers, n.º 1387, Paris: OECD Publishing, 2017. https://doi.org/10.1787/f957c2cc-en; and Moral-Benito, Enrique. "The microeconomic origins of the Spanish boom." Banco de España, Documentos Ocasionales, n.º 1805, 2018. http://dx.doi.org/10.2139/ssrn.3176999.

¹⁰⁰ SMEs exporting goods for less than 1 million euros per year are

considered. It is worth mentioning that the difference between the percentage of small and medium-sized enterprises exporting is significant, as is the case in other European economies. For further details, see: Gutiérrez Chacón, Eduardo, and César Martín Machuca. "Exporting Spanish Firms. Stylized facts and trends." *Banco de España, Documentos Ocasionales,* nº. 1903, 2019. https://www.bde. es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/ DocumentosOcasionales/19/Files/do1903e.pdf; and Falk, Martin, *et al . Drivers of SME Internationalisation Implications for firm growth and competitiveness.* Luxembourg: Publication Office of the European Union, 2014. https://op.europa.eu/en/publication-detail/-/publication/d09de1b2-6ee0-4d0a-95b1-3c7dc40f8fec/language-en/format-PDF/ source-search.

¹⁰¹ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. Lithuania is also not included due to lack of data availability. For further details, see: OCDE. *OECD Economic Surveys: Spain 2018, Fig. 37.* https://doi.org/10.1787/eco_surveys-esp-2018-en.

¹⁰² Data in constant prices, adjusted for differences in purchasing power. Data from 2014 or latest available year. The EU-8 is constructed as the simple average of the values of the individual countries. For further details, see: OCDE. *OECD Economic Surveys: Spain 2018, Fig. 37.* https://doi.org/10.1787/eco_surveys-esp-2018-en.

¹⁰³ For further details on the relationship between human capital and technology adoption, see: Cuadrado, Pilar, Enrique Moral-Benito, and Irune Solera. "A sectoral anatomy of the Spanish productivity puzzle." *Banco de España, Documentos Ocasionales,* n.º 2006, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Files/do2006e.pdf.

¹⁰⁴ Data are the average for the period 2015-19. The EU-8 is constructed as the simple average of the values of the individual countries. See: Eurostat. *Gross value added and income by A*10 industry breakdowns* [nama_10_a10]. https://ec.europa.eu/eurostat/data/database.

¹⁰⁵ INE. Contabilidad nacional trimestral de España: principales agregados Madrid: Nota de prensa, 2021. https://www.ine.es/daco/ daco42/daco4214/cntr0420.pdf.

¹⁰⁶ For further details, see: Banco de España. "Proyecciones macroeconómicas." Banco de España, https://www.bde.es/bde/ es/areas/analisis-economi/analisis-economi/proyecciones-mac/ Proyecciones_macroeconomicas.html; European Comission. Statistical Annex. European Economic Forecast. Autumn 2020. Brussels, 2020. https://ec.europa.eu/info/sites/info/files/economy-finance/ecfin_ forecast_autumn_2020_statistical-annex_en.pdf; International Monetary Fund. Spain 2020 Article IV Consultation. Washington, D.C., 2020. https://www.imf.org/en/Publications/CR/Issues/2020/11/12/ Spain-2020-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-Executive-49883; FUNCAS. Panel de previsiones de la economía española. Marzo 2021. Madrid, 2021. https://www.funcas. es/wp-content/uploads/2021/03/PP2103.pdf; OCDE. OECD Economic Outlook, Volume 2020 Issue 2. Paris: OECD Publishing, 2020. https:// doi.org/10.1787/39a88ab1-en; and Department of Economic Affairs and Digital Transformation. Madrid, 2021. https://www.lamoncloa. gob.es/serviciosdeprensa/notasprensa/asuntos-economicos/

Documents/2021/090421-Presentaci%C3%B3n_previsiones_macro. pdf.

¹⁰⁷ INE. *Contabilidad nacional trimestral de España: principales agregados* Madrid: Nota de prensa, 2021. https://www.ine.es/daco/ daco42/daco4214/cntr0420.pdf.

¹⁰⁸ International Monetary Fund. *World Economic Outlook Update, June* 2020: A crisis like no other, an uncertain recovery. Washington, D.C.: IMF, 2020. https://www.imf.org/en/Publications/WEO/Issues/2020/06/24/ WEOUpdateJune2020.

¹⁰⁹ Data published before 10 April 2021. For further details, see: Banco de España. "Proyecciones macroeconómicas." Banco de España, https://www.bde.es/bde/es/areas/analisis-economi/analisis-economi/ proyecciones-mac/Proyecciones_macroeconomicas.html; European Comission. Statistical Annex. European Economic Forecast. Winter 2021. Bruselas, 2021. Https://ec.europa.eu/info/sites/info/files/economyfinance/ecfin_forecast_winter_2021_statistical_annex_en.pdf;; International Monetary Fund. World Economic Outlook Update, January 2021. Washington, D.C., 2021. https://www.imf.org/en/Publications/ WEO/Issues/2021/01/26/2021-world-economic-outlook-update; FUNCAS. Panel de previsiones de la economía española. Marzo 2021. Madrid, 2021. https://www.funcas.es/wp-content/uploads/2021/03/ PP2103.pdf;Government of Spain. Recovery, Transformation and Resilience Plan. Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20v%20Resiliencia. pdf; OCDE. Strengthening the recovery: The need for speed. Paris: OECD Publishing, 2021. https://www.oecd-ilibrary.org/docserver/34bfd999en.pdf?expires=1616078435&id=id&accname=guest&checksum =B2EBA592160E1F8EA1D6612AEC99C142; and Department of Economic Affairs and Digital Transformation. Madrid, 2021. https:// www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/asuntoseconomicos/Documents/2021/090421-Presentaci%C3%B3n_ previsiones_macro.pdf.

¹¹⁰These population forecasts are based on the demographic projections made by Eurostat in its baseline scenario (latest available). This scenario envisages a net migration balance of 191,000 people on average between 2021 and 2050, in line with that observed between 2002 and 2018. For further details, see: Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]*. https://ec.europa.eu/ eurostat/data/database.

¹¹¹See the Apunte metodológico number IIII.

¹¹² A larger inflow of immigrants could contain the fall in the working-age population, but would not by itself prevent a scenario of low economic growth. If, instead of taking Eurostat's base scenario as a reference, the "higher immigration" scenario offered by the same institution is considered (it assumes an increase of 62,000 people in the net migration balance for the period 2023-50 with respect to the base scenario and a fall of 1.9 million in the working-age population), Spain's real GDP would grow, on average, by 0.1% more over the same period. For further details, refer to the *Apunte metodológico* número III. For further details on the data sources, see: Eurostat. Assumptions for net migration by age, sex and type of projection [proj_19nanmig]; Emigration by age and sex [migr_emi2]; e Immigration by age and sex [migr_imm8]. https://ec.europa.eu/eurostat/data/database.

¹¹³ The ranges projected for per capita income in Spain are established according to the periods used to calculate the trends in the variables that determine per capita income. We are referring to the employment rate, hours worked per employed person, human capital, the capital stock (both physical and intangible) and productivity. The lower limit considers the period 1996-2018, while the upper limit covers the years 2010-18. For further details, refer to the Apunte metodológico número V. For more information on data sources, see: Aum, Sangmin, Dongya Koh, and Raül Santaeulàlia-Llopis. "Growth facts with intellectual property products: an exploration of 31 OECD new national accounts." Barcelona GSE Working Paper Series, n.º 1029, 2018. https://www. barcelonagse.eu/sites/default/files/working_paper_pdfs/1029_0. pdf; and Eurostat. Employment by sex, age and citizenship (1 000) [lfsa_egan]; Population on 1 January by age and sex [demo_pjan]; and Population on 1st January by age, sex and type of projection [proj_19np]. https://ec.europa.eu/eurostat/data/database.

¹¹⁴ In the case of the EU-8, the analysis carried out, taking the period 1996-2018 for the trend calculation, shows an average GDP per capita growth in the order of 0.8%, above the mid-point of the projected range for Spain. The difference with Spain lies, above all, in a more favourable outlook for total factor productivity (progressive growth in the EU-8 in the recent past as opposed to falls in the Spanish case). The construction of the trends for the EU-8 varies according to the typology of the variables included in the growth accounting exercise.

¹¹⁵ For further details, refer to: Aum, Sangmin, Dongya Koh, and Raül Santaeulàlia-Llopis. "Growth facts with intellectual property products: an exploration of 31 OECD new national accounts." *Barcelona GSE Working Paper Series*, n.º 1029, 2018. https://www.barcelonagse.eu/ sites/default/files/working_paper_pdfs/1029_0.pdf; and Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; Population on 1 January by age and sex [demo_pjan];* and *Population on 1st January by age, sex and type of projection [proj_19np]*. https://ec.europa.eu/ eurostat/data/database.

¹¹⁶Fouré, Jean, Agnès Bénassy-Quéré, and Lionel Fontagné. "The Great Shift: Macroeconomic projections for the world economy at the 2050 horizon." *Centre d'Études Prospectives et d'Informations Internationales (CEPII) Working Paper*, n.º 2010-27, 2012. http://projects.mcrit.com/ foresightlibrary/attachments/The_Great_Shift_Macroeconomic_ projections_for_the_world_economy_at_2050_horizon.pdf. Fouré, Jean, Agnès Bénassy-Quéré, and Lionel Fontagné. "The Great Shift: Macroeconomic projections for the world economy at the 2050 horizon." Centre d'Études Prospectives et d'Informations Internationales (CEPII) Working Paper, n.º 2010-27, 2012. http://projects.mcrit. com/foresightlibrary/attachments/The_Great_Shift_Macroeconomic_ projections_for_the_world_economy_at_2050_horizon.pdf.

¹¹⁷ PriceWaterhouseCoopers. *The World in 2050, Will the shift in global economic power continue*? 2015. https://www.pwc.com/gx/ en/issues/the-economy/assets/world-in-2050-february-2015.pdf. PriceWaterhouseCoopers. The World in 2050, Will the shift in global economic power continue? 2015. https://www.pwc.com/gx/en/issues/ the-economy/assets/world-in-2050-february-2015.pdf.

¹¹⁸ European Comission *The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070).* Luxembourg: Publications Office of the European Union, 2018. https:// doi.org/10.2765/615631. European Comission. The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070). Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2765/615631.

¹¹⁹ Guillemette, Yvan, and David Turner. "The Long View: Scenarios for the World Economy to 2060." *OECD Economic Policy Papers*, n.º 22, Paris: OECD Publishing, 2018. https://doi.org/10.1787/b4f4e03e-en. Guillemette, Yvan, and David Turner. "The Long View: Scenarios for the World Economy to 2060." OECD Economic Policy Papers, n.º 22, Paris: OECD Publishing, 2018. https://doi.org/10.1787/b4f4e03e-en.

¹²⁰ For the construction of the ranking, real GDP has been used as a reference variable. In the case of the European Commission, it is expressed in 2015 euros, adjusted for purchasing power differences; in that of the Centre d'Études Prospectives et d'Informations Internationales, in 2005 dollars; for PriceWaterhouseCoopers in 2014 dollars; and for the OECD, in 2010 dollars. In addition, in the case of the European Commission, the average annual GDP growth between 2016 and 2070 set out in the report is applied to the value of real GDP in 2016. In the case of the OECD, only real GDP per capita growth between 2018 and 2060 is detailed, and therefore data from the World Bank (2018 GDP in 2010 dollars) and the United Nations (population in 2020 and 2060) are used for the transformation to real GDP. For further details, see: World Bank. GDP per capita (constant 2010 US\$). https:// data.worldbank.org/indicator/NY.GDP.PCAP.KD; European Commission. The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070). Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2765/615631; Eurostat. Gross domestic product at market prices [TEC00001]. https://ec.europa. eu/eurostat/data/database; Fouré, Jean, Agnès Bénassy-Quéré, and Lionel Fontagné. "The Great Shift: Macroeconomic projections for the world economy at the 2050 horizon." Centre d'Études Prospectives et d'Informations Internationales (CEPII) Working Paper, n.º 2010-27, 2012. http://projects.mcrit.com/foresightlibrary/attachments/The_ Great_Shift_Macroeconomic_projections_for_the_world_economy_ at_2050_horizon.pdf; Guillemette, Yvan, and David Turner. "The Long View: Scenarios for the World Economy to 2060." OECD Economic Policy Papers, n.º 22, Paris: OECD Publishing, 2018. https://doi.org/10.1787/ b4f4e03e-en; United Nations. World Population Prospects 2019. https:// population.un.org/wpp/Download/Probabilistic/Population/; and PriceWaterhouseCoopers. The World in 2050, Will the shift in global economic power continue? 2015. https://www.pwc.com/gx/en/issues/ the-economy/assets/world-in-2050-february-2015.pdf.

¹²¹Total factor productivity or TFP is the difference between the growth rate of production and the growth rate of the production factors (labour and capital), each weighted by its weight. It approximates the degree of efficiency in the use of the factors of production available to an economy.

¹²²The same evolution presented for the TFP of Spain can alsobe found in Fu and Moral-Benito, as well as in Prados de la Escosura and Rosés. Other sources such as the OECD or AMECO show a similar evolution, albeit with a more moderate reduction between 1995 and 2013. The construction of the EU-8 varies according to the typology of variables included in the growth accounting exercise. For futher details, see the *Apunte metodológico* número V. For more data and ideas: AMECO. *Total factor productivity [ZVGDF]*. https://ec.europa.eu/economy_ finance/ameco/user/serie/SelectSerie.cfm; Aum, Sangmin, Dongya Koh, and Raül Santaeulàlia-Llopis. "Growth facts with intellectual property products: an exploration of 31 OECD new national accounts." Barcelona GSE Working Paper Series, n.º 1029, 2018. https://www. barcelonagse.eu/sites/default/files/working_paper_pdfs/1029_0. pdf; Fu, Chenxu, and Enrique Moral-Benito. "The evolution of Spanish total factor productivity since the global financial crisis." *Banco de España, Documentos Ocasionales*, n.º 1808, 2018. http://dx.doi. org/10.2139/ssrn.3176999. *Level of GDP per capita and productivity*. https://stats.oecd.org/; and Prados de la Escosura, Leandro, and Joan Rosés. "Accounting for growth in Spain, 1850-2019." *CEPR Discussion paper*, nº 15380. 2020. https://frdelpino.es/investigacion/wp-content/ uploads/2020/10/LPE-JRR-Accounting_for_Growth_in_Spain_1850-2019-CEPR_dp_15380-1.pdf.

¹²³ According to IMF estimates, for a country with a female employment rate similar to Spain's, closing the gender gap in employment could raise the level of GDP by 15-20% thanks, in part, to an increase in productivity. For further details, refer to: Dabla-Norris, Era, and Kalpana Kochhar. "Closing the Gender Gap". *IMF*, 2019, https://www.imf.org/ external/pubs/ft/fandd/2019/03/pdf/fd0319.pdf; and Ostry, Jonathan David, *et al.* "Economic Gains from Gender Inclusion: New Mechanisms, New Evidence." *IMF Staff Discussion Note*, 2018. https://www.imf. org/en/Publications/Staff-Discussion-Notes/Issues/2018/10/09/ Economic-Gains-From-Gender-Inclusion-New-Mechanisms-New-Evidence-45543.

¹²⁴ The increase in the employment rate is between 1988 and 2018 (latest year available). For further details, see: OCDE. *Level of GDP per capita and productivity; and Annual Labour Force Statistics summary tables.* https://stats.oecd.org/.

¹²⁵For Spain, the lower limit of the projected range for 2050 is the result of extrapolating into the future the trends observed between 1996 and 2018 for the variables that determine per capita income. In the case of the upper limit of the range, this is the one that results from establishing 2010-18 as the time period for the calculation of these trends. For the EU-8, the per capita income figure for 2050 is obtained by extrapolating the trends between 1996-2018 to the income determinants. For further details, refer to: Aum, Sangmin, Dongya Koh, and Raül Santaeulàlia-Llopis. "Growth facts with intellectual property products: an exploration of 31 OECD new national accounts." *Barcelona GSE Working Paper Series*, n.º 1029, 2018. https://www.barcelonagse.eu/sites/default/files/ working_paper_pdfs/1029_0.pdf; and Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; Population on 1 January by age and sex [demo_pjan]; y Population on 1st January by age, sex and type of projection [proj_19np]. https://ec.europa.eu/eurostat/data/database.*

¹²⁶ Eurostat. *Population on 1st January by age, sex and type of projection* [*proj_19np*]. https://ec.europa.eu/eurostat/data/database.

¹²⁷ In Europe, demographic ageing could reduce total factor productivity growth by 0.2 percentage points per year for the next two decades. This effect could be greater in countries such as Spain, where ageing will be particularly pronounced. See: Aiyar, Shekhar, Christian Ebeke, and Xiaobo Shao. "The Impact of Workforce Aging on *European Productivity*." *IMF Working Papers*, n.º 16/238, 2016. https://www.imf.org/external/ pubs/ft/wp/2016/wp16238.pdf. For a more extensive discussion of the effects of ageing on productivity, see: Batsaikhan, Uuriintuya and Bruegel. "Embracing the silver economy." Bruegel Blog Post, https:// www.bruegel.org/2017/04/embracing-the-silver-economy/?utm_ content=buffer16162&utm_medium=social&utm_source=twitter. com&utm_campaign=buffer+(bruegel). ¹²⁸ For further details, see: Anghel, Brindusa, and Aitor Lacuesta. "Envejecimiento, productividad y situación laboral." *Banco de España, Artículos Analíticos, Boletín Económico*, n.º 1/2020, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ InformesBoletinesRevistas/ArticulosAnaliticos/20/T1/descargar/Fich/ be2001-art2.pdf; and Azoulay, Pierre, *et al.* "Age and High-Growth Entrepreneurship." *American Economic Review: Insights 2*, n.º 1, 2020. https://doi.org/10.1257/aeri.20180582.

¹²⁹WHO. Active Ageing: A Policy Framework. Madrid, 2002. https://apps. who.int/iris/bitstream/handle/10665/67215/WHO_NMH_NPH_02.8.pd f;jsessionid=4D28776C9CD99A8C68187D85164FBDE8?sequence=1.

¹³⁰WHO World Report on Ageing and Health. Geneva, 2015. https://apps. who.int/iris/bitstream/handle/10665/186463/9789240694811_eng. pdf;jsessionid=4D697B6C455F69CB1A17C03DD5E6357B?sequen ce=1.

¹³¹ Technopolis and Oxford Economics for the Directorate-General of Communications Networks , Content & Technology and of the European Commission. *The Silver Economy Study*. 2018. https://doi. org/10.2759/685036.

¹³² For example, several studies suggest that the development of Artificial Intelligence could generate significant productivity gains and raise the GDP level of Southern European countries by 1% by 2030. For further details, see: Bughin, Jacques, *et al.* "Notes from the AI frontier – Modeling the impact of AI on the world economy." *McKinsey Global Institute, Discussion Paper*, 2018. https://www. mckinsey.com/~/media/McKinsey/Featured%20Insights/Artificial%20 Intelligence/Notes%20from%20the%20frontier%20Modeling%20 the%20impact%20of%20AI%20on%20the%20world%20economy/ MGI-Notes-from-the-AI-frontier-Modeling-the-impact-of-AI-on-theworld-economy-September-2018.ashx; and PricewaterhouseCoopers. *The macroeconomic impact of artificial intelligence*. 2018. https://www. pwc.co.uk/economic-services/assets/macroeconomic-impact-of-aitechnical-report-feb-18.pdf.

¹³³ European Commission. *The Digital Economy and Society Index* (*DESI*), 2020 Spain. Luxembourg: Publication Office of the European Union, 2020. https://administracionelectronica.gob.es/pae_Home/dam/ jcr:7995e8b9-a135-4268-8a0a-1581fba1c537/DESI2020-SPAIN-ENG.pdf.

¹³⁴ Spain ranks 15th out of 54 *in the Global IA Index 2019* prepared by Tortoise Media. The European funds (component 16 "National Artificial Intelligence Strategy" of the Recovery, Transformation and Resilience Plan project) also aim at boosting its development over the coming years. For further details, see: Government of Spain. *Recovery, Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia. pdf; and Tortoise Media. "The Global AI Index 2019." Tortoise Media, https://www.tortoisemedia.com/intelligence/ai/.

¹³⁵ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The *Cisco Global Digital Readiness Index ranking* of 2019 places Spain in 25th position out of 121, the *Readiness for the Future of Production Report* 2018 ranks Spain 29th out of 100 and the *The Network Readiness Index* of 2019 at 26 out of 141. Similar estimates are provided by Kuruczleki *et al.* For further

details, see: Cisco. *Cisco Global Digital Readiness Index 2019*. San Jose, 2020. https://www.cisco.com/c/dam/en_us/about/csr/reports/globaldigital-readiness-index.pdf; Kuruczleki, Éva, *et al.* "The Readiness of the European Union to Embrace the Fourth Industrial Revolution." *Management* 11, n.º 4, 2016. http://www.fm-kp.si/zalozba/ISSN/1854-4231/11_327-347.pdf; Portulans Institute. *The Network Readiness Index*. Washington D.C., 2019. https://networkreadinessindex.org/wpcontent/uploads/2020/03/The-Network-Readiness-Index-2019-Newversion-March-2020.pdf;and World Economic Forum *Readiness for the Future of Production Report 2018*. Geneva, 2018 http://www3.weforum. org/docs/FOP_Readiness_Report_2018.pdf.

¹³⁶ The production of manufacturing goods with medium-high technological content accounted for 4% of employment in Spain in 2019, as compared to 5% on average in the EU-8. The difference is wider in the case of knowledge-intensive services: while in Spain they account for 36% of total employment, in the EU-8 this figure rises to 46%. See: Eurostat. *Employment in high and medium-high technology manufacturing sectors and knowledge-intensive service sectors* [tsc00011]. https://ec.europa.eu/eurostat/data/database.

¹³⁷ Haskel, Jonathan, and Stian Westlake. *Capitalism without Capital: The Rise of the Intangible Economy*. Princeton: Princeton University Press, 2018.

¹³⁸ On this question, see, among others: Graetz, Georg, and Guy Michaels. "Robots at Work." *Review of Economics and Statistics* 100, n.° 5, 2018. https://doi.org/10.1162/rest_a_00754; and Jungmittag, Andre, and Annarosa Pesole. "The impact of robots on labour productivity: A panel data approach covering 9 industries and 12 countries." *JRC Working Papers Series on Labour, Education and Technology*, n.° 118044, 2019. https://ec.europa.eu/jrc/sites/jrcsh/files/jrc118044.pdf.

¹³⁹ For example, Klenert, Fernández-Macías, and Antón find that, in Europe between 1995 and 2015, one additional robot per 1,000 workers was associated with a 0.6% increase in total employment. Similarly, Koch, Manuylov, and Smolka show that, in Spain, manufacturing firms that adopted robots between 1990 and 1998 experienced strong productivity gains and, thanks to them, increased their employment by 10%. Other studies find a similar effect in neighbouring countries. In Italy, results indicate that, on average, the adoption of robots in manufacturing did not negatively affect employment. See: Klenert, David, Enrique Fernández-Macías, and José-Ignacio Antón. "Do robots really destroy jobs? Evidence from Europe." JRC Working Papers Series on Labour, Education and Technology, n.º 118393, 2020. https:// ec.europa.eu/jrc/sites/jrcsh/files/jrc118393.pdf; Koch, Michael, Ilya Manuylov, and Marcel Smolka. "Robots and firms." CESifo Working Papers, n.º 7608, 2019. https://www.ifo.de/DocDL/cesifo1_wp7608. pdf; and Dottori, Davide. "Robots and employment: Evidence from Italy." Questioni di Economia e Finanza, n.º 572, 2020. https://www.sipotra. it/wp-content/uploads/2020/09/Robots-and-employment-evidencefrom-Italy.pdf.

¹⁴⁰ The EU-8 is constructed as the weighted average of the values of the individual countries, with GDP being the reference for the calculation of weights, and the EU-27 from the aggregate indicators reported by Eurostat. For further details, see: Eurostat. *GDP and main components* (*output, expenditure and income*) [*nama_10_gdp*]; *y High-tech trade* by high-tech group of products [htec_trd_group4]. https://ec.europa.eu/eurostat/data/database.

¹⁴¹The EU-8 and EU-27 is constructed as the simple average of the values of the individual countries. For further details, see: International Federation of Robotics. "Welcome to the IFR Press Conference." International Federation of Robotics, https://ifr.org/downloads/ press2018/IFR%20World%20Robotics%20Presentation%20-%20 18%20Sept%202019.pdf.

¹⁴² Refer to: Global Wind Energy Council. "Wind turbine sizes keep growing as industry consolidation continues." Global Wind Energy Council, https://gwec.net/wind-turbine-sizes-keep-growing-asindustry-consolidation-continues/; and Schmela, Michael. *EU Market Europe For Solar Power 2019 - 2023*. Solar Power Europe, 2019. https://www.solarpowereurope.org/wp-content/uploads/2019/12/ SolarPower-Europe_EU-Market-Outlook-for-Solar-Power-2019-2023_. pdf?cf_id=5387.

¹⁴³ Díaz, Antonia, Gustavo A. Marrero, and Luis A. Puch. "Cambio climático, crecimiento económico y el papel de las tecnologías energéticas." In Javier Andrés (coord.). *Economic Growth*. Madrid: Funcas, Papeles de Economía Española, n.º 164, 2019. 120-133. https://www.funcas.es/wp-content/uploads/2020/08/PEE164art09. pdf.

¹⁴⁴ Renewable energy generation costs have fallen dramatically over the last decade. Future energy efficiency gains could substantially raise productivity in the industry. The reduction of production costs associated with the promotion of the circular economy would also contribute to the improvement of business productivity. For further details, see: International Energy Agency. *Multiple Benefits of Energy Efficiency*. Paris, 2019. https://www.iea.org/reports/multiple-benefitsof-energy-efficiency/productivity; International Renewable Energy Agency. *Renewable Power Generation Costs in 2019*. Abu Dhabi, 2020. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/ Jun/IRENA_Power_Generation_Costs_2019.pdf; and Department for Ecological Transition and Demographic Challenge. *Circular Economy Strategy España Circular 2030*. Madrid, 2020. https://www.miteco. gob.es/es/calidad-y-evaluacion-ambiental/temas/economia-circular/ espanacircular2030_def1_tcm30-509532.PDF.

¹⁴⁵ World Economic Forum. *Fostering Effective Energy Transition 2020 edition*. Geneva, 2020.http://www3.weforum.org/docs/WEF_Fostering_ Effective_Energy_Transition_2020_Edition.pdf.

¹⁴⁶ Spain invested 3 euros per capita in 2018, compared to 9 euros per capita in the EU-27. For further details, refer to: Eurostat. *Total GBAORD by NABS 2007 socio-economic objectives 2018 [gba_nabsfin07]*. https://ec.europa.eu/eurostat/data/database.

¹⁴⁷ González-Enguino, Mikel, *et al.* "Análisis de impacto del Plan Nacional Integrado de Energía y Clima (PNIEC) 2021-30 de España." In María José Sanz, and Mikel González-Enguino (eds.). *Transition to a decarbonised economy*. Madrid: Funcas, Papeles de Economía Española, n.º 163, 2020. 9-22. https://www.funcas.es/wp-content/ uploads/Migracion/Articulos/FUNCAS_PEE/163art04.pdf.

¹⁴⁸ Díaz, Antonia, Gustavo A. Marrero, Luis A. Puch, and Jesús Rodríguez. "Economic growth, energy intensity and the energy mix." *Universidad Carlos III de Madrid, Working Paper*, n.º 2019-10, 2019. https://e-archivo.uc3m.es/bitstream/handle/10016/28461/we1910. pdf?sequence=1.

¹⁴⁹ See: Department for Ecological Transition and Demographic

Challenge Impacto económico, de empleo, social y sobre la salud pública del Plan Nacional Integrado de Energía y Clima 2021-2030. Madrid, 2020. Https://www.miteco.gob.es/images/es/informesoci oeconomicopnieccompleto_tcm30-508411.pdf;; and Department for Ecological Transition and Demographic Challenge.. Long Term Decarbonisation Strategy Anexos. Madrid, 2020. https://www.miteco. gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf.

¹⁵⁰ Eurofound estimates that Spain's GDP and employment would increase by more than 1% and 0.8%, respectively, compared to a baseline scenario, in 2030. See: Eurofound. *Energy scenario: Employment implications of the Paris Climate Agreement*. Luxembourg: Publications Office of the European Union, 2019. https://www. eurofound.europa.eu/sites/default/files/ef_publication/field_ef_ document/fomeef18003en.pdf.

¹⁵¹European Commission. Europe 2020: A European strategy for smart, sustainable and inclusive growth. Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20 BARROSO%20%20%20007%20-%20Europe%202020%20-%20 EN%20version.pdf.

¹⁵² The income per capita gap measures the relative differences in GDP per capita between Spain and the EU-8. GDP per capita is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total population. The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. For further details, see: Eurostat. GDP and main components (output, expenditure and income) [nama 10 gdp]; Population on 1 January by age and sex [demo_pjan]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. Https://ec.europa.eu/eurostat/data/database..The income per capita gap measures the relative differences in GDP per capita between Spain and the EU-8. GDP per capita is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total population. The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. For further details, see: Eurostat. GDP and main components (output, expenditure and income) [nama_10_gdp]; Population on 1 January by age and sex [demo pjan]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/ database.

¹⁵³ Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. The EU-8 is constructed as the weighted average of the values of the individual countries, with total hours worked being the reference for the calculation of weights. The EU-27 is calculated on the basis of the aggregate indicators reported by Eurostat. For further details, see: Eurostat. *GDP and main components (output, expenditure and income) [nama_10_gdp]; Employment by A*10 industry breakdowns [nama_10_ a10_e]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]*. https://ec.europa. eu/eurostat/data/database.Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. The EU-8 is constructed as the weighted average of the values of the individual countries, with total hours worked being the reference for the calculation of weights. The
EU-27 is calculated on the basis of the aggregate indicators reported by Eurostat. For further details, see: Eurostat. GDP and main components (output, expenditure and income) [nama_10_gdp]; Employment by A*10 industry breakdowns [nama_10_a10_e]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/database.

¹⁵⁴ The total employment rate is defined as the ratio of total employed persons to the population aged 16-64. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 16-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan]. https://ec.europa.eu/eurostat/data/database. The total employment rate is defined as the ratio of total employed persons to the population aged 16-64. The EU-8 is constructed as the weighted average of the values of the individual countries, with working age population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: E ostat. Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan]. https://ec.europa.eu/eurostat/data/database

¹⁵⁵ It should be noted that among the headline targets of the EU 2020 strategy, 75% of men and women aged 20-64 should be in employment. In 2019, this employment rate for Spain was 74% for men and 62% for women, below the target and far from the EU-27 average. (79% and 67% respectively). For further details, see: European Commission. Europe 2020: https://ec.europa.eu/eu2020/pdf/COMPLET%20 EN%20BARROSO%20%20%20007%20-%20Europe%202020%20 -%20EN%20version.pdf; and INE. Tasas de empleo según niveles de educación. Brecha de género https://www.ine.es/ss/Satellite?L=es_ES &c=INESeccion_C&cid=1259925461647&p=1254735110672&pa gename=ProductosYServicios/PYSLayout¶m1=PYSDetalle&par am3=1259924822888.

¹⁵⁶ Total R&D expenditure includes expenditure by the General Government, higher education, the business sector and non-profit institutions. In the case of Spain, R&D expenditure by General Government and higher education represents 0.5% of GDP for the period 2015-19, i.e. about 45% of the country's total R&D expenditure. In the case of the EU-27, expenditure by general government and higher education accounts for 0.7% of GDP, i.e. 34% of aggregate R&D expenditure, while in the EU-8 these proportions are 0.9% and 32% respectively. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: *Eurostat. Intramural R&D expenditure (GERD) by sectors of performance [rd_e_gerdtot]*. https://ec.europa.eu/eurostat/data/database.

¹⁵⁷ The 2020 European Strategy sets an R&D investment target of 3% of GDP. For further details, see: European Commission. *Europe* 2020: A European strategy for smart, sustainable and inclusive growth. Brussels: European Commission, 2020. https://ec.europa.eu/ eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20 -%20Europe%202020%20-%20EN%20version.pdf. The 2020 European Strategy sets an R&D investment target of 3% of GDP. For further details, see: European Commission. Europe 2020: A European strategy for smart, sustainable and inclusive growth. Brussels: Comisión Europea, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20 BARROSO%20%20%20%20007%20-%20Europe%202020%20-%20 EN%20version.pdf.

¹⁵⁸ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The EU-8 does not include Denmark due to lack of data availability. The latest available data for Spain is from 2018, and for the EU-8 it is from 2016, 2017 or 2018, depending on the country. For further details, see: Eurostat. *Persons employed in the non-financial business economy by size class of employment [tin00148]*. https:// ec.europa.eu/eurostat/data/database. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The EU-8 does not include Denmark due to lack of data availability. The latest available data for Spain is from 2018, while for the EU-8 and EU-27 it is from 2017. For further details, see: Eurostat. Persons employed in the nonfinancial business economy by size class of employment [tin00148]. https://ec.europa.eu/eurostat/data/database.

¹⁵⁹ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The latest data available is from 2017. For further details, see: Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" *IMF Working Papers*, n.º 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last-20-Years-45583. The EU-8 and the EU-27 are constructed as the simple average of the values of the individual countries The latest data available is from 2017. For further details, see: Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" IMF Working Papers, n.º 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last 20 Years?" IMF Working Papers, n.º 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last 20 Years?" IMF Working Papers, n.º 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last-20-Years-45583.

¹⁶⁰ Bloom, Nicholas, John Van Reenen, y Heidi Williams. "A Toolkit of Policies to Promote Innovation." *Journal of Economic Perspectives* 33, n.º 3, 2019. https://doi.org/10.1257/jep.33.3.163.

¹⁶¹To this end, the implementation of the *Science and Innovation Shock* Plan and the investments foreseen in the "Recovery, Transformation and Resilience Plan" (component 17 "Institutional reform and strengthening of the capacities of the national science, technology and innovation system") could constitute a short-term boost, as could the development of the Spanish Science, Technology and Innovation Strategy 2021-2027. For further details, refer to: Government of Spain. Science and Innovation Shock Plan Hacia una economía basada en el conocimiento. Madrid, 2020. https://www.ciencia.gob.es/stfls/MICINN/Ministerio/ FICHEROS/Plan_de_choque_para_la_Ciencia_y_la_Innovacion.pdf; Government of Spain. Recovery, Transformation and Resilience Plan. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf; and Department of Science and Innovation. Strategy Spanish Science, Technology and Innovation 2021-2027. Madrid, 2020. https://www.ciencia.gob.es/stfls/MICINN/ Ministerio/FICHEROS/EECTI-2021-2027.pdf.

¹⁶² Edquist, Charles. "Towards a holistic innovation policy: Can the Swedish National Innovation Council (NIC) be a role model?" *Research Policy* 48, n.º 4, 2019. https://doi.org/10.1016/j.respol.2018.10.008. ¹⁶³ In this respect, the Centro de Excelencia "Severo Ochoa" and the Unidades de Excelencia "María de Maeztu" are particularly noteworthy. For further details, see: Department of Science and Innovation. "Apoyo y acreditación de Centros de Excelencia «Severo Ochoa» y a Unidades de Excelencia «María de Maeztu»." Department of Science and Innovation, https://www.ciencia.gob.es/portal/site/MICINN/menuitem.7eeac5cd3 45b4f34f09dfd1001432ea0/?vgnextoid=cba733a6368c2310VgnVCM 1000001d04140aRCRD.

¹⁶⁴ Bell, Alex, *et al.* "Who Becomes an Inventor in America? The Importance of Exposure to Innovation." *The Quarterly Journal of Economics* 134, n.º 2, 2019. https://doi.org/10.1093/qje/qjy028.

¹⁶⁵ European Commission. "European research area (ERA)." European Commission, https://ec.europa.eu/info/research-and-innovation/ strategy/era_en#:~:text=The%20European%20Research%20 Area%20(ERA)%20is%20the%20ambition%20to%20create, and%20 technology%20across%20the%20EU.&text=ERA%20was%20launched%20in%202000, revitalise%20it%20began%20in%202018.

¹⁶⁶ Some examples of venture capital investment experiences. For further details, refer to: Tresmares Capital. "Plataforma de financiación independiente." Tresmares Capital, https://www.tresmarescapital.com/ filosofia/#%20.

¹⁶⁷ In the particular case of SMEs, the draft of the "Recovery, Transformation and Resilience Plan" dedicates in its component 13 "Boosting SMEs" almost 5 billion euros, of which a significant part is expected to be devoted to their digitalisation and to boosting their growth. See: Government of Spain. *Recovery, Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf.

¹⁶⁸ The draft "Recovery, Transformation and Resilience Plan" devotes in its component 15 "Digital connectivity, boosting cybersecurity and 5G deployment" almost 4 billion euros to improving telecommunications infrastructure (ultrafast broadband, 5G network deployment) and digital connectivity. See: *Ibid.*

¹⁶⁹ Fraunhofer-Gesellschaft, https://www.fraunhofer.de/en.html.

¹⁷⁰ Industrial Technology Research Institute (ITRI), https://www.itri.org. tw/english/.

¹⁷¹ Electronics and Telecommunications Research Institute (ETRI), https://www.etri.re.kr/eng/main/main.etri.

¹⁷² TNO innovation for life, https://www.tno.nl/en/.

¹⁷³ Tecnalia, https://www.tecnalia.com/.

¹⁷⁴ The"*Green Tech*" incubator provides funding to selected *startups* of 150,000 euros in the pre-seed phase, and of up to 500,000 aditional euros for those showing the best results. For further details, see: Linares, Pedro, and Marta Suárez-Varela. "Cómo usar los fondos europeos para acelerar la transición ecológica." *EsadeEcPol-Center for Economic Policy*, n.º5, 2021. https://www.esade.edu/ecpol/es/publicaciones/ fondos-europeos-transicion-ecologica/; and Ministère de la Transition Écologique. "La Greentech innovation." Ministère de la Transition

¹⁷⁵ For further details, see: Lacuesta, Aitor, and Patrocinio Tello. "Los comités nacionales de productividad." *Banco de España, Boletín*

Económico, 2016. https://www.bde.es/f/webbde/SES/Secciones/ Publicaciones /InformesBoletinesRevistas /BoletinEconomico/ descargar/16/nov/fich/be1611-art4.pdf; and Renda, Andrea, and Sean Dougherty. "Pro-Productivity Institutions: Learning from National Experience." *OECD Education Working Papers*, n.º 7, Paris: OECD Publishing, 2017. https://doi.org/10.1787/d1615666-en.

¹⁷⁶ European Commission. "National Productivity Boards." European Commission, https://ec.europa.eu/info/business-economy-euro/ economic-and-fiscal-policy-coordination/national-productivityboards_en.

¹⁷⁷ Institute for Fiscal Studies, https://www.ifs.org.uk/.

¹⁷⁸ CPB Netherlands Bureau for Economic Policy Analysis, https://www.cpb.nl/en.

¹⁷⁹ The draft of the "Recovery, Transformation and Resilience Plan" devotes, in its component 11 "Modernisation of Public Administrations", around 2,000 million euros to projects for the digitalisation of the General State Administration and the digital transformation and modernisation of territorial public administrations. See: Government of Spain. *Recovery, Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

¹⁸⁰ A representative example is the digitalisation process carried out by the Tax Agency.

¹⁸¹ Agence Française de Développement. "Proyecto OPAL: El Big Data al Servicio del Desarrollo." Agence Française de Développement, https:// www.afd.fr/es/actualites/proyecto-opal-el-big-data-al-servicio-deldesarrollo

¹⁸² International Labour Organization, and OECD. *Tackling vulnerability in the informal economy*. Development Centre Studies, Paris: OECD Publishing, 2019. https://doi.org/10.1787/939b7bcd-en.

¹⁸³ Tax Agency. Plan Estratégico de la Agencia Tributaria 2020-2023. Madrid, 2020. https://www.agenciatributaria.es/static_files/ AEAT/Contenidos_Comunes/La_Agencia_Tributaria/Planificacion/ PlanEstrategico2020_2023/PlanEstrategico2020.pdf.

¹⁸⁴ The efficiency index is defined as the ratio between the amount collected for the fight against tax and customs fraud and the amount of the Tax Agency's annual budget. The latter includes the cost of all the functions carried out by the Tax Agency, all of which contribute to fulfilling its mission of ensuring the correct application of the State tax and customs system. The results show that this rate has doubled in the last decade, from 5.7 euros in 2008 to 11.1 euros in 2018. For further details, see: Tax Agency. *Memoria 2018. Cuadro 16: Efficiency index* Madrid, 2018. https://www.agenciatributaria.es/AEAT.internet/Inicio/ La_Agencia_Tributaria/Memorias_y_estadisticas_tributarias/Memorias/ Memorias_de_la_Agencia_Tributaria/_Ayuda_Memoria_2018/_Ayuda_ Memoria_2018.html

¹⁸⁵ According to 2009 data, in Spain there were 1,928 citizens for every tax agency employee, compared to 875 in the EU-8 and 896 in the EU-27. For further details, see: Onrubia, Jorge. "La reforma de la administración tributaria: mitos y realidades." In Durán, José María, and Alejandro Esteller Moré (dirs.) *Por una verdadera reforma fiscal*. Madrid: Ariel Economía, 2013. ¹⁸⁶Onrubia, Jorge. "La administración tributaria en España: diagnóstico y propuestas de reforma." In Durán, José María, and Alejandro Esteller Moré (dirs.) *De nuestros impuestos y su administración*. Barcelona: Economía UB, 2015.

¹⁸⁷ Department of Finance. Informe de la comisión de expertos para la revisión del modelo de financiación autonómica. Madrid, 2017. https:// www.hacienda.gob.es/CDI/sist%20financiacion%20y%20deuda/ informaciónccaa/informe_final_comisión_reforma_sfa.pdf.

¹⁸⁸ OCDE. Tax Administration 2019. Comparative Information on OECD and Other Advanced and Emerging Economies. Paris: OECD Publishing, 2019. http://www.oecd.org/ctp/administration/taxadministration-23077727.htm.

¹⁸⁹ Some interesting experiences in neighbouring countries include letters encouraging compliance (UK), assessment of knowledge and attitudes towards taxation among young people (Canada) or simplification of administrative procedures (Denmark). For other social measures to improve citizens' tax compliance, see: Goenaga Ruiz de Zuazu, María. "¿Qué hacer para combatir la economía sumergida y el fraude fiscal en España?: una perspectiva social." In Santiago Lago Peñas (dir.). *Black economy and tax fraud in Spain: ¿qué sabemos? ¿qué podemos hacer*? Madrid: Funcas, 2018. 119-145. https://www. funcas.es/libro/economia-sumergida-y-fraude-fiscal-en-espana-quesabemos-que-podemos-hacer-junio-2018/.

¹⁹⁰ For example, avoiding short-term actions such as tax amnesties, which, although they do return tax revenues to the country in the short term, can have pernicious effects on tax morale in the medium and long term. For further details, see: Goenaga Ruiz de Zuazu, María. "¿Qué hacer para combatir la economía sumergida y el fraude fiscal en España?: una perspectiva social." In Santiago Lago Peñas (dir.). *Economía sumergida y fraude fiscal en España: ¿qué sabemos? ¿qué podemos hacer?* Madrid: Funcas, 2018. 119-145. https://www.funcas.es/libro/economia-sumergida-y-fraude-fiscal-enespana-que-sabemos-que-podemos-hacer-junio-2018/.

¹⁹¹ Tax Agency. "Tax and Civic Education Portal (PECT)" Tax Agency.https://www.agenciatributaria.es/AEAT.educacion/ InformacionEducacion_es_ES.html.

¹⁹²European Commission. *The EU budget powering the recovery plan for Europe*. Brussels, 2020.https://eur-lex.europa.eu/legal-content/EN/TX T/?uri=COM%3A2020%3A442%3AFIN.

¹⁹³ For example, in an economy where tourism is a relevant sector, the development of new ICT applications, either to increase service efficiency or to improve the tourism offer, can become a smart specialisation if the new activity attracts sufficient resources and allows competitive advantages to be created. See: European Commission. 2014. https://ec.europa.eu/regional_policy/sources/docgener/ informat/2014/smart_specialisation_es.pdf; and Halleux, Vivienne. "Especialización inteligente: el concepto y su aplicación a la política de cohesión de la UE." *Servicio de Estudios del Parlamento Europeo*, n.º 573.912, 2016. https://www.europarl.europa.eu/RegData/etudes/ BRIE/2016/573912/EPRS_BRI(2016)573912_ES.pdf.

¹⁹⁴ The Atlas recommends Spain to follow a "*parsimonious Industrial Policy Approach: limited opportunities require addressing bottlenecks, to help jump short distances, into related products.*" In other words, Spain has many opportunities at a very "short distance" and to take advantage of them it only needs to remove the bottlenecks that prevent it from "making the leap" to products with greater added value. See: Atlas of Economic Complexity, https://atlas.cid.harvard.edu/.

¹⁹⁵ European Structural and Investment Funds. ESIF 2014-2020: ESIF 2014-2020: *Financial implementation (total cost) by Country*. European Commission, 2020. https://cohesiondata. ec.europa.eu/stories/s/Information-maps-tracking-progress-in-investment-a/wjiv-jyr9.

CHALLENGE #2: MOVE TO THE FOREFRONT OF EDUCATION

¹The General Education Law of 1970 was a first step towards the modernisation of the education system in Spain. See: Official State Gazette. *Ley Orgánica 14/1970, de 4 de agosto de, General de Educación y Financiamiento de la Reforma Educativa*. Madrid, 1970. https://www.boe.es/boe/dias/1970/08/06/pdfs/A12525-12546.pdf.

² Official State Gazette *Spanish Constitution* Art. 27. Madrid, 1978.https://www.boe.es/legislacion/documentos/Constitucion CASTELLANO.pdf.

³ Between 1977 and 2000, public spending on education as a percentage of GDP increased from 2.1% to 4.4%, a level similar to that observed in 2018. For further details, see: Department of Education and Vocational Training. *Gasto Público en educación en relación al P.I.B. por cobertura económica, tipo de administración y periodo.* https://www.educacionyfp.gob.es/servicios-al-ciudadano/estadisticas/recursos-economicos/gasto-publico/series-2018-dp.html; and UNESCO. *Government expenditure on education as a percentage of GDP* (%). http://data.uis.unesco.org/#.

⁴ Department of Education and Vocational Training. *Enseñanzas no universitarias. Sociedad de la información y la comunicación en los centros educativos. Series.* http://www.educacionyfp.gob.es/servicios-alciudadano/estadisticas/no-universitaria/centros/sociedad-informacion/ series.html.

⁵ Viñao, Antonio. Escuela para todos: Educación y modernidad en la España del siglo XX. Madrid: Marcial Pons Historia, 2004.

⁶ For further details, see: Marchesi, Álvaro. "La LOGSE en la educación española. Breve relato de un cambio histórico." *Avances En Supervisión Educativa*, n.º 33, 2020. https://doi.org/10.23824/ase.v0i33.681; and Martín Ortega, Elena. "El papel del currículo en la reforma educativa española." *Investigación en la Escuela*, n.º 36, 1998. https://dialnet. unirioja.es/servlet/articulo?codigo=116998.

⁷ Benayas del Álamo, Javier, *et al.* "Educación para la sostenibilidad en España. Reflexiones y propuestas." *Documento de trabajo Opex*, n.º 86/2017, 2017. http://www.fundacionalternativas.org/public/storage/ opex_documentos_archivos/81ef826c30f2322a5c9c8536a50faf20. pdf

⁸Colectivo Lorenzo Luzuriaga. *Logros, problemas y retos del Sistema Educativo Español: La formación del profesorado. 2014.* http:// www.colectivolorenzoluzuriaga.com/PDF/FORMACION%20DEL%20 PROFESORADO.pdf.

⁹ Castillo Arredondo, Santiago, and Jesús Cabrerizo Diago. *Evaluación educativa de aprendizajes y competencias*. Madrid: Prentice Hall, 2010.

¹⁰ In the 1980s, the average number of students per teacher in secondary education in Spain was more than 20, while in 2017 it was 12. This ranks our country in the European average. For further details, see: World Bank. *Pupil-teacher ratio in secondary education (headcount basis)*. https://datatopics.worldbank.org/ education/. ¹¹García Rubio, Juan. "Evolución legislativa de la educación inclusiva en España." *Revista Nacional e Internacional de Educación Inclusiva, n.º* 10, 2017. https://revistaeducacioninclusiva.es/index.php/REI/article/ view/271/0.

¹² The percentage of students with scholarships in non-university education is calculated as the quotient between the number of students with scholarships in compulsory education, pre-primary education, special education and non-university post-compulsory education, and the total number of students in non-university education. For further details, see: Department of Education and Vocational Training. *Alumnado de Enseñanzas de Régimen General por titularidad del centro, comunidad autónoma y periodo*. http://estadisticas.mecd. gob.es/EducaDynPx/educabase/index.htm?type=pcaxis&path=/ Educacion/Alumnado/Matriculado/Series20/SeriesAlumnado&file=pcax is&l=s0; and Department of Education and Vocational Training. *Anuario estadístico. Las cifras de la educación en España [B5. Las becas y ayudas a la educación]*. https://www.educacionyfp.gob.es/serviciosal-ciudadano/estadisticas/indicadores/cifras-educacion-espana.html

¹³ Department of Education and Vocational Training. Enseñanzas no universitarias. Alumnado matriculado. Series. Alumnado matriculado por enseñanza. Enseñanzas de Régimen General; y Alumnado extranjero por enseñanza. Madrid, 2020. http://www.educacionyfp.gob.es/serviciosal-ciudadano/estadisticas/no-universitaria/alumnado/matriculado/ series.html.

¹⁴ Between 2000 and 2018, secondary school repetition rates have fallen from 13% to 9%. For further details, see: Department of Education and Vocational Training. *Sistema estatal de indicadores de la educación*. https://www.educacionyfp.gob.es/inee/indicadores/ sistema-estatal.html

¹⁵ De la Fuente, Ángel, and Rafael Doménech. "El nivel educativo de la población en España y sus regiones: 1960-2011." *Investigaciones Regionales – Journal of Regional Research*, 34. 2016. http://www.aecr. org/images/ImatgesArticles/2016/5/04_DELAFUENTE.pdf

¹⁶ The 1980 figure is from De la Fuente and Domenech, while the 2019 figure is from Eurostat. For further details, see: De la Fuente, Ángel, and Rafael Doménech. "El nivel educativo de la población en España y sus regiones: 1960-2011." *Investigaciones Regionales – Journal of Regional Research*, 34. 2016. http://www. aecr.org/images/ImatgesArticles/2016/5/04_DELAFUENTE.pdf; y Eurostat. *Population by educational attainment level, sex and age* (%) *[edat_lfs_9903]*. https://ec.europa.eu/eurostat/data/database.

¹⁷ Updated figures for Spain have been provided by Felgueroso, Gutiérrez-Domènech and Jiménez-Martín. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For more details on the construction of the EU-8, see the *Apunte metodológico* número I. For further details, see: Eurostat. *Early leavers from education and training by sex and labour status [edat_lfse_14]*. https://ec.europa.eu/ eurostat/data/database; and Felgueroso, Florentino, Maria GutiérrezDomènech, and Sergi Jiménez-Martín. "¿Por qué el abandono escolar se ha mantenido tan elevado en España en las últimas dos décadas? El papel de la Ley de Educación (LOGSE)." FEDEA, 2013. https:// documentos.fedea.net/pubs/ee/2013/02-2013.pdf.

¹⁸Until 2003 the series in De la Fuente and Domenech (population over 25 years old) are used, and between 2004 and 2019 the Eurostat series (population between 25 and 74 years old) are used. For further details, see: De la Fuente, Ángel, and Rafael Doménech. "El nivel educativo de la población en España y sus regiones: 1960-2011." *Investigaciones Regionales – Journal of Regional Research*, 34. 2016. http://www. aecr.org/images/ImatgesArticles/2016/5/04_DELAFUENTE.pdf; and Eurostat. *Population by educational attainment level, sex and age* (%) [edat_lfs_9903]. https://ec.europa.eu/eurostat/data/database.

¹⁹ Department of Education and Vocational Training. *Publicaciones de la Estadística de la Educación en España Curso 1977-1978. Tasas de escolaridad, por edad y enseñanza*. Madrid: INE, 1980. http://biblioteca-central.educacion.gob.es/record=b1200460~S0*spi.

²⁰ In 2018, Spain had an enrolment rate for the population under the age of 2 of 27% (EU-8: 17% and EU-27: 11%) and 60% for 2 year olds (EU-8: 56% and EU-27: 36%). The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further information, see: Eurostat. *Pupils in early childhood and primary education by education level and age - as % of corresponding age population [educ_uoe_enrp07]*. https://ec.europa.eu/eurostat/data/database; and Department of Education and Vocational Training. *Escolarización y entorno educativo. Tasas de escolarización en las edades teóricas de los niveles no obligatorios. Pre-primary education.* Madrid, 2020. https://www.educacionyfp.gob.es/inee/indicadores/sistema-estatal/mapa-indicadores.html.

²¹ In 2018, Spain had an enrolment rate for the 3-year-old population of 96% (EU-8: 87% and EU-27: 86%), 98% for the 4-year-old population (EU-8: 95% and EU-27: 93%) and 98% for the 5-year-old population (EU-8: 96% and EU-27: 94%). The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: *Ibid.*

²² On the importance of early education, see: Heckman, James J. "Schools, skills and synapses." *Economic Inquiry* 46, n.º 3, 2008. https://doi.org/10.1111/j.1465-7295.2008.00163.x; and Cunha, Flavio, and James J. Heckman. "Formulating, Identifying and Estimating the Technology of Cognitive and Noncognitive Skill Formation." *Journal of Human Resources* 43, n.º 4, 2008. https://www.jstor. org/stable/40057370. On the positive effect of early education on health, see: Campbell, Frances, *et al.* "Early Childhood Investments Substantially Boost Adult Health." Science 343, n.º 6178, 2014. https:// science.sciencemag.org/content/343/6178/1478.

²³OECD. "How does access to early childhood services affect the participation of women in the labour market?". *Education indicators in focus*. 2018. https://www.oecd-ilibrary.org/docserver/232211ca-en.pdf?expires=1 603983633&id=id&accname=guest&checksum=7B18F2602C83FA 5E8D5DF681EE4E3464.

²⁴ The EU-22 include all the EU-27 member countries that are also members of the OECD. This excludes Bulgaria, Croatia, Cyprus, Malta and Romania. ²⁵ The EU-8 average is constructed as the simple average of the values of the individual countries. For further details, see: OECD. OECD *Skills Outlook 2013. First results from the Survey of Adults Skills Figure 3.2* (*L*). Paris: OECD Publishing, 2013. https://www.oecd.org/skills/piaac/ Skills%20volume%201%20(eng)--full%20v12--eBook%20(04%20 11%202013).pdf.

²⁶ Thanks to the increase in school enrolment and the democratisation of degrees between 1985- 2005, the weight of social origin in the professional destiny of students has been reduced by 30%. In other words, thanks to education, social equality of opportunity has increased by 30%. For further details, see: Martínez-Celorrio, Xavier, and Antoni Marín Saldo. "Educación y movilidad social en España." *Informe España 2012. Fundación Encuentro*. 2012. https://www.fund-encuentro.org/ informe_espana/indiceinforme.php?id=IE19.

²⁷ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The EU-27 does not include Cyprus, Ireland, Malta, Poland and Romania due to lack of data availability. For further details, see: OECD. *PISA 2015 Results (Volume V): Collaborative Problem Solving. Figure V.4.7.* Paris: OECD Publishing, 2017. https://doi.org/10.1787/9789264285521-en.

²⁸ For further details, see: Echazarra, Alfonso, and Thomas Radinger. "Learning in rural schools: Insights from PISA, TALIS and the literature." *OECD Education Working Papers*, n.º 196, Paris: OECD Publishing, 2019. http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?co te=EDU/WKP(2019)4&docLanguage=En; y Goerlich Gisbert, Francisco, and Ernest Reig Martínez (dirs.). Las áreas urbanas funcionales en España. *Economía y calidad de vida*. Bilbao: Fundación BBVA, 2020. https://www.fbbva.es/wp-content/uploads/2020/06/DE2020_areasurbanas-funcionales_ivie_web.pdf.

²⁹ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The EU-27 does not include Cyprus due to lack of data. The data for Spain is taken from the document of the Department of Education and Vocational Training. For further details, see: Department of Education and Vocational Training. *PISA 2018 Resultados de lectura en España*. Madrid, 2020. Https://www.educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/2018/pisa-2018-informes-es.html;; and OECD. *PISA 2018 Results (Volume II). Where all students can succeed. Academic resilience.* Paris: OECD Publishing, 2019. https://doi.org/10.1787/b5fd1b8f-en.

³⁰ OIDEL, NOVAE and TERRAE. *Freedom of Education Index Worldwide Report 2016 on Freedom of Education*. 2018. https://www.novaeterrae. eu/images/FEI_completo_Eng_Fra.pdf.

³¹ The EU-8 and the EU-27 are constructed as the simple average of the values of the individual countries. In the index of students' respect for people from other cultures, the EU-27 does not include the Czech Republic, Cyprus, Denmark, Luxembourg, Belgium, the Netherlands, Sweden and Finland due to lack of data availability. On the indicator of average performance in global competencies, the OECD is the aggregate reported by the institution itself. On the bullying indicator, the EU-22 include all the EU-27 member countries that are also members of the OECD. This excludes Bulgaria, Croatia, Cyprus, Malta and Romania. This variable is only available by parents' level of education and, in order to synthesise it into a single indicator, the average has been calculated. For further details, see: OECD. *Education at a glance 2020, Figura A6.2*. Paris: OECD Publishing, 2020. Https://doi.org/10.1787/69096873en; and Department of Education and Vocational Training. *PISA 2018 Competencia global, Figura 3.7a and Figura 6.1.* Madrid, 2020. https://www.educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/pisa-2018/pisa-2018-informes-es.html.

³² Data from 2018. For further details, see: Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad*. Madrid, 2019. https:// www.savethechildren.es/sites/default/files/imce/dossier_pisa2018_ espanadatos.pdf; and Department of Education and Vocational Training. *Sistema Estatal de Indicadores de la Educación 2020*. Madrid, 2020. https://www.educacionyfp.gob.es/dam/jcr:7bd02364-3fd2-405f-b0d6-4fe05debbd38/seie-2020.pdf.

³³ For further details, see: Jacob, Brian A., and Lars Lefgren. "The Effect of Grade Retention on High School Completion." *American Economic Journal: Applied Economics* 1, n°. 3, 2009. https://www.jstor.org/stable/25760170?seq=1; and OECD. *Education Policy Outlook Spain*. Paris: OECD Publishing, 2018. https://www.educacionyfp.gob.es/dam/jcr:a4319a40-3163-42eba432-74dc95dbadb3/education-policy-outlook-country-profilespain-2018.pdf.

³⁴ European Commission. Communication of the Commission Europe 2020: the European Union strategy for growth and employment. COM(2010) 2020 final. Brussels, 2020. https://eur-lex.europa.eu/ LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:ES:PDF.

³⁵ This phenomenon affects mainly men. In 2019, the early school leaving rate in Spain was 21% for males and 13% for females. For further details, see: Eurostat. *Early leavers from education and training* [edat_lfse_14]. https://ec.europa.eu/eurostat/data/database.

³⁶ This was especially the case after the 2008 crisis and the expansion of the construction industry, since before the crisis they were getting high-paying jobs and there was no lack of demand for labour. For further details, see: Serrano, Lorenzo, *et al.* "El abandono educativo temprano: análisis del caso español." *Instituto Valenciano de Investigaciones Económicas*, 2013. http://web2016.ivie.es/wp-content/ uploads/2017/06/Informe_Abandono_Educativo_Temprano.pdf.

³⁷ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Early leavers from education and training [edat_lfse_14]*. https://ec.europa.eu/eurostat/data/database.

³⁸ The figure is from 2019. For further details, see: INE. *Encuesta de población activa*. *Activos por nivel de formación alcanzado, sexo y grupo de edad*. https://www.ine.es/dynt3/inebase/es/index. htm?padre=811&capsel=813.

³⁹ This means that they have only primary or secondary general education (compulsory secondary education and Bachillerato).

⁴⁰ Note that Spain's educational structure has an "hourglass" shape as opposed to the "barrel" shape of other European states, which seems to be better aligned with the requirements of the productive system. The EU-8 is constructed as the simple average of the values for each of its countries and the EU-27 and the OECD are the aggregate indicators reported by Eurostat and the OECD respectively. For further details, see: Eurostat. *Population by educational attainment level, sex and age (%)* - main indicators [edat_lfse_03]. https://ec.europa.eu/eurostat/data/ database; and OCDE. *Educational attainment and labour-force status*. https://stats.oecd.org/.

⁴¹The chapter uses PISA for the comparison of learning levels, as it is the most robust source at present. In the future, as other studies such as the Estudio Internacional de Tendencias en Matemáticas y Ciencias (TIMSS, *Trends in International Mathematics and Science Study* (TIMSS)), the Estudio Internacional para el Progreso de la Comprensión Lectora (PIRLS, *Progress in International Reading Literacy Study*), or other diagnostic assessments are available and sufficiently reliable, it would be interesting to incorporate them into the analysis. For further details, see: TIMSS & PIRLS International Study Center, https://timssandpirls.bc.edu/.

⁴² For example, students with disabilities that prevented them from filling in the test booklets or those students who did not have a full year of schooling in Spain and did not have a sufficient command of the language of the test. For further details, see: Department of Education and Vocational Training. *PISA 2003. Matemáticas. Informe español.* Madrid, 2008. https://www.educacionyfp.gob.es/inee/dam/ jcr:e33efca0-7c9b-4039-975f-c6875bcc36b0/pisa2003mat.pdf.

⁴³ The EU-8 is constructed as the simple average of the values for each of its countries and does not include Finland due to lack of data availability. The OECD average is the aggregate indicator reported by the institution itself. For further details, see: OECD. *PISA 2015 Results (Volume I): Excellence and Equity in Education. Figure I.7.1.* Paris: OECD Publishing, 2016. https://doi.org/10.1787/9789264266490-en.

⁴⁴ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. For further details, see: OECD. PISA 2018 Results (Volume I): *What Students Know and Can Do. Annex A2 Results for countries and economies. Change in the enrollment of 15-year-olds in grade 7 and above (PISA 2003 through PISA 2018)* [coverage index 3. coverage of the national 15-year-old population]. https://doi.org/10.1787/5f07c754-en.

⁴⁵ It is worth noting that many high-performing EU and OECD countries (such as Australia, Canada, Ireland, Belgium, Finland, South Korea or New Zealand) have experienced declines in learning, even larger than Spain, since 2009, which explains the decline in the OECD, EU-22 and EU-8 over the last decade. For further details, see: OECD. *Education at a Glance 2020*. Paris: OECD Publishing, 2020. http://www.oecd.org/education/education-at-a-glance-19991487. htm/?refcode=20190209ig.

⁴⁶ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The OECD average is the aggregate indicator reported by the institution itself and refers specifically to the OECD-23, which does not include Austria, Chile, Colombia, Estonia, Israel, Lithuania, Slovenia, Luxembourg, the Netherlands, Slovakia, Spain, Turkey, the United Kingdom and the United States . Estonia is the EU-27 country that scored the best in 2018 and Bulgaria, the one that scored the worst. The 2018 figure for Spain is obtained from the Department of Education and Vocational Training (2019). For further details, see: Department of Education and Vocational Training. PISA 2018. Madrid, 2019. https://sede.

educacion.gob.es/publiventa/pisa-2018-programa-para-la-evaluacioninternacional-de-los-estudiantes-informe-espanol/evaluacionexamenes/23505; Department of Education and Vocational Training. PISA 2018 Resultados de lectura en España. Madrid, 2020. https:// www.educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/ pisa-2018/pisa-2018-informes-es.html; and OECD. PISA 2018 Results (Volume I): What Students Know and Can Do. Annex B1 Results for countries and economies. Mean reading performance, 2003 through 2018. https://doi.org/10.1787/5f07c754-en.

⁴⁷ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The OECD average is the aggregate indicator reported by the institution itself and refers specifically to the OECD-29 which does not include Austria, Chile, Colombia, Estonia, Israel, Lithuania, Slovenia and the United Kingdom. Estonia is the EU-27 country that scored the best in 2018 and Bulgaria, the one that scored the worst. For further details, see: OECD. *PISA 2018 Results (Volume I): What Students Know and Can Do. Annex B1 Results for countries and economies. Mean mathematics performance, 2003 through 2018.* https://doi.org/10.1787/5f07c754-en.

⁴⁸ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The OECD average is the aggregate indicator reported by the institution itself and refers specifically to the OECD-36 which does not include Austria. Estonia is the EU-27 country that scored the best in 2018 and Bulgaria, the one that scored the worst. For further details, see: OECD. PISA 2018 Results (Volume I): What Students Know and Can Do. Annex B1 Results for countries and economies. Mean science performance, 2006 through 2018. https://doi.org/10.1787/5f07c754-en.

⁴⁹ The EU-8 and EU-22 are constructed as the simple average of the values of the individual reported countries, and the average of the OECD is the aggregate indicator reported by the same institution. The EU-27 does not include Ireland and Poland due to lack of data. Estonia is the EU-27 country that scored the best and Bulgaria, the one that scored the worst. For further details, see: Mo, Jeffrey. *Collaborative Problem Solving*. PISA in Focus, n° 78, Paris: OECD Publishing, 2017. https://doi.org/10.1787/cdae6d2e-en; and OECD. PISA 2018 Results (Volume IV): Are students smart about money? Paris: OECD Publishing, 2020. https://www.oecd-ilibrary.org/education/pisa-2018-results-volume-iv_48ebd1ba-en.

⁵⁰ With regard to PISA results, see: OECD. *Education at a Glance* 2020. Paris: OECD Publishing, 2020. http://www.oecd.org/education/ education-at-a-glance-19991487.htm/?refcode=20190209ig. We found similar results when we looked at other international tests. For example, TIMSS (mathematics and science) and PIRLS (reading). In science, the proportion of students with *an advanced level* is 2 percentage points (pp) lower than the EU-8 (5% and 7%, respectively) and the proportion of students with a high level is 3 pp lower (34% and 37%, respectively). In mathematics, the proportion of students with an advanced level is 4 pp lower than the EU-8 (3% and 7%, respectively) and the proportion of students with a high level is 10 pp lower (27% and 37%, respectively). In reading comprehension, the proportion of students with an advanced level is 4 pp lower than in the EU-8 (6% and

10%, respectively) and the proportion of students with a high level is 7 pp lower (39% and 46%, respectively). For further details, see, among others: Martin, Michael O., et al. TIMSS 2015 International Results in Science. TIMSS & PIRLS International Study Center. Massachusetts: Boston College, 2015. https://www.educacionyfp.gob.es/inee/ dam/jcr:7bfa71d4-bef3-4efc-9bd3-a0db51dd3861/timss2015international-results-in-science.pdf; Mullis, Ina V. S., et al. TIMSS 2015 International Results in Mathematics. TIMSS & PIRLS International Study Center. Massachusetts: Boston College, 2016. https://www. educacionyfp.gob.es/inee/dam/jcr:e650c54d-2315-4467-8edce32b0643527b/timss2015-international-results-in-mathematics. pdf; and Mullis, Ina V.S., et al. PIRLS 2016 International Results in Reading. TIMSS & PIRLS International Study Center. Massachusetts: Boston College, 2017. https://www.educacionyfp.gob.es/inee/dam/ jcr:16027373-dfd0-4005-a318-6f6d5d040a81/INFORME%20 INTERNACIONAL%20PIRLS%202016.pdf.

⁵¹School segregation is defined as the deviations or differences between the composition of schools and the composition of the environment in which they are located. The profile can be socio-economic, academic or "ethnic".

⁵² For further details, see: Herrera Sosa, Katia Marina, *et al.* "Education in the EU: diverging learning opportunities? - an analysis of a decade and a half of skills using the Program for International Student Assessment (PISA) in the European Union (English)." *Washington, D.C.*: *World Bank Group, 2018.* http://documents.worldbank.org/curated/ en/894191528957211270/Education-in-the-EU-diverging-learningopportunities-an-analysis-of-a-decade-and-a-half-of-skills-using-the-Program-for-International-Student-Assessment-PISA-in-the-European-Union

⁵³ Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad*. Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/ dossier_pisa2018_espanadatos.pdf

⁵⁴ Data from 2015. The EU-22 excludes Sweden, Denmark and Finland due to data availability. For further details, see: Fernández Enguita, Mariano, Luis Mena Martínez, and Jaime Riviere Gómez. "Fracaso y abandono escolar en España." Fundación la Caixa, 2010. http:// gidid.unizar.es/viejo/chen/chaime/asigna/sistemasbienestar/textos/ ENGUITA-2010.pdf; Gortazar, Lucas. "¿Favorece el sistema educativo español la igualdad de oportunidades?" ICE, Economía de la Educación y Política Educativa, n.º 910, 2019. http://www.revistasice.com/index. php/ICE/article/view/6917/6936; Herrera Sosa, Katia Marina, et al. "Education in the EU: diverging learning opportunities? - an analysis of a decade and a half of skills using the Program for International Student Assessment (PISA) in the European Union (English)." Washington, D.C.: World Bank Group, 2018. http://documents.worldbank.org/curated/ en/894191528957211270/Education-in-the-EU-diverging-learningopportunities-an-analysis-of-a-decade-and-a-half-of-skills-using-the-Program-for-International-Student-Assessment-PISA-in-the-European-Union; and OECD. PISA 2015 Results (Volume I): Excellence and Equity in Education. Paris: OECD Publishing, 2019. https://www.oecd.org/ education/pisa-2015-results-volume-i-9789264266490-en.htm.

⁵⁵Between 2006 and 2018, socio-economic school segregation in Spain (measured using the Gorard Index) has risen from 0.28 to 0.3. In 2018, the EU-8 and EU-22 averages were 0.28 and 0.29, respectively. The Gorard index shows the difference between the weight of a minority

group (in this case the most vulnerable students, defined as the 25% with the lowest social background) and the total members of the group (the whole student body). In simpler terms, this index shows the proportion of children who would need to transfer to other schools to desegregate the territory. In our country, school segregation is closely associated with residential segregation, the existence of the dual publicprivate network and the planning and admission policies for educational provision. At a regional level, it is quite heterogeneous and in some autonomous communities, such as Andalusia, the Basque Country and especially Madrid, it has increased in recent years. On this question, see: Ferrer, Álvaro. Todo lo que debes saber de PISA 2018 sobre equidad. Madrid, 2019. https://www.savethechildren.es/sites/default/ files/imce/dossier pisa2018 espanadatos.pdf; and Ferrer, Álvaro and Lucía Martínez. "Mézclate conmigo. De la segregación socioeconómica a la educación inclusiva." Save the Children. Madrid, 2019. https://www. savethechildren.es/sites/default/files/imce/docs/mezclate_conmigo. pdf.

⁵⁶ At equal proficiency in mathematics and science, the *odds ratio* (depicted in the graph) is the ratio between the probability of repeating an academic year for a student in the lowest quartile by socioeconomic level and the highest quartile by socio-economic level. The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The OECD average is the aggregate indicator reported by the institution itself. For further details, see: Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad*. Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/dossier_pisa2018_espanadatos.pdf.

⁵⁷ Educational mobility is approximated by the ratio between the number of years of schooling of parents and children. The higher the association, the lower the educational mobility. The EU-8 is constructed as the simple average of the values of the individual reported countries, but does not include Austria due to lack of data availability. The OECD average is the aggregate indicator reported by the institution itself and refers specifically to the OECD-29 which does not include Austria, Chile, Colombia, Estonia, Israel, Lithuania, Slovenia and the United Kingdom. For further details, see Fig. 5.13. Intergenerational educational persistence en: OECD. A Broken Social Elevator? How to Promote Social Mobility. Paris: OECD Publishing, 2018. https://doi. org/10.1787/9789264301085-en.

⁵⁸ OECD. *Education at a Glance* 2020. Paris: OECD Publishing, 2019. http://www.oecd.org/education/education-at-a-glance-19991487. htm/?refcode=20190209ig.

⁵⁹ For further details, see: Fernández Enguita, Mariano. "'Y, si no te gusta, te aguantas.' En torno a algunos indicadores del malestar del alumnado." *Indicadores comentados sobre el estado del sistema educativo español. Fundación Ramón Areces.* Madrid, 2018. Https://www.fundacionareces. es/recursos/doc/portal/2018/03/20/indicadores-comentados-sobreel-estado-del-sistema-educativo-espanol-2018.pdf;; World Health Organization. Spotlight on adolescent health and well-being. Findings from the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey in Europe and Canada. International report. Vol. 1. Key findings. Copenhague: WHO Regional Office for Europe, 2020. https://apps.who. int/iris/bitstream/handle/10665/332091/9789289055000-eng.pdf. ⁶⁰ The EU-22 is constructed as the simple average of the values of the individual countries. For further details, see: World Health Organisation. Health Behaviour in School-aged Children. *Proportion of young people who like school a lot [HBSC_42]*. https://gateway.euro.who.int/en/ datasets/hbsc/.

⁶¹ For further details, see: Aparicio-Fenoll, Ainhoa. "Returns to Education and Educational Outcomes: *The Case of the Spanish Housing Boom*", Journal of Human Capital 10, n.º 2, 2016. https:// doi. org/10.1086/686154; and Lacuesta, Aitor, Sergio Puente, and Ernesto Villanueva. "The schooling response to a sustained increase in low-skill wages: evidence from Spain 1989-2009." SERIEs 11, 2020. https://doi. org/10.1007/s13209-020-00218-0.

⁶² For further details, see: Official State Gazette. *Ley Orgánica 2/2006, de 3 de mayo de, Educación (LOE)*. Madrid, 2006. https://www.boe.es/ buscar/pdf/2006/BOE-A-2006-7899-consolidado.pdf;Official State Gazette. *Ley Orgánica 8/2013, de 9 de diciembre, para la Mejora de la Calidad Educativa (LOMCE)*. Madrid, 2013. https://www.boe.es/eli/ es/lo/2013/12/09/8; and Official State Gazette. *Ley Orgánica 3/2020, de 29 de diciembre de, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación*. Madrid, 2020. https://www.boe.es/boe/ dias/2020/12/30/pdfs/BOE-A-2020-17264.pdf.

⁶³ OECD. PISA 2015 Results (Volume V): *Collaborative Problem Solving, PISA*. Paris: OECD Publishing, 2017. https://doi. org/10.1787/9789264285521-en.

⁶⁴ Overall, the effect of teacher quality ("having a good teacher") on student learning is guite important. Academic research focuses on the 'added value' that a particular teacher has on educational outcomes. That is, controlling for student characteristics (e.g. socio-economic status or previous grades), and contextual characteristics (e.g. school, class), they identify what is the causal improvement in learning from having a particular teacher. For example, evidence for the USA shows that increasing a teacher's added value in a standard deviation (i.e. the difference between an average teacher and one at the 84th percentile of the distribution) accounts for between 0.1 and 0.2 of a standard deviation of cognitive improvement for students. In addition, a good teacher improves students' non-cognitive performance (reduces absences and repetition), which are good predictors of essential variables such as successfully completing high school or taking the university entrance exam. See: Jackson, C. Kirabo, Jonah E. Rockoff, and Douglas O. Staiger. "Teacher effects and teacher-related policies." Annual Review of Economics 6, 2014. https://doi.org/10.1146/annureveconomics-080213-040845; and Jackson, C. Kirabo. "What do test scores miss? The importance of teacher effects on non-test score outcomes." Journal of Political Economy 126, n.º 5, 2018. https://doi. org/10.1086/699018. For further details, also refer to: Calero, Jorge, and J. Oriol Escardíbul. "Teacher quality and student skill acquisition. An analysis based on PIRLS-2011 outcomes." Journal of Educational studies, 2019. https://doi.org/10.1080/03055698.2019.1628710; Hargreaves, Andy, and Michael Fullan. Professional Capital: Transforming Teaching in Every School. New York: Teachers College Press, 2012; y Jackson, C. Kirabo, and Elias Bruegmann. "Teaching Students and Teaching Each Other: The Importance of Peer Learning for Teachers." American Economic Journal: Applied Economics 1, n.º 4, 2009. https:// www.jstor.org/stable/25760183?seq=1.

⁶⁵Colectivo Lorenzo Luzuriaga. *Logros, problemas y retos del Sistema*

Educativo Español: La formación del profesorado. 2014. http:// www.colectivolorenzoluzuriaga.com/PDF/FORMACION%20DEL%20 PROFESORADO.pdf.

⁶⁶ Manso, Jesús, and José Moya (coord.). Profesión y profesionalidad docente: Una acción educativa comprometida con el desarrollo humano. Red por el Diálogo Educativo, 2019. https://www.dialogorede.es/wpcontent/uploads/2019/04/LIBRO_PROFESION_DOCENTE.pdf.

⁶⁷ For instance, for the case of Finland, see: García Perales, Nuria, and Miguel A. Martín Sánchez. "Algunas notas en perspectiva comparada sobre formación de maestros: el caso de España y de Finlandia." Tejuelo 13, 2012. https://dialnet.unirioja.es/servlet/articulo?codigo=3804433; Melgarejo Draper, Javier. "La selección y formación del profesorado: clave para comprender el excelente nivel de competencia lectora de los alumnos finlandeses." Revista de Educación, n.º 13, 2006. http:// www.educacionyfp.gob.es/dam/jcr:36aab44a-2675-4abd-9ab0-99460cc664b7/re200614-pdf.pdf; and Saavedra, Jaime, Hanna Alasuutari and Marcela Gutiérrez. "Los maestros y la confianza, los pilares del sistema educativo de Finlandia." World Bank Blogs, 2019. https://blogs.worldbank.org/es/education/los-maestros-y-la-confianzalos-pilares-del-sistema-educativo-de-finlandia. For instance, for the case of Japan, see: Ramírez Carpeño, Eva, and Yoko Mekochi. "Initial teacher education in Japan and Spain. A comparative study." Revista Española de Educación Comparada 25, 2015. http://revistas.uned.es/ index.php/REEC/article/view/14786/13159.

⁶⁸ Admission marks for undergraduate degrees of newly admitted students in on-site public universities. For further details, see: Department of Universities. *Datos y cifras del Sistema Universitario Español - Publicación 2019-2020*. Madrid, 2020. https://www.ciencia. gob.es/stfls/MICINN/Universidades/Ficheros/Estadisticas/Informe_ Datos_Cifras_Sistema_Universitario_Espanol_2019-2020.pdf.

⁶⁹ In the case of "the best teachers receive recognition from their peers", the reference year is 2013. The OECD average is the aggregate indicator reported by the institution itself. For further details, see: OECD. *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*. Paris: OECD Publishing, 2019. https://doi. org/10.1787/1d0bc92a-en; and OECD. *TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals*. Paris: OECD Publishing, 2020. https://doi.org/10.1787/19cf08df-en.

⁷⁰ The "extra" effect of a "good" teacher on the results of a student from a disadvantaged background is greater than for a student from a favourable socio-economic background who, irrespective of teacher quality, has other tools and resources at his or her disposal to progress. In other words, the importance of teachers is key for both students from favourable and vulnerable backgrounds, but is higher in the latter case. For further details, see: Calero, Jorge, and J. Oriol Escardíbul. "Teacher quality and student skill acquisition. An analysis based on PIRLS-2011 outcomes." *Journal of Educational studies*, 2019. https://doi.org/10.1 080/03055698.2019.1628710; and López Rupérez, Francisco, Isabel García García, and Eva Expósito Casas. *Liderazgo de la dirección y feedback formativo: Dos pilares básicos de la gobernanza escolar.* Centro de Enseñanza Universitaria Sek, 2019.

⁷¹ De Puelles Benítez, Manuel. "Reflexiones sobre cuarenta años de educación en España o la irresistible seducción de las leyes." *Historia y Memoria de la Educación*, n.º 3, 2016. https://dialnet.unirioja.es/servlet/ articulo?codigo=5455665. ⁷² León, Sandra, and Mónica Ferrín Pereira. "Intergovernmental Cooperation in a Decentralized System: *the Sectoral Conferences in Spain." South European Society and Politics* 16, n.º 4, 2011. https://doi. org/10.1080/13608746.2011.602849.

⁷³ In Spain, only 24% of school leaders have significant responsibility for school tasks (both pedagogical and resource management), compared to 63% in the OECD as a whole. According to research by Hanushek, Link, and Woessmann, school autonomy is a key determinant of educational performance, especially in some dimensions such as academic content design and staff management. For further details, see: Hanushek, Eric A., Susanne Link, and Ludger Woessmann. "Does school autonomy make sense everywhere? Panel estimates from PISA." Journal of Development Economics 104, 2013, https://doi.org/10.1016/j. jdeveco.2012.08.002; OECD. Education Policy Outlook. Spain. 2018. http://www.oecd.org/education/Education-Policy-Outlook-Country-Profile-Spain-2018.pdf; OECD. TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners. Paris: OECD Publishing, 2019. https://doi.org/10.1787/1d0bc92a-en; and OECD. TALIS 2018 Results (Volume II): Teachers and School Leaders as Valued Professionals. Paris: OECD Publishing, 2020. https://doi.org/10.1787/19cf08df-en.

⁷⁴ Bolívar Botía, Antonio. "Políticas de gestión escolar desde una perspectiva comparada: la excepción ibérica." *ICE, Economía de la Educación y Política Educativa*, n.º 910, 2019. http://www.revistasice. com/index.php/ICE/article/view/6916/6937.

⁷⁵ In fact, literature shows that, in European and OECD countries, greater school autonomy is associated with better outcomes for the education system. For further details, see: Balázs, Égert, Jarmila Botev, and David Turner. "The Contribution of Human Capital and Its Policies to per Capita Income in Europe and the OECD." *European Economic Review* 129, 2020. https://doi.org/10.1016/j.euroecorev.2020.103560.

⁷⁶ Pritchett, Lant. "Creating Education Systems Coherent for Learning Outcomes: Making the Transition from Schooling to Learning." *Research on improving systems of education Working Papers*, n.º 15/005, 2015. https://riseprogramme.org/sites/default/files/inline-files/RISE_WP-005_Pritchett_1.pdf.

⁷⁷ The OECD average is the aggregate indicator reported by the institution itself. For further details, see: OECD. *Education at a Glance 2018. Percentage of decisions taken at each level of government in public lower secondary education, by domain [Table D6.2].* Paris: OECD Publishing, 2019. https://doi.org/10.1787/eag-2018-en.

⁷⁸ López Rupérez, Francisco, Isabel García García, and Eva Expósito Casas. La calidad de la gobernanza del sistema educativo español. Un estudio empírico. Universidad Camilo José Cela, 2017. https://www. ucjc.edu/wp-content/uploads/Gobernanza_Digital.pdf.

⁷⁹ Roldán, Toni, and Antonio Cabrales. "Dos acuerdos educativos para la legislatura: una propuesta transversal." *EsadeEcPol - Center for Economic Policy & Political Economy*, 2020. https://www.esade.edu/ itemsweb/wi/research/ecpol/EsadeEcPol_policybrief1.pdf.

⁸⁰ Red por el Diálogo Educativo. "Hacia un nuevo modelo de evaluación, responsabilidad y mejora educativa." *Cuadernos de pedagogía*, nº 504. 2019 https://dialnet.unirioja.es/servlet/articulo?codigo=7192409.

⁸¹ For further details, see: De la Rica, Sara, Lucas Gortazar, and Ainhoa Vega Bayo. "Análisis de los resultados de aprendizaje del sistema." *Fundación ISEAK*, 2019. https://iseak.eu/documentos/analisis-delos-resultados-de-aprendizaje-del-sistema-educativo-vasco/; y Marcenero-Gutiérrez, Oscar, and Anna Vignoles. "A comparison of teacher and test-based assessment for Spanish primary and secondary students." *Journal of Educational Research* 57, n.º 1, 2015. https://www. tandfonline.com/doi/abs/10.1080/00131881.2014.983720.

⁸² Marina, J. Antonio, Carmen Pellicer, and Jesús Manso. *Libro blanco de la profesión docente y su entorno escolar.* Fundación Ciudadanía y Valores, 2015. http://www.funciva.org/wp-content/uploads/2016/11/ Libro-blanco-de-la-profesi%C3%B3n-docente.pdf.

⁸³ Álvarez López, Gabriel. "La evaluación de la educación básica en el sistema educativo español: Estudio comparado en el ámbito de las Comunidades Autónomas." Universidad Autónoma de Madrid, 2017. https://repositorio.uam.es/handle/10486/679872.

⁸⁴ Between 1977 and 2000, public spending on education as a percentage of GDP increased from 2.1% to 4.2% (the latter, similar to the level observed in 2017). For further details, see: UNESCO. *Government expenditure on education as a percentage of GDP* (%). http://data.uis.unesco.org/#.

⁸⁵ Several factors could explain this figure: the lower importance that Spain attaches to education compared to other EU-8 countries; the inability to create a political consensus that guarantees a sustained increase in education spending; or the smaller size of the public education sector in Spain and the higher private spending by households (double the EU-22 average). This last fact is associated with the notable weight that the subsidised model has in our country, accounting for 25% of the education system. Para más detalles, véase: OECD. Education at a Glance 2018. Paris: OECD Publishing, 2018. https://doi.org/10.1787/ eag-2018-en; Pérez García, Francisco, and Ezequiel Uriel Jiménez. "Cuentas de la educación en España, 2000-2013: Recursos, gastos y resultados." Fundación BBVA, 2016. https://www.fbbva.es/wp-content/ uploads/2017/07/DE_2016_IVIE_Cuentas_de_la_educacion.pdf; and Gortazar, Lucas (coord.). La financiación del sistema educativo: invertir en calidad, equidad e inclusión. Red por el Diálogo Educativo y Asociación Nacional de Editores de Libros y material de Enseñanza, 2020. https://www.dialogorede.es/wp-content/uploads/2020/12/3libro-financiacion.pdf.

⁸⁶ Public expenditure on education includes both expenditure on preprimary, primary and secondary education and expenditure on postcompulsory education (bachillerato, vocational training and university). In 2018 (latest year available), pre-primary, primary and secondary education accounted for around 60% of total public spending on education in our country. Between 1977 and 1994, for the case of Spain, the UNESCO time series has been used, while since 1995 (the first year available) the series of the Department of Education and Vocational Training has been used. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries and include all the available data for each year. For further details, see: Department of Education and Vocational Training. Gasto Público en educación en relación al P.I.B. por cobertura económica, tipo de administración y periodo. https://www.educacionyfp.gob.es/servicios-al-ciudadano/ estadisticas/recursos-economicos/gasto-publico/series-2018-dp.html; and UNESCO. Government expenditure on education as a percentage of GDP (%). http://data.uis.unesco.org/#.

⁸⁷ Data in constant Purchasing Power Parity (PPP) prices. PPP makes

it possible to compare income levels between countries, taking into account differences in the cost of living. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further information, see: Eurostat. *Public expenditure on education per pupil/ student based on FTE by education level and programme orientation [educ_uoe_fine09]*. https://ec.europa.eu/eurostat/data/database; and OCDE. *Purchasing power parities*. https://data.oecd.org/conversion/ purchasing-power-parities-ppp.htm.

⁸⁸ In 2016, the percentage of education expenditure on capital goods in Spain was 3% of the total in primary and secondary education, while in the OECD and EU-22 it was 7%. For further details, see: OECD. *Education at a glance 2019. Table C6.1. Share of current and capital expenditure.* Paris: OECD Publishing, 2019. https://doi.org/10.1787/ f8d7880d-en.

⁸⁹ Gortazar, Lucas (coord.). La financiación del sistema educativo: invertir en calidad, equidad e inclusión. Red por el Diálogo Educativo y Asociación Nacional de Editores de Libros y material de Enseñanza, 2020. https://www.dialogorede.es/wp-content/uploads/2020/12/3libro-financiacion.pdf.

⁹⁰ The digitalisation of the education sector, which has been progressing over the last decade, helped to reduce the negative effect of confinement, providing schools and teachers with equipment and allowing teaching to continue remotely. Without these resources, the learning loss would have been more pronounced. In general, households also did their best to support and monitor their children's school work. However, the absence or scarcity of technological resources, which affects the most disadvantaged Spanish households, made it almost impossible for many children and adolescents to continue their education remotely. On this issue, see: Fernández Enguita, Mariano. "Una pandemia imprevisible ha traído la brecha previsible." Cuaderno de campo, https://blog.enguita. info/2020/03/una-pandemia-imprevisible-ha-traido-la.html; Moreno, J. Manuel, and Lucas Gortazar. "Preparación de las escuelas para el aprendizaje digital, en opinión de los directores. Un análisis de PISA 2018 y sus implicaciones para la respuesta a la crisis del COVID-19." World Bank Blogs, 2020. https://blogs.worldbank.org/es/education/ schools-readiness-digital-learning-eyes-principals-analysis-pisa-2018-and-its; and Zubillaga, Ainara, and Lucas Gortazar. COVID-19 y educación I: problemas, respuestas y escenarios. Fundación COTEC, 2020. https://online.flippingbook.com/view/967738/.

⁹¹Bonal, Xavier, and Sheila González Motos. "Proyecto - Desigualdades de aprendizaje en el confinamiento." UAB blog, 2020. https://blogs. uab.cat/aprenentatgeiconfinament/es/equip/. Similar data on activity, communication and distance learning gaps have been found in studies carried out in other countries, e.g. the Netherlands, Belgium, the UK and the US. For further details, see: Andrew, Alison, et al. "Learning during the lockdown: real-time data on children's experiences during home learning." Institute for Fiscal Studies, 2020. https://www.ifs.org. uk/publications/14848; Bacher-Hicks, Andrew, Joshua Goodman, and Christine Mulhern. "Inequality in household adaptation to schooling shocks: Covid-induced online learning engagement in real time." Journal of Public Economics 193, 2021. https://doi.org/10.1016/j. jpubeco.2020.104345; Bol, Thijs. "Inequality in homeschooling during the Corona crisis in the Netherlands. First results from the LISS Panel." SocArXiv Papers, 2020. https://osf.io/preprints/socarxiv/hf32q/; Engzell, Per, Arun Frey, and Mark Verhagen. "Learning Loss Due to School

Closures During the COVID-19 Pandemic." *SocArXiv Papers*, 2020. https://osf.io/preprints/socarxiv/ve4z7/; and Maldonado, Joana Elisa, and Kristof De Witte. "The effect of school closures on standardised student test outcomes." *Discussion Paper Series*, n.º DPS20.17, 2020. https://lirias.kuleuven.be/3189074?limo=0.

⁹² Authors' own, based on PISA 2018 data. For further details, see: OECD. *PISA* 2018. https://www.oecd.org/pisa/.

⁹³ Authors' own, based on PISA 2018 data. The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. For further details, see: OECD. *PISA* 2018. https:// www.oecd.org/pisa/.

⁹⁴ Data until 29 March 2021. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: UNESCO. "Total duration of school closures." UNESCO, https://en.unesco.org/covid19/educationresponse#schoolclosures.

⁹⁵ For further details, see: Hanushek, Eric A., and Ludger Woessmann. "The Economic Impacts of Learning Losses." *Paris: OECD Publishing*, 2020. https://www.oecd.org/education/The-economic-impacts-ofcoronavirus-covid-19-learning-losses.pdf; and Sanz, Ismael, Miguel Cuerdo, and Luis Miguel Doncel. "El efecto del coronavirus en el aprendizaje de los alumnos: efecto en el uso de recursos digitales educativos." In Ismael Sanz (ed.). *El capital humano en la economía digital.* Madrid: Funcas, Papeles de Economía Española, n.º 166, 2020. 2-18. https://www.funcas.es/wp-content/uploads/2021/01/PEE-166-WEB.pdf.

⁹⁶ For further details, see: Martínez García, José S., and Pablo Molina Derteano. "Fracaso escolar, crisis económica y desigualdad de oportunidades educativas: España y Argentina." Papers UAB, 2019. https://papers.uab.cat/article/view/v104-n2-martinez-molina; and Serrano, Lorenzo, et al. "El abandono educativo temprano: análisis del caso español." Instituto Valenciano de Investigaciones Económicas, 2013. http://web2016.ivie.es/wp-content/uploads/2017/06/Informe_ Abandono_Educativo_Temprano.pdf.

⁹⁷ Ruiz-Valenzuela, Jenifer. "Job loss at home: children's school performance during the Great Recession." *SERIEs* 11, 2020. https://doi.org/10.1007/s13209-020-00217-1.

⁹⁸ Department of Education and Vocational Training Sistema Estatal de Indicadores de la Educación 2020. Madrid, 2020. https:// www.educacionyfp.gob.es/dam/jcr:7bd02364-3fd2-405f-b0d6-4fe05debbd38/seie-2020.pdf.

^{9°} For further details, see: De la Fuente, Ángel. "Gasto educativo por regiones y niveles en 2015 y su evolución desde 2000." *BBVA Research, Documentos de trabajo*, n.º 18/10, 2018. https://www.bbvaresearch. com/wp-content/uploads/2018/09/Datos-gasto-edu-2000-15. pdf; and Pérez García, Francisco, and Ezequiel Uriel Jiménez. "Cuentas de la educación en España, 2000-2013: Recursos, gastos y resultados." *Fundación BBVA*, 2016. https://www.fbbva.es/wp-content/uploads/2017/07/DE_2016_IVIE_Cuentas_de_la_educacion.pdf.

¹⁰⁰The most recent evidence shows that investment in school education has a positive causal effect on students' learning and academic progress, especially for the most vulnerable ones. For further details, see: Jackson, C. Kirabo. "Does School Spending Matter? The New Literature on an Old Question." N*BER Working Paper*, n.º 25368, 2018. https://www.nber.org/papers/w25368.pdf.

¹⁰¹ Department of Education and *Vocational* Training *Financiación educativa. Public and household expenditure on education in Spain [F1.1]* 2020. http://www.educacionyfp.gob.es/inee/indicadores/ sistema-estatal/mapa-indicadores/segunda-epoca-2018-en-adelante. html.

¹⁰² The government earmarked an additional 2 billion euros to strengthen education systems during the pandemic, to which European recovery funds will have to be added. For further details, see: Official State Gazette. *Real Decreto-ley 22/2020, de 16 de junio, por el que se regula la creación del Fondo COVID-19 y se establecen las reglas relativas a su distribución y libramiento.* Madrid, 2020. https://www.boe. es/boe/dias/2020/06/17/pdfs/BOE-A-2020-6232.pdf; y Gobierno de España. *Proyecto Plan de Recuperación, Transformación y Resiliencia.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

¹⁰³World Economic Forum *New Vision for Education: Fostering Social and Emotional Learning through Technology*. Ginebra, 2016. http://www3. weforum.org/docs/WEF_New_Vision_for_Education.pdf; and OECD. *Trends shaping education 2019. Paris: OECD Publishing*, 2019. https:// doi.org/10.1787/22187049.

¹⁰⁴ Elliott, Stuart W. *Computers and the Future of Skill Demand*. Paris: OECD Publishing, 2017. https://doi.org/10.1787/9789264284395-en.

¹⁰⁵Key competences identified by the European Commission include: 1) competence in reading and writing in the mother tongue; 2) foreign language competence; 3) mathematics and science competences; 4) digital competence; 5) interpersonal competences and ability to acquire new competences ("learning to learn"); 6) social and civic competences; 7) entrepreneurial competence; and 8) competence in cultural awareness and expression. For further details, see: European Commission. *Key competences for lifelong learning*. Luxembourg: Publications Office of the EU, 2019. https://op.europa.eu/en/publicationdetail/-/publication/297a33c8-a1f3-11e9-9d01-01aa75ed71a1/ language-en.

¹⁰⁶ European Commission. *Science, research and innovation performance of the EU 2018: Strengthening the foundations for Europe's future.* Luxembourg: Publications Office of the EU, 2018. http://readerasturias. org/wp-content/uploads/2018/04/Informe-sobre-cienciainvestigaci%C3%B3n-e-innovaci%C3%B3n-de-la-UE.pdf.

¹⁰⁷ These projections are based on the Eurostat baseline scenario for population growth up to 2050 and assume the following: 1) a linear decrease in the percentage of students repeating an academic year at age 15 from 28.7% in PISA 2018 to 20% in 2050 and 2) a linear decrease in early school leavers from 17.3% in 2019 to 10% in 2050. For further details, see: Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]*. 2020. https://ec.europa.eu/eurostat/ data/database.

¹⁰⁸Reducing repetition by 18 percentage points would imply an increase of about 12 points in PISA (the marginal effect of reducing repetition by 1 per cent is an improvement of 0.68 points), roughly equivalent to learning almost half a year of schooling in the most advanced countries. For further details, see: García- Pérez, J. Ignacio, Marisa Hidalgo-Hidalgo, and Antonio Robles-Zurita. "Does grade retention affect achievement? Some evidence from PISA." *Pablo de Olavide University*, WP ECON, 2011. http://www.upo.es/serv/bib/wps/econ1109.pdf; and OECD. *PISA 2018*. https://www.oecd.org/pisa/.

¹⁰⁹ In Spain, the repetition rate in primary and secondary education is, on average, 5%, and 28% of students aged 15 have repeated an academic year at least once (in the case of the OECD, this percentage drops to 11%). Convergence to OECD repetition levels would mean reducing average annual repetition by 60% to 2%. Reducing the repetition rate by 1 point would imply a drop in education expenditure per student of approximately 1.25 percentage points (the ratio is greater than unity since repeating students generally require a greater educational effort). Therefore, a reduction of the repetition rate by 3 points (from 5% on average to 2%) would imply a reduction of expenditure in primary and secondary education of 3.75 points. On the other hand, the number of students between primary and secondary education reaches 4.7 million (not including private education). Given that the average expenditure per student is around 5,500 euros, the total expenditure on public education in these educational stages is around 25 billion euros. A reduction of 3.75% results in a saving of 900 million euros. For further details, see: Ferrer, Álvaro. Todo lo que debes saber de PISA 2018 sobre equidad. Madrid, 2019. https://www.savethechildren.es/sites/default/ files/imce/dossier_pisa2018_espanadatos.pdf; and Department of Education and Vocational Training. Sistema Estatal de Indicadores de la Educación 2020. Madrid, 2020. https://www.educacionyfp.gob.es/ dam/jcr:7bd02364-3fd2-405f-b0d6-4fe05debbd38/seie-2020.pdf.

¹¹⁰ Authors' own, based on PISA 2018 data. For further details, see: OECD. *PISA 2018*. https://www.oecd.org/pisa/.

¹¹¹ In this respect, the new Organic Law for the Modification of the LOE (LOMLOE) has eliminated the prevalence of the number of failed subjects for promoting to the next year and has transferred greater power to the teaching staff who, in a collegiate manner, will decide on the progress of each student according to the degree of acquisition of competences. For further details, see: Official State Gazette. *Ley Orgánica 3/2020, de 29 de diciembre de, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación*. Madrid, 2020. https://www.boe.es/boe/dias/2020/12/30/pdfs/BOE-A-2020-17264.pdf.

¹¹² Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad.* Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/ dossier_pisa2018_espanadatos.pdf.

¹¹³ European Commission. *Communication of the Commission Europe* 2020: the European Union strategy for growth and employment. *COM*(2010) 2020 final. Brussels, 2020. https://eur-lex.europa.eu/ LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:ES:PDF.

¹¹⁴ The graph shows the results in Serrano *et al.* (2013) under the assumption that students who do not drop out prematurely complete post-compulsory secondary education. These results do not take into account the general equilibrium effects that an increase in post-secondary graduates could have on the labour market. For further details, see: Serrano, Lorenzo, *et al.* "El abandono educativo temprano: análisis del caso español." Instituto Valenciano de Investigaciones Económicas, 2013. http://web2016.ivie.es/wp-content/uploads/2017/06/Informe_Abandono_Educativo_Temprano.pdf.

¹¹⁵ Eurostat. *Early leavers from education and training [edat_lfse_14]*. https://ec.europa.eu/eurostat/data/database.

¹¹⁶ The effect, between 0.4 and 0.5 percentage points, refers to the increase in the annual rate of GDP growth once the entire active population has achieved higher educational attainment. For further details, see: Hanushek, Eric A., and Ludger Woessmann. "Universal Basic Skills: What countries stand to gain." Paris: OECD Publishing, 2015. https://doi.org/10.1787/9789264234833-en.

¹¹⁷ Kautz, Tim, *et al.* "Fostering and Measuring Skills: Improving Cognitive and Non-Cognitive Skills to Promote Lifetime Success." *NBER Working Paper* n.^o 20749, 2014. https://www.nber.org/papers/w20749.

¹¹⁸ OECD. PISA 2018 Results (Volume I): What Students Know and Can Do. Annex B1 Results for countries and economies. https://doi. org/10.1787/5f07c754-en.

¹¹⁹ The marginal effect of reducing repetition by 1% is 0.68 points in PISA. For further details, see: García- Pérez, J. Ignacio, Marisa Hidalgo-Hidalgo, and Antonio Robles-Zurita. "Does grade retention affect achievement? Some evidence from PISA." *Pablo de Olavide University*, WP ECON, 2011. http://www.upo.es/serv/bib/wps/econ1109.pdf; and OECD. *PISA 2018*. https://www.oecd.org/pisa/.

¹²⁰ OECD. *Trends shaping education 2019. Paris: OECD Publishing,* 2019. https://doi.org/10.1787/22187049.

¹²¹ According to Eurostat's baseline scenario for demographic projections. For further details, see: Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]*. 2020. https://ec.europa.eu/eurostat/data/database.

¹²² In 2018, the latest year available, the number of students per educational group in primary education was 22 and 25 in secondary education. For further details, see: Department of Education and Vocational Training. *Sistema estatal de indicadores de la educación*. https://www.educacionyfp.gob.es/inee/indicadores/sistema-estatal. html.

¹²³ Denmark is taken as a reference for two main reasons: it is a world educational power and has a similar level of per capita income today as Spain will have in 2050 if it implements the changes set out in this *Strategy*.

¹²⁴ Public expenditure on these formative stages would increase by only 3 tenths of GDP. For futher details, see the *Apunte metodológico* número VI. For more data and ideas:

¹²⁵ N kow, Andre, Philip Oreopoulos, y Vincent Quan. "The Impressive Effects of Tutoring on PreK-12 Learning: A Systematic Review and Meta-Analysis of the Experimental Evidence." *NBER Working Paper, n.º* 27476, 2020. https://www.nber.org/papers/w27476.pdf.

¹²⁶ Tuomi, Ilkka. "The Impact of Artificial Intelligence on Learning, Teaching, and Education." *JRC Science for Policy Report*, Luxembourg: Publications Office of the European Union, 2018. https://publications. jrc.ec.europa.eu/repository/bitstream/JRC113226/jrc113226_jrcb4_ the_impact_of_artificial_intelligence_on_learning_final_2.pdf.

¹²⁷ For further details, see: Nkambou, Roger, Roger Azevedo, and Julita Vassileva (eds.). Intelligent Tutoring Systems. Montreal: Springer International Publishing, 2018. https://www.springer.com/ gp/book/9783319914633; and Penstein Rosé, Carolyn, *et al.* (eds.). *Artificial Intelligence in Education*. London: Springer International Publishing, 2018. https://www.springer.com/gp/book/9783319938455.

¹²⁸ Carlana, Michela, and Eliana La Ferrara. "Apart but Connected: Online Tutoring and Student Outcomes during the COVID-19 Pandemic." *HKS Working Paper*, n.º RWP21-001, 2021. https://www.hks.harvard.edu/ publications/apart-connected-online-tutoring-and-student-outcomesduring-covid-19-pandemic.

¹²⁹ A paradigmatic example is the Swedish company *Lexplore*, which has developed a system that quickly scans at-risk students and detects dyslexia by tracking the reader's eye movements. For further details, see: Lexplore, https://www.lexplore.com/.

¹³⁰ For further details, see: Boccanfuso, Laura, *et al.* "Emotional Robot to Examine Differences in Play Patterns and Affective Response of Children with and Without ASD." 2016. https://dl.acm.org/ doi/10.5555/2906831.2906837; and Scassellati, Brian, Henry Admoni, and Maja Mataric. "Robots for use in autism research." *Annual Review of Biomedical Engineering* 14. 2012. https://doi.org/10.1146/annurevbioeng-071811-150036.

¹³¹Tuomi, Ilkka. "The Impact of Artificial Intelligence on Learning, Teaching, and Education." *JRC Science for Policy Report*, Luxembourg: Publications Office of the European Union, 2018. https://publications. jrc.ec.europa.eu/repository/bitstream/JRC113226/jrc113226_jrcb4_ the_impact_of_artificial_intelligence_on_learning_final_2.pdf.

¹³² MIT Technology Review. "Machine Learning Opens Up New Ways to Help People with Disabilities." MIT Technology Review, https://www. technologyreview.com/2017/03/23/68727/machine-learning-opensup-new-ways-to-help-disabled-people/.

¹³³ For a detailed analysis of the relationship between digital technologies and emotional wellness in childhood, see: Burns, Tracey, and Francesca Gootschalk (eds.). *Educación e infancia en el siglo XXI: El bienestar emocional en la era digital*. Madrid: Fundación Santillana, 2020. https://www.oecd.org/education/ceri/Educaci%C3%B3n-einfancia-en-el-siglo-XXI-Bienestar-emocional-en-la-era-digital.pdf.

¹³⁴ The 2003 Brussels European Council already set as a benchmark "to bring the maximum percentage of 15 year olds with level 1 and below in reading literacy in PISA to below 15%" by 2010. For further details, see: European Council. *Council Conclusions on Reference Levels of European Average Performance in Education and Training (Benchmarks)*. Brussels, 2003. https://data.consilium.europa.eu/doc/document/ST-8981-2003-INIT/en/pdf; and Roca Cobo, Enrique. "El abandono temprano en la educación y la formación en España." *Revista de Educación*, n.º extra 1, 2010. http://www.revistaeducacion.educacion.es/re2010/re2010_02. pdf.

¹³⁵ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018 microdata. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The latest data available is from 2018. For further details, see: Ferrer, Álvaro. Todo lo que debes saber de PISA 2018 sobre equidad. Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/dossier_pisa2018_espanadatos.pdf; and OECD *PISA 2018*. https://www.oecd. org/pisa/.

¹³⁶ The early school drop out rate is defined as the percentage of the population between 18 and 24 years of age whose highest educational level is secondary education or lower, and who are not currently in formal education. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2019. For further details, see: Eurostat. *Early leavers from education and training by sex and labour status [edat_lfse_14]*. https://ec.europa.eu/eurostat/data/database.

¹³⁷ The European Strategy set a target of 10% for 2020. For further details, see: European Commission. *Europe 2020: A European strategy for smart, sustainable and inclusive growth*. Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20 EN%20BARROSO%20%20%20007%20-%20Europe%202020%20 -%20EN%20Version.pdf.

¹³⁸ The population aged 25-34 with a qualification higher than secondary education is defined as the percentage of people in this age range whose highest level of education is the second stage of secondary education (Bachillerato or Intermediate Level Vocational Training) or tertiary education (University or Higher Level Vocational Training). The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2019. For further details, see: Eurostat. *Population by educational attainment level, sex and age* (%) - main indicators [edat_lfse_03]._https://ec.europa.eu/eurostat/ data/database

¹³⁹ The odds ratio is used, i.e. at equal mathematics and science proficiency, how many times higher is the probability of repeating an academic year for a student from a more disadvantaged background compared to a student with more resources. For example, a value of 4 means that, with equivalent skills in mathematics and science, a student with fewer resources (25% of students with fewer resources) is four times more likely to have repeated an academic year than a student from a more favourable background (25% of students with more resources). The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018 microdata. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The latest data available is from 2018. For further details, see: Ferrer, Álvaro. Todo lo que debes saber de PISA 2018 sobre equidad. Madrid, 2019. Https://www.educacionyfp.gob.es/inee/evaluacionesinternacionales/pisa/pisa-2018/pisa-2018-informes-es.html;; and OECD .PISA 2018. https://www.oecd.org/pisa.

¹⁴⁰ The percentage of low-achieving 15-year-olds in PISA is defined as the percentage of students below level 2 (below 406 points). The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The figure corresponds to the average of 2015 and 2018. For further details, see: Department of Education and Vocational Training. *PISA 2018 Resultados de lectura en España*. Madrid, 2020. https://www.educacionyfp.gob.es/inee/ evaluaciones-internacionales/pisa/pisa-2018/pisa-2018-informeses.html; and OECD. *PISA 2018 Results (Volume I): What Students Know and Can Do. Tablas I.B1.7, I.B1.8, and I.B1.9*. https://doi. org/10.1787/5f07c754-en. ¹⁴¹The percentage of low-achieving 15-year-olds in PISA is defined as the percentage of students below level 2 (below 406 points). The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The figure corresponds to the average of 2015 and 2018. For further details, see: Department of Education and Vocational Training. *PISA 2018 Resultados de lectura en España*. Madrid, 2020. https://www.educacionyfp.gob.es/inee/ evaluaciones-internacionales/pisa/pisa-2018/pisa-2018-informeses.html; and OECD. *PISA 2018 Results (Volume I): What Students Know and Can Do. Tablas I.B1.7, I.B1.8, and I.B1.9*. https://doi. org/10.1787/5f07c754-en.

¹⁴² Public expenditure on education includes both expenditure on pre-primary, primary and secondary education and expenditure on post-compulsory education (bachillerato, vocational training and university). In 2018 (latest year available), pre-primary, primary and secondary education accounted for around 60% of total public spending on education in our country. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The latest available data for Spain is from 2018, while for the EU-8 and EU-27 it is from 2017. For further details, see: Department of Education and Vocational Training. *Gasto Público en educación en relación al P.I.B. por cobertura económica, tipo de administración y periodo.* http://www. educacionyfp.gob.es/servicios-al-ciudadano/estadisticas/economicas/ gasto.html; and UNESCO. *Government expenditure on education as a percentage of GDP* (%). http://data.uis.unesco.org/#.

¹⁴³ Public expenditure on education of 5.5% of GDP is the result of increasing expenditure per student to current Danish levels and assuming a GDP evolution in line with the EU-8 convergence objective [see chapter 1]. The difference compared to the EU-8, which currently spends 6.1% of its GDP on education, is that the reduction in the number of students will be very sharp in the coming decades, allowing us to increase funding per student significantly without such a sharp increase as a percentage of GDP.

¹⁴⁴ For further details, see: Cox, Cristián. "Construcción política de reformas curriculares: el caso de Chile en los noventa." Profesorado. Revista de currículum y formación del profesorado, n.º 10, 2006. https:// www.ugr.es/~recfpro/rev101ART5.pdf; López Rupérez, Francisco. *El currículo y la educación en el siglo XXI. La preparación del futuro y el enfoque por competencias.* Madrid: Ediciones Narcea, 2020; and Zubillaga del Río, Ainara. "¿Es el sistema español un sistema educativo innovador?" *ICE, Economía de la Educación y Política Educativa*, n.º 910, 2019. http://www.revistasice.com/index.php/ICE/article/ view/6920/6933.

¹⁴⁵ Stiglitz, Joseph E., and Bruce C. Greenwald. *La creación de una sociedad del aprendizaje.* Madrid: La Esfera de los Libros, 2016.

¹⁴⁶ European Commission. *Key competences for lifelong learning*. Luxembourg: Publications Office of the EU, 2019. https://op.europa. eu/en/publication-detail/-/publication/297a33c8-a1f3-11e9-9d01-01aa75ed71a1/language-en.

¹⁴⁷ Elliott, Stuart W. *Computers and the Future of Skill Demand*. Paris: OECD Publishing, 2017. https://doi.org/10.1787/9789264284395-en.

¹⁴⁸ UNESCO. "Futures literacy." UNESCO, https://en.unesco.org/

futuresliteracy.

¹⁴⁹ In terms of integrating the climate agenda into the education curriculum, Finland is a good example to follow. For further details, see: Department of the Environment and Statistics Finland. *Finland's Sixth National Communication under the United Nations Framework Convention on Climate Change: Chapter 9.* Helsinki, 2013. https:// tilastokeskus.fi/tup/khkinv/nc6_chapter_9.pdf.

¹⁵⁰ In this respect, the LOMLOE incorporates a new learning area: "Education in Civic and Ethical Values" which has as its main lines of content "knowledge and respect for Human and Children's Rights, those contained in the Spanish Constitution, education for sustainable development and global citizenship, the social function of taxes and fiscal justice, equality of women and men and the value of respect for diversity, fostering a critical spirit, a culture of peace and non-violence and respect for the environment and animals". For further details, see: Official State Gazette. *Ley Orgánica 3/2020, de 29 de diciembre de, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación*. Madrid, 2020. https://www.boe.es/boe/dias/2020/12/30/ pdfs/BOE-A-2020-17264.pdf.

¹⁵¹ OECD. "La infancia y las tecnologías digitales: tendencias y resultados." In Tracey Burns, and Francesca Gootschalk (eds.). *Educación e infancia en el siglo XXI: El bienestar emocional en la era digital*. Madrid: Fundación Santillana, 2020. https://www.oecd. org/education/ceri/Educaci%C3%B3n-e-infancia-en-el-siglo-XXI-Bienestar-emocional-en-la-era-digital.pdf.

¹⁵²For example, Finland carries out a curriculum review every 10 years and Singapore, every 6 years. For further details, see: Chin, Tang-Yin, and Chew-Leng Poon. "Design and Implementation of the National Primary Science Curriculum: A Partnership Approach in Singapore." *Inquiry into the Singapore Science Classroom*, 2014. https://link.springer.com/ chapter/10.1007%2F978-981-4585-78-1_2;and Tikkanen, Lota, *et al.* "Lessons learnt from a large-scale curriculum reform: The strategies to enhance development work and reduce reform-related stress." *Journal of Educational Change*, nº 21, 2020. https://link.springer.com/ article/10.1007/s10833-019-09363-1.

¹⁵³ Official Gazette of the Spanish Parliament. *Proposición no de Ley presentada por el Grupo Parlamentario Socialista, sobre la creación del Instituto de Desarrollo Curricular.* Madrid, 2020. https://www.congreso.es/public_oficiales/L14/CONG/BOCG/D/BOCG-14-D-137.PDF.

¹⁵⁴ For example, Finland has the *National Forum for Skills Anticipation* For further details, see: Department of Education and Culture of Finland. *Anticipation of skills and education needs in Finland*. 2019. https:// minedu.fi/documents/1410845/4150027/Anticipation+of+skills+and +education+needs/d1a00302-8773-bbe0-39a0-46e0d688d350/An ticipation+of+skills+and+education+needs.pdf.

¹⁵⁵ Moya, José, *et al.* "Documento de líneas de actuación dirigidas a la definición de un modelo profesional docente." *Red por el Diálogo Educativo*, 2018. https://www.dialogorede.es/wp-content/ uploads/2019/03/doc-lineas-concrecion.pdf.

¹⁵⁶ An interesting experience is the case of Australia. For further details, see: OECD. *Improving the Quality of the Selection Process of Teacher Candidates in Australia*. Paris: OECD Publishing, 2018. http://www.oecdteacherready.org/wp-content/uploads/2018/05/FINAL-

REV-Promising-Practice-Australia-4-Improving-quality-of-teachercandidates.pdf.

¹⁵⁷ Evidence shows that mentoring programmes can be an effective policy to improve teacher performance and preparation. For further details, see: Jackson, C. Kirabo, Jonah E. Rockoff, and Douglas O. Staiger. "Teacher effects and teacher-related policies." Annual Review of Economics 6, 2014. https://doi.org/10.1146/annureveconomics-080213-040845; and Rockoff, Jonah E. "Does mentoring reduce turnover and improve skills of new employees? Evidence from teachers in New York City." *NBER Working Paper*, n.º 13868, 2008. https://www.nber.org/papers/w13868.pdf.

¹⁵⁸ Authors' own, based on data from the Department of Education and Vocational Training. For further details, see: Department of Education and Vocational Training. *Enseñanzas no universitarias. Estadística del profesorado y otro personal. Enseñanzas de Régimen General. Profesorado por titularidad del centro, comunidad autónoma/ provincia, sexo y edad.* https://www.educacionyfp.gob.es/servicios-al-ciudadano/ estadísticas/no-universitaria/profesorado/estadística.html.

¹⁵⁹ Department of Education and Vocational Training *Igualdad en* cifras MEFP. Madrid, 2019. https://www.educacionyfp.gob.es/dam/ jcr:957c29bb-ebd1-4e5b-9417-3d163cc32def/cifrasweb.pdf.

¹⁶⁰ For the case of France, see: Piketty, Thomas. "L'impact de la taille des classes et de la ségrégation sociale sur la réussite scolaire dans les écoles françaises: une estimation à partir du panel primaire 1997." 2004. http://piketty.pse.ens.fr/files/Piketty2004b.pdf. For the case of Australia, see: OECD. *Attracting Teachers to Schools in Rural and Remote Areas in Australia*. Paris: OECD Publishing, 2018. http://www.oecdteacherready.org/wp-content/uploads/2018/05/FINAL-REV-Promising-Practice-Australia-1-Attracting-teachers-to-remote-areas-1. pdf.

¹⁶¹ The Territorial Cooperation Programmes are coordinated by the Department of Education and Vocational Training and aim to "promote territorial cooperation in order to achieve general educational objectives, reinforce students' basic skills, foster students' knowledge and appreciation of the cultural and linguistic wealth of the different Autonomous Communities, and contribute to inter-territorial solidarity and territorial balance in compensating for inequalities" For further details, see: Department of Education and Vocational Training. "Programas de Cooperación Territorial." Department of Education and Vocational Training http://www.educacionyfp.gob.es/mc/sgctie/ cooperacion-territorial/programas-cooperacion.html.

¹⁶² Blanchenay, Patrick, and Tracey Burns. "Policy experimentation in complex education systems." In Tracey Burns, and Florian Köster (eds.). *Governing Education in a Complex World*. Paris: OECD Publishing, 2016. https://doi.org/10.1787/9789264255364-10-en.

¹⁶³ Refer to: Department of Education and Science. Madrid, 2005. Madrid, 2005. https://sede.educacion.gob.es/publiventa/d/22315/19/0; and Department of Education and Vocational Training. *Indicadores de la Estrategia 2020 de Educación y Formación*. Madrid, 2020. http://www. educacionyfp.gob.es/servicios-al-ciudadano/estadisticas/internacional/ eurostat/estrategia2020.html.

¹⁶⁴ Council of the European Union. *Council Resolution on a strategic* framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030). 2021. https://

eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=CELEX:32021G02 26(01)&from=EN.

¹⁶⁵ For further details, see: Balázs, Égert, Jarmila Botev, and David Turner. "The Contribution of Human Capital and Its Policies to per Capita Income in Europe and the OECD." *European Economic Review* 129, 2020. https://doi.org/10.1016/j.euroecorev.2020.103560.

¹⁶⁶ In this respect, the LOMLOE is committed to avoiding schools or areas of schools with a high concentration of vulnerable students. For further details, see: Official State Gazette. *Ley Orgánica 3/2020, de 29 de diciembre de, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación.* Madrid, 2020. https://www.boe.es/boe/ dias/2020/12/30/pdfs/BOE-A-2020-17264.pdf.

¹⁶⁷ In this sense, the LOMLOE introduces a new external evaluation system. On the one hand, it recovers the mid-stage census evaluations (4th year of Primary education and 2nd year of secondary education), of a diagnostic nature and with a framework agreed between the Department of Education and Vocational Training and the National Institute for Educational Evaluation, which were already present in the LOE. In addition, it introduces general evaluations of the Spanish education), which will be carried out at national level, and will be sample-based and multi-annual. For further details, see: Official State Gazette. *Ley Orgánica 3/2020, de 29 de diciembre de, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación*. Madrid, 2020. https://www.boe.es/boe/dias/2020/12/30/pdfs/BOE-A-2020-17264.pdf.

¹⁶⁸ Empirical evidence shows that external assessments at student and school level that allow for comparative analysis over time improve students' academic performance. However, using internal tests that simply report without being able to compare them externally does not have an effect on student performance. For further details, see: Bergbauer, Annika B., Eric A. Hanushek, and Ludger Woessmann. "Testing." *NBER Working Paper*, n.º 24836, 2018. https://www.nber. org/papers/w24836.pdf.

¹⁶⁹ Education Endowment Foundation, https://educationendow mentfoundation.org.uk.

¹⁷⁰ Best Evidence Synthesis, https://www.educationcounts.govt.nz/ topics/BES.

¹⁷¹What Works Clearinghouse, https://ies.ed.gov/ncee/wwc/.

¹⁷²For more details on the suitability of split versus continuous working hours, see: Gromada, Anna, and Claire Shewbridge. "Student Learning Time: A Literature Review." *OECD Education Working Papers*, n.º 127, Paris: OECD Publishing, 2016. https://doi.org/10.1787/5jm409kqqkjhen.

¹⁷³ The current mechanism for allocating schools to students is known as the Boston Mechanism. It is characterised by its limited ability to capture household preferences accurately and to foster (strategic) economic segregation. For further details, see: Abdulkadiroglu, Atila, and Tayfun Sönmez. "School choice: A mechanism design approach." *American Economic Review* 93, n.º 3. 2003. https://www.aeaweb. org/articles?id=10.1257/000282803322157061; and Calsamiglia, Caterina, Francisco Martínez-Mora, and Antonio Miralles. "School Choice Design, Risk Aversion, and Cardinal Segregation." *Economic Journal*,

2020. https://academic.oup.com/ej/advance-article/doi/10.1093/ej/ ueaa095/5890338.

¹⁷⁴ The draft of the "Recovery, Transformation and Resilience Plan" can play a key role on this front. Component 19 of the "National Plan for *Digital Skills*" and component 21 "Modernisation and digitalisation of the education system, including early education from 0-3 years" with a joint funding of around 5 billion euros aims, among other things, to increase the provision of portable devices to reduce the digital gap; to improve the digital skills of the teaching staff; and to extend the public offer in the first cycle of pre-primary education. For further details, see: Government of Spain. *Recovery, Transformation and Resilience Plan* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

¹⁷⁵ Balázs, Égert, Jarmila Botev, and David Turner. "The Contribution of Human Capital and Its Policies to per Capita Income in Europe and the OECD." *European Economic Review* 129, 2020. https://doi. org/10.1016/j.euroecorev.2020.103560.

¹⁷⁶ Gortazar, Lucas (coord. *La financiación del sistema educativo: invertir en calidad, equidad e inclusión*. Red por el Diálogo Educativo y Asociación Nacional de Editores de Libros y material de Enseñanza, 2020. https://www.dialogorede.es/wp-content/uploads/2020/12/3libro-financiacion.pdf.

¹⁷⁷ The LOMLOE is committed to moving towards free schooling in subsidised schools. With regard to complementary activities involving a monetary charge, it is determined that: (i) those that are necessary for the curriculum must be scheduled without economic discrimination; (ii) those that are extracurricular cannot be scheduled during school hours; and (iii) complementary services (e.g. canteen or transport) will have additional measures to ensure that economic circumstances do not prevent access. For further details, see: Official State Gazette. Ley Orgánica 3/2020, de 29 de diciembre de, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación. Madrid, 2020. https:// www.boe.es/boe/dias/2020/12/30/pdfs/BOE-A-2020-17264.pdf; Ferrer, Álvaro, and Lucía Martínez. "Mézclate conmigo. De la segregación socioeconómica a la educación inclusiva." Save the Children. Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/docs/ mezclate conmigo.pdf; and Gortazar, Lucas. "Lo bueno, lo ausente y lo malo de la nueva Ley de Educación." EsadeEcPol - Center for Economic Policy & Political Economy, 2020. http://itemsweb.esade.edu/research/ EsadeEcpol-Insight-23-ley-educacion-.pdf

CHALLENGE #3: IMPROVE TRAINING AND RE-SKILLING OF OUR POPULATION

¹Carreras, Albert, and Xavier Tafunell (*coords*). *Estadísticas históricas de España: siglos XIX-XX*. Fundación BBVA, 2005. https://www.fbbva.es/ wp-content/uploads/2017/05/dat/DE_2006_estadisticas_historicas. pdf.

² De la Fuente, Ángel, and Rafael Doménech. "El nivel educativo de la población en España y sus regiones: 1960-2011." *Investigaciones Regionales – Journal of Regional Research* 34, 2016. http://www.aecr. org/images/ImatgesArticles/2016/5/04_DELAFUENTE.pdf.

³ Official State Gazette. *Spanish Constitution Art. 27 y 40*. Madrid, 1978. https://www.boe.es/eli/es/c/1978/12/27/(1)/con.

⁴ In 2018, vocational training accounted for 42% of job vacancies in Spain, while university education accounted for 38%. For further details, see: Adecco. *Informe Infoempleo Adecco: Oferta y Demanda de Empleo en España*. Madrid, 2019. https://cdn.infoempleo.com/ infoempleo/documentacion/Informe-infoempleo-adecco-2019.pdf; Bentolila, Samuel, Antonio Cabrales, and Marcel Jansen. "Does Dual Vocational Education Pay Off." *OECD Employment, Labour and Social Affairs Department*, Paris: OECD Publishing, 2019. https://www.oecd. org/employment/emp/OECD-ELS-Seminars-SBentolila.pdf.

⁵Prior to the current intermediate and higher level Training Cycle, there was the auxiliary technician (FP I) and specialist technician (FP II) qualifications. These vocational training qualifications were modified in the Ley Orgánica 1/1990, de 3 de octubre, de Ordenación General del Sistema Educativo. For further details, see: Official State Gazette. *Ley Orgánica 1/1990, de 3 de octubre, de Ordenación General del Sistema Educativo.* Madrid, 1990. https://www.boe.es/eli/es/lo/1990/10/03/1; and Department of Education and Vocational *Training. Alumnado de Ciclos Formativos de FP Básica/FP Grado Medio/FP Grado Superior por titularidad del centro, comunidad autónoma y curso académico.* http://estadisticas.mecd.gob.es/EducaDynPx/educabase/index. htm?type=pcaxis&path=/Educacion/Alumnado/Matriculado/Series20/ SeriesAlumnado&file=pcaxis&l=s0.

⁶Universitas 21, the other ranking available, places us in 23rd position in the world and 10th position in the EU-27. See: U21. *Ranking of National Higher Education Systems*. https://universitas21.com/sites/ default/files/2020-04/U21_Rankings%20Report_0320_Final_LR%20 Single.pdf.

⁷ The 1980 figure comes from García López and Simancas Gonzáles and the 2018 figure, from the Department of Universities. For further details, see: García López, Marcial, and Esther Simancas González. "Historia de un secuestro: de la Iglesia a la Marca. Evolución histórica de la universidad en España." *Chasqui*, n.º 133, 2016. https://doi. org/10.16921/chasqui. v0i133.2953; and Department of Universities. *Datos y cifras del Sistema Universitario Español - Publicación 2019-2020*. Madrid, 2020. https://www.ciencia.gob.es/stfls/MICINN/ Universidades/Ficheros/Estadisticas/Informe_Datos_Cifras_Sistema_ Universitario_Espanol_2019-2020.pdf.

⁸ Fundación Conocimiento y Desarrollo. *Informe CYD 2018*. Barcelona, 2019. https://www.upo.es/diario/wp-content/uploads/2019/09/ICYD-2018_completo.pdf.

⁹ For further details on the construction of the see the *Methodological note* number 1.

¹⁰ QS Top Universities. "Higher Education System Strength Ranking." QS Top Universities, https://www.topuniversities.com/system-strengthrankings/2018.

¹¹ The Shanghai ranking ranks universities on several indicators of academic or research performance, including alumni and staff winning Nobel Prizes and Fields Medals, most cited researchers, articles published in journals such as Nature or Science, articles indexed in major citation indexes, and the institution's per capita academic performance. For further details, see: Academic Ranking of World Universities. "Number of Universities in top 1000 by country in 2020." Academic Ranking of World Universities, http://www.shanghairanking.com/ ARWU2020.html; World Bank. *Total Population*. https://data.worldbank. org/; and Eurostat. *Population on 1 January 2020 [tps00001]*. https:// ec.europa.eu/eurostat/data/database.

¹² Rahona, Marta Mercedes. "La educación universitaria en España y la inserción laboral de los graduados en la década de los noventa. Un enfoque comparado." *Madrid, Premios Injuve para Tesis Doctoral*, 2008. https://issuu.com/injuve/docs/premiotesis2008.

¹³ Department of Education and Vocational Training. *Anuario Estadístico.* Las cifras de la educación en España en el curso 1996- 1997 y 2017-2018: Las becas y ayudas a la educación. Becarios y becas concedidas en enseñanza universitaria por Universidad. https://www.educacionyfp. gob.es/servicios-al-ciudadano/estadisticas/indicadores/cifraseducacion-espana.html.

¹⁴ In 1977, Spanish universities enrolled a total of 689,971. In 2019, this number was 1,633,358. For further data, see: Bricall, Josep M. *Informe Universidad 2000*. 2000. https://www.observatoriuniversitari. org/es/files/2014/05/Bricall_JM-2000-Informe-Universidad-2000.pdf; and Department of Education and Vocational Training. Matriculados por tipo y modalidad de la universidad, nivel de estudio, sexo y rama de enseñanza. http://estadisticas.mecd.gob.es/EducaDynPx/educabase/ index.htm?type=pcaxis&path=/Universitaria/Alumnado/Nueva_ Estructura/Serie/TotalSUE/&file=pcaxis.

¹⁵ See, for example: World Economic Forum. *The Global Human Capital Report 2017: Preparing People for the Future of Work.* Geneva, 2017. http://www3.weforum.org/docs/WEF_Global_Human_Capital_ Report_2017.pdf; and US News. "Best Countries Survey." US News, https://www.usnews.com/news/best-countries/data-explorer.

¹⁶ Bentolila, Samuel, Florentino Felgueroso, Marcel Jansen, and Juan F. Jimeno. "Lost in Recession: Youth Employment and Earnings in Spain." *FEDEA, Estudios sobre la Economía Española,* n.º 2021/12, 2021. http:// documentos.fedea.net/pubs/eee/eee2015-24.pdf.

¹⁷ Salguero, José Luis. "Historia de la Formación continua en España." AENOA Congreso Virtual, https://congresosdeformacion. com/2016/10/04/historia-de-la-formacion-continua-en-espana/.

¹⁸ Homs, Oriol. "La formación profesional en España: Hacia la sociedad

del conocimiento." *Obra Social, Fundación "La Caixa*", 2008. https:// www.todofp.es/dam/jcr:31fb7120-ffd4-4e07-a025-cc9041be7830/ informe-caixa-version-noviembre-2012-pdf.pdf.

¹⁹ Public expenditure on active training policies went from 0.03% in 1985 to 0.11% in 2018. For further details, see: OECD. *Public expenditure and participant stocks on LMP - Training as a percentage of GDP*. https://stats.oecd.org/.

²⁰ The budget for training for the employed has increased from 110 million in 1993 to 1,142 million in 2019. There were 197,980 participants in 1993 and 4,776,684 in 2019, of which a small proportion (40,421) were unemployed. There were 18,550,726 hours of training delivered in 1993 and 75,486,464 in 2019. For further details, see: FUNDAE. Series estadísticas de participantes en formación y empresas formadoras. https://www.fundae.es/publicaciones/series-estadisticas; FUNDAE. Formación histórica (I-III ANFC y Acciones Complementarias). https://www.fundae.es/publicaciones/sintesis-estadisticas?filterTy pe=7,8,9,10; FUNDAE. Formación para el empleo. Balance de situación 2019. Madrid, 2020. https://www.fundae.es/docs/default-source/ publicaciones-y-evaluaciones/publicaciones-estad%C3%ADstica/ balance-de-situaci%C3%B3n-2019.pdf; and FUNDAE. Indicadores históricos. Formación en el empleo. 1993-2017. Madrid, 2018. https:// www.fundae.es/docs/default-source/publicaciones-y-evaluaciones/ informes-y-balances/balance-20de-20resultados-201993_2017.pdf.

²¹ Data up to 2003 are obtained from FUNDAE's historical training database, while from 2004 onwards the most recent FUNDAE statistical series are used. It should be noted that these courses do not only include employees; a small part may also include training courses for the unemployed. In addition, a person may have participated in different courses and therefore be counted more than once. For further details, see: FUNDAE. *Series estadísticas de participantes en formación y empresas formadoras.* https://www.fundae.es/publicaciones/series-estadísticas; and FUNDAE. *Formación histórica (I-III ANFC y Acciones Complementarias).* https://www.fundae.es/publicaciones/sintesis-esta disticas?filterType=7,8,9,10.

²² Homs, Oriol. "La formación profesional en España: Hacia la sociedad del conocimiento." *Obra Social, Fundación "La Caixa*", 2008. https://www.todofp.es/dam/jcr:31fb7120-ffd4-4e07-a025-cc9041be7830/informe-caixa-version-noviembre-2012-pdf.

²³ Barro, Robert, and Jong-Wha Lee. "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of Development Economics* 104, 2013. https://www.nber.org/papers/w15902; and United Nations. Human Development Report 2018 Statistical Update. http://hdr.undp.org/en/2018-update.

²⁴ De la Fuente, Ángel, and Rafael Doménech. "El nivel educativo de la población en España y sus regiones: 1960-2011." *Investigaciones* Regionales – *Journal of Regional Research* 34, 2016. http://www.aecr. org/images/ImatgesArticles/2016/5/04_DELAFUENTE.pdf.

²⁵ When these data are disaggregated by gender, there are differences between men and women. For men, the proportion of those born in the 1940s with a tertiary degree was 20% and among those born in the 1980s, it was 41%. The increase for women was even more pronounced, from 13% to 52% for the same birth years. For further details, see: Department of Education and Vocational Training. *Explotación de las variables educativas de la encuesta de población* activa / nivel de formación de la población. Población de 25-64 años por grupo de edad, comunidad autónoma, sexo, nivel de formación y año. http://estadisticas.mecd.gob.es/EducaDynPx/educabase/index. htm?type=pcaxis&path=/laborales/epa/nivfor&file=pcaxis&l=s0.

²⁶ The EU-8 average is constructed as the simple average of the values of the individual countries. For further details, see: OECD. OECD Skills Outlook 2013. First results from the Survey of Adults Skills Figure 3.2 (L). Paris: OECD Publishing, 2013. https://www.oecd.org/skills/piaac/ Skills%20volume%201%20(eng)--full%20v12--eBook%20(04%20 11%202013).pdf.

²⁷ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The human capital index calculates the contributions of health and education to worker productivity. The index score ranges from zero to one. For data, see: World Bank. *The Human Capital Index 2020 Update: Human Capital in the Time of COVID-19.* Washington D.C., 2020. http://hdl.handle.net/10986/34432. Similar results in: World Economic Forum. *The Global Human Capital Report 2017: Preparing People for the Future of Work.* Geneva, 2017. http://www3.weforum.org/docs/WEF_Global_Human_Capital_Report_2017.pdf.

²⁸ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. Three levels of education are represented in the graph: i) higher education which includes short post-secondary education (vocational or post-secondary non-tertiary certificates and short-cycle higher or tertiary vocational training), bachelor degree or equivalent, master's degree or equivalent and doctorate; ii) upper secondary education which includes high school, intermediate level vocational training, access course to intermediate level vocational training, basic vocational training and other equivalents; and iii) lower than second stage of secondary education which contains less than primary education, primary education and first stage of secondary education. See: INE. "Clasificación Nacional de Educación 2014. CNED-2014. Clasificación de programas, titulaciones y certificaciones en niveles de formación alcanzados (CNED-A): Estructura." INE, https://www.ine.es/dyngs/INEbase/es/operacion. htm?c=Estadistica C&cid=1254736177034&menu=ultiDatos&i dp=1254735976614; and OECD. Educational attainment and labourforce status y Population data. https://stats.oecd.org/.

²⁹ The percentage of people not completing upper secondary education in Spain is high both among the 55-64 age group (over 60%) and among the younger 25-34 age group (the only country above 30% in the OECD except for Turkey). See figure 2.3 in: OECD. *Skills Matter: Further Results from the Survey of Adult Skills.* Paris: OECD Publishing, 2016. https://doi. org/10.1787/9789264258051-en.

³⁰ "Who do not have any vocational training qualification" means that they have only primary or secondary general education (secondary education and high school).

³¹ The figure corresponds to the year 2019. For further details, see: INE. *Encuesta de población activa. Activos por nivel de formación alcanzado, sexo y grupo de edad.* https://www.ine.es/dyngs/INEbase/ es/operacion.htm?c=Estadistica_C&cid=1254736176918&menu =resultados&secc=1254736195129&idp=1254735976595#!ta bs-1254736195129. ³² The reading comprehension data are taken from Figure 3.2. and the mathematical comprehension data, from table A3.2 (N) of the report mentioned below. The EU-8 and EU-22 have been constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD. In the case of reading literacy, the EU-22 does not include Hungary, Latvia, Luxembourg and Portugal due to lack of data. For its part, the EU-22 of mathematical comprehension does not include Latvia, Luxembourg and Portugal for the same reason. For further details, see: OECD. *Skills Matter: Further Results from the Survey of Adult Skills*. Paris: OECD Publishing, 2016. https://doi.org/10.1787/9789264258051-en.

³³ According to the Adult Education Survey (AES), in 2016, 46% of the Spanish active population did not know any foreign language, one of the worst results among European countries. This is not exclusive to the over-55s, but affects young people between 25 and 34 almost as strongly. See: Eurostat. Number of foreign languages known (self-reported) by labour status [edat_aes_l24]. https://ec.europa. eu/eurostat/data/database. Other studies such as the EF English Proficiency Index or CIS (Anuario CIS 2016, p. 317), confirm these figures. It is estimated that 60% of our adults have no knowledge of the language, well below the EU-8 countries. The EF English Proficiency Index 2019 places Spain, along with Italy, at the bottom of European countries in terms of English proficiency. See: Centro de Investigaciones Sociológicas. Anuario CIS 2016. Madrid: Catalogo de Publicaciones de la Administración Central del Estado, 2017. https://libreria.cis.es/ libros/anuario-cis-2016/9788474767346/; y Education First. EF EPI: Índice EF de nivel de inglés. 2019. https://www.ef.com.es/assetscdn/ WIBIwq6RdJvcD9bc8RMd/legacy/__/~/media/centralefcom/epi/ downloads/full-reports/v9/ef-epi-2019-spanish-euro.pdf.

³⁴ The European Commission's Digital Economy and Society Index (DESI) ranks Spain in a good position in terms of connectivity (broadband coverage) or digitalisation of public services, but does not perform as well in terms of digital technology integration (e-commerce or digitalisation of companies), where it scores at the EU average (41.3/100). Spain's worst score (47.5/100) is in competences in the use of the Internet or other advanced skills that make up the human capital index, below the EU average (49.3/100) and well below the average of the EU-8 countries (60.8/100). See: European Commission. *Digital Economy and Society Index (DESI)*. https://digital-agenda-data. eu/datasets/desi^{<7>}

³⁵ On this matter, see: Bhutoria, Aditi, John Jerrim, and Anna Vignoles. "The financial skills of adults across the world. New estimates from PIAAC." 2018. https://johnjerrim.files.wordpress.com/2018/03/piaac_ working_report_march_2018.docx; and Klapper, Leora, Annamaria Lusardi, and Peter van Oudheusden. *Financial Literacy Around the World: Insights From The Standard & Poor's Ratings Services Global Financial Literacy Survey.* Washington D.C.: Standard & Poor's, 2015. https:// responsiblefinanceforum.org/wp-content/uploads/2015/12/2015-Finlit_paper_17_F3_SINGLES.pdf.

³⁶ Rubio, Diego. "Transferable skills to tackle education obsolescence and foster innovation." *European Commission, Science, Research and Innovation Performance of the EU*. 2018. https://ec.europa.eu/info/sites/ info/files/srip-report-chap-1-3_2018_en.pdf.

³⁷ The values for each indicator correspond to the quintiles of EU

countries' skill levels available (1 for countries with the lowest levels, 5 for countries with the highest levels). See: World Economic Forum. *New Vision for Education: Unlocking the Potential of Technology*. Geneva, 2015. http://www3.weforum.org/docs/WEFUSA_ NewVisionforEducation_Report2015.pdf.

³⁸OECD. Skills for Jobs Mismatch [mismatch]. https://stats.oecd.org/.

³⁹ Proportion of employers with less than primary or primary and secondary education. See: Eurostat. *Self-employment by sex, age and educational attainment level [edat_lfse_03].* https://ec.europa.eu/ eurostat/data/database. Quizá por ello, algunos estudios sitúan a los cuadros directivos españoles a la cola de las grandes economías de Europa en su capacidad de liderazgo y gestión empresarial. See, for example: Banco de España. Informe Anual 2015. 2015. https://www. bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesAnuales/ InformesAnuales/descargar/15/Fich/inf2015.pdf; and World Management Survey. *Management Matters: Manufacturing Report* 2014. 2014. https://cdnstatic8.com/worldmanagementsurvey.org/ wp-content/images/2015/06/Manufacturing-Report-2014-EUROPE-ENGLISH.pdf.

⁴⁰ Manpower. 2018 Talent Shortage Survey. 2018. https:// go.manpowergroup.com/talent-shortage-2018#thereport.

⁴¹ See: Almeida, Rita, and Pedro Carneiro. "The return to firm investments in human capital." *Labour Economics* 16, n.º 1, 2009. https://doi.org/10.1016/j.labeco.2008.06.002; Brunello, Giorgio, Simona Lorena Comi, and Daniela Sonedda. "Training Subsidies and the Wage Returns to Continuing Vocational Training: Evidence from Italian Regions." *Labour Economics* 19, n.º 3, 2012. https://doi.org/10.1016/j. labeco.2012.03.002; CEDEFOP. *The impact of vocational education and training on company performance*. Luxembourg: Publications Office of the European Union, 2011. https://doi.org/10.2801/37083; Dostie, Benoit. "Estimating the returns to firm-sponsored on-the-job and classroom training." *Journal of Human Capital* 7, n.º2, 2013. https:// doi.org/10.1086/671186; and Zwick, Thomas. "Continuing Vocational Training Forms and Establishment Productivity in Germany." *German Economic Review* 6, n.º2, 2005. https://doi.org/10.1111/j.1465-6485.2005.00125.x.

⁴²See: Dorsett, Richard, Silvia Lui, and Martin Weale. "Economic Benefits of Lifelong Learning." *Centre for Learning and Life Chances in Knowledge Economies and Societies (LLAKES) Research Paper*, n.º 13, 2010. https://www.llakes.ac.uk/sites/default/files/DorsettLuiWealeComplete. pdf; Richardson, Katarina, and Gerard J. van den Berg. "Duration Dependence Versus Unobserved Heterogeneity In Treatment Effects: Swedish Labor Market Training And The Transition Rate To Employment." *Journal of Applied Economics* 28, n.º 2, 2012. https:// doi.org/10.1002/jae.2263; and Stenberg, Anders. "Comprehensive Education for the Unemployed: Evaluating the Effects on Unemployment of the Adult Education Initiative in Sweden." *Labour* 19, n.º 1, 2005. htts://doi.org/10.1111/j.1467-9914.2005.00293.x.

⁴³ See: *Blanden, Jo,* et al. "Measuring the Returns to Lifelong Learning", *Economics of Education Review* 31, n.º 4, 2012. https://doi. org/10.1016/j.econedurev.2011.12.009; Brunello, Giorgio, Simona Lorena Comi, and Daniela Sonedda. "Training Subsidies and the Wage Returns to Continuing Vocational Training: Evidence from Italian Regions." *Labour Economics* 19, n.º 3, 2012. https://doi.org/10.1016/j. labeco.2012.03.002; Dearden, Lorraine, *et al.* "The returns to academic and vocational qualifications in the Britain." *Bulletin of Economic Research* 54, n.º 3, 2002. https://doi.org/10.1111/1467-8586.00152; Vignoles, Anna, Augustin De Coulon, and Oscar Marcenaro-Gutierrez. "The Value of Basic Skills in the British Labour Market." *Oxford Economic Papers* 63, n.º 1, 2011. https://doi.org/10.1093/oep/gpq012; Vignoles, Anna, Fernando Galindo-Rueda, and Leon Feinstein. "The Labour Market Impact of Adult Education and Training: A Cohort Analysis." *Scottish Journal of Political Economy* 51, n.º 2, 2004. https://doi.org/10.1111/j.0036-9292.2004.00306.x; and What Works Center for Local Economic Growth. *Evidence Review* 1: *Employment Training*. 2016. https://whatworksgrowth.org/public/files/Policy_Reviews/16-06-15_Employment_Training_Update.pdf.

⁴⁴ At the European level, the results of these strategies have also been limited. *European progression in* Lifelong Learning has stagnated for a decade, and right now there are only 8 member states that will reach the target of 15% of adults participating in lifelong learning set by the Commission for 2020. The rest are in danger of falling behind and losing their competitive advantage over the US. and Asian rivals. See: European Commission. *An in-depth analysis of adult learning policies and their effectiveness in Europe*. Electronic Platform for Adult Learning in Europe (EPALE), 2015. https://epale.ec.europa.eu/en/resource-centre/content/ depth-analysis-adult-learning-policies-and-their-effectiveness-europe; and Lifelong Learning Platform (LLLP). *Feasibility Study for National Lifelong Learning Platforms*. 2018. http://lllplatform.eu/lll/wp-content/ uploads/2018/09/FeasibilityStudy_COMPLETE.pdf.

⁴⁵See: European Commission. "Política europea de cooperación (marco ET 2020)." European Commission, https://ec.europa.eu/education/ policies/european-policy-cooperation/et2020-framework_es; European Commission, *An in-depth analysis of adult learning policies and their effectiveness in Europe*. Electronic Platform for Adult Learning in Europe (EPALE), 2015. https://epale.ec.europa.eu/en/resource-centre/content/ depth-analysis-adult-learning-policies-and-their-effectiveness-europe; and Lifelong Learning Platform (LLLP). *Feasibility Study for National Lifelong Learning Platforms*. 2018. http://lllplatform.eu/lll/wp-content/ uploads/2018/09/FeasibilityStudy_COMPLETE.pdf.

⁴⁶ The EU-8 average is constructed as the simple average of the values of the individual countries. For further details, see: OECD. *Survey of Adult Skills (PIAAC) (2012, 2015)*. http://www.oecd.org/skills/piaac/ publicdataandanalysis/.

⁴⁷ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Participation rate in education and training by age [TRNG_AES_101]*. https://ec.europa.eu/eurostat/data/database.

⁴⁸ The following document highlights three key factors to explain the different levels of business productivity: worker skills, business management and the ability to innovate. See: Syverson, Chad. "What Determines Productivity?" *Journal of Economic Literature* 49, n.º 2, 2011. https://doi.org/10.1257/jel.49.2.326.

⁴⁹ CEDEFOP. "Learning and Innovation in Enterprises." Luxembourg: Publications Office of the European Union, Research Note, n.º 27, 2012. https://www.cedefop.europa.eu/files/5527_en.pdf.

⁵⁰ The data are revealing. In Spain, 48% of the total of almost 23 million adults in the active population have a level of education that

does not qualify them professionally. If we examine the people who applied for jobs in Spain between 2014 and 2019, this percentage rises to 75% (SEPE calculation). See: Brian, Keeley. *Human Capital: How What You Know Shapes Your Life*. Paris: OECD Publishing, 2017. http://www.oecd.org/insights/humancapitalhowwhatyouknowshapes yourlife.htm; Department of Education and Vocational Training. *Plan de Modernización de la Formación Profesional*. Madrid, 2020. https:// www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/educacion/ Documents/2020/220720-Plan_modernizacion_FP.pdf; and OECD. *Education at a Glance 2019*. Paris: OECD Publishing, 2019. https://doi. org/10.1787/f8d7880d-en.

⁵¹Broecke, Stijn. "Do skills matter for wage inequality?" *IZA World of Labor*, n.º 232, 2016. https://doi.org/10.15185/izawol.232.

⁵² See: Sianesi, Barbara, and John Van Reenen. "The Returns to Education: Macroeconomics." *Journal of Economic Surveys* 17, n.º 2, 2003. https://doi.org/10.1111/1467-6419.00192; and OECD. *The OECD Skills Outlook, 2013.* Paris: OECD Publishing, 2013. http://www. oecd.org/skills/piaac/Skills%20volume%201%20(eng)--full%20v12--eBook%20(04%2011%202013).pdf.

⁵³ See: Digby, Cynthia L. B. "The Influences of Socio-Demographic Factors, and Non-Formal and Informal Learning Participation on Adult Environmental Behaviors" *International Electronic Journal of Environmental Education* 3, n.º 1, 2013. https://files.eric.ed.gov/fulltext/ EJ1104862.pdf; and Lipset, Seymour Martin. *Political Man: The Social Bases of Politics*. Garden City, NY: Anchor, 1960.

⁵⁴ See: Yao, Yao,*et al.* "Human Capital and Energy Consumption: Evidence from OECD Countries." *Energy Economics* 84, 2019. https:// doi.org/10.1016/j.eneco.2019.104534; and Sianesi, Barbara, and John Van Reenen. "The Returns to Education: Macroeconomics." *Journal of Economic Surveys* 17, n.º 2, 2003. https://doi.org/10.1111/1467-6419.00192.

⁵⁵ In fact, their graduates today have employability and personal satisfaction rates that are often equal to or higher than those of university graduates. In 2018, vocational training accounted for 42% of job vacancies in Spain, while university education accounted for 38%. For further details, see: Adecco. *Informe Infoempleo Adecco: Oferta y Demanda de Empleo en España*. Madrid: Adecco, 2019. https://cdn. infoempleo.com/infoempleo/documentacion/Informe-infoempleoadecco-2019.pdf. See also: Bentolila, Samuel, Antonio Cabrales, and Marcel Jansen. "Does Dual Vocational Education Pay Off" Presented in: OCDE Employment, Labour and Social Affairs Department, Paris, 27 November 2019. https://www.oecd.org/employment/emp/OECD-ELS-Seminars-SBentolila.pdf.

⁵⁶ The early school leaving rate differs by gender. For example, in 2019, this rate in Spain was 21% for men and 13% for women. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Early leavers from education and training by sex and labour status [edat_lfse_14]*. https://ec.europa.eu/eurostat/data/database.

⁵⁷ The EU-8 average is constructed as the simple average of the values of the individual countries. For further details, see: Eurostat. *Distribution of pupils and students enrolled in general and vocational programmes by education level and NUTS2 regions [educ_uoe_enra13]*. https://

ec.europa.eu/eurostat/data/database.

⁵⁸ When the Ley General de Educación (General Education Law) introduced compulsory schooling in General Basic Education (the popular EGB) until the age of 14, and relegated vocational training to a natural outlet for those students who, due to insufficient academic results, could not access the Bachillerato Unificado Polivalente (BUP) (post-compulsory secondary education). For further details, see: Official State Gazette. *Ley Orgánica 14/1970, de 4 de agosto de, General de Educación y Financiamiento de la Reforma Educativa.* Madrid, 1970. https://www.boe.es/boe/dias/1970/08/06/pdfs/A12525-12546.pdf.

^{5°} Several are detected in this regard: 1) an excessively rigid degree structure that leaves students with little choice; 2) an excessively slow and bureaucratised process of updating curricula and accreditation that prevents a rapid response to technological and socio-economic transformations; 3) a shortage of well-trained teachers, especially in STEM content; 4) a training system that is difficult to reconcile with work and family obligations, which discourages the participation of active workers; and 5) poor coordination between vocational training and universities, which does not allow the dual hybrid training itinerary of vocational training as an access route to university and vocational training as a specialisation route for university graduates to be exploited to its full potential.

⁶⁰ Although the total number of women and men choosing vocational training in Spain is similar, there is a notable difference depending on the qualifications. Four out of every five women in intermediate level vocational education and training are concentrated in four very specific vocational families: Health (36%), Administration (20%), Socio-cultural and community services (13%), and Personal image (11%). Except in the case of Administration, in all of them they account for 80% or more of the enrolled students. On the other hand, their presence in technicalindustrial families is almost anecdotal, both in the traditional ones (such as Electricity and Electronics or Installation and Maintenance, where they account for barely 3% of the enrolled students) and in the more innovative Computer and Communications (8%). These are the data for intermediate level vocational training. In higher level vocational training studies, the greater presence of women in these studies hardly modifies this pattern, but softens the concentration of women in certain professional families, adding Commerce and Marketing, and Hotel and Catering, to those already mentioned. Segregation by professional families is also maintained in this training cycle, in accordance with the aforementioned pattern, which is very similar to that of the EU as a whole. See: EIGS. Study and Work in the EU: Set Apart by Gender. Vilnius: European Institute for Gender Equality, 2018. https://eige. europa.eu/publications/study-and-work-eu-set-apart-gender-report.

⁶¹ Particularly significant is the fact that there are autonomous communities with rates well above the national average in terms of educational drop-out rates which, nevertheless, have a low unemployment rate, which is evidence of the lack of demand on the part of the business community for adequate and sufficient training. This situation means that training is not perceived by young people as a necessary requirement to access a job, strengthening the erroneous belief that "studying is useless"

⁶² Dual vocational training is a type of vocational training in which both the educational centre and the company are jointly responsible for the student's training. Thus, the student combines the theoretical training received in an educational centre with the practical activity in a workplace. For further details, see: Department of Education and Vocational Training. "Formación Profesional Dual." Department of Education and Vocational Training https://www.todofp.es/sobre-fp/ informacion-general/formacion-profesional-dual/preguntas-frecuentes. html.

⁶³ There are many reasons for this low implementation, but two stand out: 1) the predominance of SMEs in our production system, which find it more difficult to participate in this type of programmes, and 2) the conditions offered to Spanish students, which are less advantageous than those of their European counterparts (e.g. in Germany, most students receive a stipend during the course and have a high probability of being hired by the company). For further details, see: Department of Education and Vocational Training. Plan de Modernización de la Formación Profesional. Madrid, 2020. https://www.lamoncloa.gob.es/ serviciosdeprensa/notasprensa/educacion/Documents/2020/220720-Plan_modernizacion_FP.pdf. Data correspond to 2018 or latest available year. Data for the OECD and EU-8 have been calculated as a simple average of the available countries in these groups. For further details, see: OECD. Enrolment of students in upper secondary education by category of education (School and work-based vocational programmes). https://stats.oecd.org/. https://stats.oecd.org/.

⁶⁴ For example, after interviewing 53 companies representative of the Spanish economy, Canals et al find that 68% of them have a significant knowledge gap in technology and digitalisation among university graduates (48% in the case of vocational training graduates). See: Blázquez, María Luisa, Roger Mesclans, and Jordi Canals. "El futuro del empleo y las competencias profesionales del futuro: la perspectiva de las empresas." The Education for Jobs Initiative, IESE Business Schoolhttps://media.iese.edu/research/pdfs/ST-0490. pdf; Llorens García, Ariadna, Joana d'Arc Prat Farran, and Jasmina Berbegal-Mirabent. "ICT skills gap in Spain: Before and after a decade of harmonizing the European Higher Education Area." Computer Applications in Engineering Education 27, n.º 4, 2019. https://doi. org/10.1002/cae.22132 and Vaasa University of Applied Sciences, Inova Consultancy, Militos Consulting, and Conexx-Europe. Employment Challenges and Training Needs of Unemployed and Underemployed Higher Education Graduates in Europe. Rebooting, Re-Rooting and Re-Skilling Unemployed and Underemployed Higher Education Graduates for Work 4.0., 2019. http://reboot-project.eu/wp-content/ uploads/2019/06/report final.pdf.

⁶⁵ The majority of graduates go on to university degrees with fewer job opportunities. See: Pérez García, Francisco, and Joaquín Aldás-Manzano (dirs.). "U-Ranking 2020: 8a edición. Indicadores Sintéticos de las Universidades Españolas." *Fundación BBVA, Ivie,* 2020. http:// doi.org/10.12842/RANKINGS_SP_ISSUE_2020.

⁶⁶ Economic and Social Council. *Competencias profesionales y empleabilidad*. Madrid: Departamento De Publicaciones Nices, n.º 03/2015, 2015. https://www.forem.es/assets/files/INFORME_COMPETENCIAS_CES.PDF.

⁶⁷ Fundación Conocimiento y Desarrollo. *Resumen ejecutivo: La pandemia y los nuevos y viejos desafíos a los que ha de hacer frente la universidad.* 2020. https://www.fundacioncyd.org/wp-content/uploads/2020/12/ICYD2019-B-RESUMEN.pdf.

⁶⁸ For example, it entails additional costs for companies. Staff who feel

overqualified for their job are often not motivated to stay on as a result of their legitimate aspiration to occupy a position that corresponds to their training. This results in a higher turnover rate of these staff, with the consequent direct or indirect costs of on-site training and time to reach optimal performance in said position.

⁶⁹ Fundación Conocimiento y Desarrollo. Resumen ejecutivo: *La* pandemia y los nuevos y viejos desafíos a los que ha de hacer frente la universidad. 2020. https://www.fundacioncyd.org/wp-content/uploads/2020/12/ICYD2019-B-RESUMEN.pdf.

⁷⁰ OECD. Benchmarking higher education system performance: conceptual framework and data. Paris: OCDE Publishing, Enhancing Higher Education System Performance, 2017. https://www.oecd.org/ education/skills-beyond-school/Benchmarking%20Report.pdf.

⁷¹OECD. Skills Matter: Further Results from the Survey of Adult Skills. Paris: OECD Publishing, 2016. https://doi.org/10.1787/9789264258051-en.

⁷² De las Alas-Pumariño, Tona Rubio (coord.). "Situación y retos de las universidades españolas ante la transformación digital." Conferencia de consejos sociales de las universidades españolas, colecciones e informes. 2020. https://euskampus.eus/eu/media/docs/estudios-einfomes-no-8-digital-portada.pdf.

⁷³ To date, we lack precise indicators to measure this phenomenon and provide an international comparison. The U-Multirank quantifies "income from continuing education" over "total income of the institution", and the *Informe 2018* of the Fundación CyD uses the figure as an indicator of how much training Spanish universities offer to workers and companies. However, given the significant differences in funding systems among European universities, this does not seem to us to be a good indicator. For further details, see: Fundación Conocimiento y Desarrollo. *Informe CYD 2018*. Barcelona, 2018. https://www. fundacioncyd.org/publicaciones-cyd/informe-cyd-2018/; y U-Multirank, https://www.umultirank.org/.

⁷⁴ From 80,807 enterprises in 1996 to 339,846 in 2019. Data up to 2003 are obtained from FUNDAE's historical training database, while from 2004 onwards the most recent FUNDAE statistical series are used. For further details, see: FUNDAE. *Series estadísticas de participantes en formación y empresas formadoras*. https://www.fundae.es/publicaciones/series-estadisticas; and FUNDAE. *Formación histórica (I-III ANFC y Acciones Complementarias*). https://www.fundae.es/publicaciones/sintesis-estadisticas?filterType=7,8,9,10.

⁷⁵ Lope, Andreu. "Ampliar y Mejorar La Formación de Las Personas Ocupadas: Una Necesidad." *Informes Del Observatorio Social "La Caixa*", 2019. https://observatoriosociallacaixa.org/en/seccion/-/asset_ publisher/CjICdPpSYHNX/content/formacion-personas-ocupadas.

⁷⁶ FUNDAE. Formación en las empresas. Informe anual 2016. Madrid, 2017. https://www.fundae.es/docs/default-source/publicaciones-yevaluaciones/publicaciones-estad%C3%ADstica/formaci%C3%B3nen-las-empresas-2016.pdf.

⁷⁷FUNDAE. Series estadísticas según año de realización de la formación. Https://www.fundae.es/publicaciones/series-estadisticas;; and Department of Industry, Commerce and Tourism. *Cifras PYME (cifras de empresas por tamaño para enero 2013 y 2019)*. http://www.ipyme. org/es-ES/publicaciones/Paginas/estadisticaspyme.aspx. ⁷⁸ In terms of participants (the same employee can take more than one training course), the number of participants increased from 596,506 in 2004 to 4,619,901 2019. For further details, see: FUNDAE. *Formación para el empleo: Balance de la situación 2009.* Madrid, 2009. https://www.fundae.es/docs/default-source/ publicaciones-y-evaluaciones/publicaciones-estad%C3%ADstica/ balance-de-resultados-2009.pdf; FUNDAE. *Formación para el empleo: Balance de la situación 2019.* Madrid, 2019. https://www.fundae.es/ docs/default-source/publicaciones-y-evaluaciones/publicacionesestad%C3%ADstica/balance-de-situación-2019.pdf; and INE. *EPA, número total de ocupados.* https://www.ine.es/dynt3/inebase/index. htm?padre=979&capsel=982.

⁷⁹ Eurostat. Participation rate in education and training by labour status [trng_aes_103]. https://ec.europa.eu/eurostat/data/database.

⁸⁰ Although the presence of women in training programmes has grown (from 40% in 2005 to 44% in 2016 and the same percentage in 2019), a gender gap remains. The over-55s and young people up to the age of 25 receive less training than would be appropriate for their presence in companies. Moreover, there is a progressive concentration of re-qualification in a few professional families: out of the 27 existing ones, 7 of them account for more than 85% of the training. Executives, technicians, middle management and, in general, those with a university education participate more than those with only primary or secondary trained. Likewise, higher rates of re-skilling are found in jobs with a lower risk of automation. For further details, see: FUNDAE. *Número de participantes formados por edad, género y familias profesionales*. https://www.fundae.es/ publicaciones/series-estadisticas.

⁸¹FUNDAE. Series estadísticas según año de realización de la formación. https://www.fundae.es/publicaciones/series-estadisticas.

⁸² Data are from the CEDEFOP's *European Skills and Job Survey* and show the recoded response to question "Q27_1_ scale" in three categories: 0-3 = has worsened. 4-6 = has remained the same. 7/10 = has improved. The original question is as follows: "Compared to when you started your job with your current employer, would you say that your skills have now improved, worsened or stayed the same?", where 0 is "worsened a lot", 5 is "stayed the same", and 10 is "improven a lot". The EU-8 is constructed as the simple average of the values of the individual countries. See: CEDEFOP. *European Skills and Jobs Survey* (*ESJS*). https://www.cedefop.europa.eu/en/events-and-projects/ projects/european-skills-and-jobs-survey-esjs.

⁸³ The unemployed are excluded from the total number of participants. In 2008, they accounted for 6.4% of the total. For further details, see: Fundación Tripartita para la Formación en el Empleo. *Informe resultados Formación de Oferta 2007 - 2011*. Madrid, 2020. https://www.fundae. es/docs/default-source/publicaciones-y-evaluaciones/publicacionesestad%C3%ADstica/informe-resultados-formaci%C3%B3n-deoferta-2007-2011.pdf.

⁸⁴ The unemployed are excluded from the total number of participants. In 2019, they accounted for 26% of the total. For further details, see: FUNDAE. *Formación de oferta estatal dirigida principalmente a ocupados. Año de ejecución 2019.* Madrid, 2020. https://www.fundae. es/docs/default-source/publicaciones-y-evaluaciones/publicacionesestad%C3%ADstica/formación-de-oferta-estatal-2019.pdf. ⁸⁵ Employed persons over the age of 45 are trained at a lower rate than that resulting from their participation in employment. Almost 50% of those trained in 2015 were university graduates and one third were managers, middle managers or technicians. Less intensively than in the case of *in-company* training, the more highly educated also receive more training *on offer*. See: Lope, Andreu. "Limitaciones de la formación a personas ocupadas para adecuar sus capacidades a los cambios en el empleo." In Fausto Miguélez (coord.) *La revolución digital en España. Impacto y retos sobre el mercado de trabajo y el bienestar*. Bellaterra: UAB, 2018. https://ddd.uab.cat/record/190326.

⁸⁶ The latter is being reversed with e-learning, which covered 86% of courses in 2019. See: FUNDAE. *Formación de oferta estatal dirigida principalmente a ocupados. Año de ejecución 2019.* Madrid, 2020. https://www.fundae.es/docs/default-source/publicaciones-y-evaluaciones/publicaciones-estad%C3%ADstica/formación-de-oferta-estatal-2019.pdf.

⁸⁷ From the 857 million euros that the State and the Autonomous Communities earmarked for training *on offer* en 2010, the figure fell to 350 million in 2019, with some years, such as 2017, in which there was no allocation. This irregularity prevents the implementation of competitive programmes and coherent strategies sustained over time.

⁸⁸ For more information, see: Card, David, Jochen Kluve, and Andrea Weber. "Active Labor Market Policy Evaluations: A Meta- Analysis." The Economic Journal 120, n.º 548, 2010. https://doi.org/10.1111/j.1468-0297.2010.02387.x; Card, David, Jochen Kluve, and Andrea Weber. "What Works? A Meta Analysis of Recent Active Labor Market Program Evaluations." Journal of the European Economic Association 16, n.º 3, 2018. https://doi.org/10.1093/jeea/jvx028; Ghirelli, Corinna, et al. "Does On-the-Job Training Help Graduates Find a Job? Evidence from an Italian Region." International Journal of Manpower 40, n.º 3, 2019. https://doi.org/10.1108/IJM-02-2018-0062; Grunau, Philipp, and Julia Lang. "Requalification for the unemployed and the quality of the job match." Applied Economics 52, n.º 47, 2020. https://doi.org/1 0.1080/00036846.2020.1753879; Kruppe, Thomas, and Julia Lang. "Labour Market Effects of Regualification for the Unemployed. The Role of Occupations." Applied Economics 50, n.º 14, 2018. https://doi. org/10.1080/00036846.2017.1368992; Lechner, Michael, and Blaise Melly. "Partial Identification of Wage Effects of Training Programs." Brown University Economics Working Paper, n.º 2010-8, 2010. http:// dx.doi.org/10.2139/ssrn.1596715; Munch, Jakob Roland, and Lars Skipper. "Program Participation, Labor Force Dynamics, and Accepted Wage Rates." In Fomby, Tom, et al. (eds.). Modelling and Evaluating Treatment Effects in Econometrics, Volume 2 (Advances in Econometrics). London: Emerald Group Publishing, 2008. https://doi.org/10.1016/ S0731-9053(07)00008-4.

⁸⁹ Eurostat. Mean instruction hours spent by participant in education and training by labour status [trng_aes_149]. https://ec.europa.eu/eurostat/data/database.

⁹⁰ The figure is constructed using data from two different sources: until 2000, the data provided by the INEM are used and, from then onwards, the SEPE years are used. In addition, the series is represented as a percentage of the total unemployed. For further details, see: INEM. *Información sobre mercado de trabajo. Resumen anual de datos del Observatorio Ocupacional 1995.* Madrid, 1996; INEM. *Información sobre mercado de trabajo. Resumen anual de Observatorio sobre mercado de trabajo. Resumen anual de latos del Observatorio de trabajo. Resumen anual de datos del Observatorio de trabajo.*

Ocupacional 1998. Madrid, 1999; INEM. Información sobre mercado de trabajo. Resumen anual de datos del Observatorio Ocupacional 2000. Madrid, 2002; OCDE. ALFS Summary tables. Unemployment by thousands of persons. https://stats.oecd.org/; and Servicio Público de Empleo Estatal. Número de trabajadores desempleados que han recibido formación. Data provided by SEPE (State Public Employment Service) on request.

⁹¹The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. In the case of formal education and training, data for Sweden, the Netherlands, Austria and Germany are not included due to lack of data. For further details, see: Eurostat. *Participation rate in education and training by labour status [trng_aes_103]*. https://ec.europa.eu/eurostat/data/database.

⁹²Data for the year 2018. The EU-8 average is constructed as the simple average of the values of the individual countries. For further details, see: Eurostat. Unemployment by sex, age and citizenship (1 000) (lfsa_ugan); y LMP expenditure by type of action - summary tables in Million euro (at constant 2010 prices) (LMP_EXPSUMM). https://ec.europa.eu/eurostat/ data/database.

⁹³ In Spain, between 2015 and 2018, public spending on active employment policies was 0.64% of GDP. Of this percentage, around 17% was spent on training (both employed and unemployed), which accounts for 0.11% of GDP. The EU-8 and EU-27 averages are constructed as the simple average of the values of the individual countries available for each period. The EU-22 consists of the EU-27 member countries that are also members of the OECD. For further details, see: De la Rica, Sara. "Políticas activas de empleo: Una panorámica." *FEDEA, Policy Papers*, n.º 2015/01, 2015. http://documentos.fedea.net/pubs/fpp/2015/01/ FPP2015-01.pdf; and OECD. *Public expenditure and participant stocks on LMP - Training as a percentage of GDP*. https://stats.oecd.org/.

⁹⁴Official State Gazette. *Ley 30/2015, de 9 de septiembre, por la que se regula el Sistema de Formación Profesional para el empleo en el ámbito laboral.* Madrid, 2015. https://www.boe.es/eli/es/l/2015/09/09/30/con.

⁹⁵ Servicio de Empleo Público (State Public Employment Service). "Prospección y Detección de Necesidades Formativas." Servicio Público de Empleo Estatal, https://www.sepe.es/HomeSepe/que-es-el-sepe/ observatorio/necesidades-formativas/ver-resultados.html?document Type=prospecciones&.

⁹⁶ It has risen from 8.6 in 1990 to 12.1 in 2019. Data correspond to the EU-27, which is constructed as the simple average of the values of the individual countries. Specifically, the variable is the average number of years of education received by persons aged 25 and over. For further details, see: United Nations Development Programme. *Human Development Reports. Mean years of schooling (years).* http://hdr.undp. org/en/indicators/103006#.

⁹⁷ Specifically, it has risen from 11.7% to 29.5%. For the year 1990, data from Barro and Lee are used, and the EU-27 is constructed as the simple average of the values of the individual countries. This percentage is the total population aged 25 and over with tertiary education. The data for 2019 is from Eurostat and includes the population aged 25-74. In this case, the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Barro, Robert, and Jong-Wha Lee. "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of*

Development Economics 104, 2013. https://www.nber.org/papers/ w15902; and Eurostat. Population by educational attainment level, sex and age (%) [edat_lfs_9903]. https://ec.europa.eu/eurostat/data/ database.

⁹⁸ In 2018, OECD data by level of education are represented, while for 2050, International Institute for Applied Systems Analysis and Lutz et al. data are used. For the 2050 data, only data for the 25-64 age group are selected in the Global Education Trend (Medium assumption) scenario defined in the Lutz et al. report. The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. Three levels of education are represented in the graph: i) higher education which includes short post-secondary education (vocational or post-secondary non-tertiary certificates and short-cycle higher or tertiary vocational training), bachelor degree or equivalent, master's degree or equivalent and doctorate; ii) upper secondary education which includes high school, intermediate level vocational training, access course to intermediate level vocational training, basic vocational training and other equivalents; and iii) lower than second stage of secondary education which contains less than primary education, primary education and first stage of secondary education. For further details, see: INE. "Clasificación Nacional de Educación 2014. CNED-2014. Clasificación de programas, titulaciones y certificaciones en niveles de formación alcanzados (CNED-A): Estructura." INE, https:// www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=12 54736177034&menu=ultiDatos&idp=1254735976614; International Institute for Applied Systems Analysis. Global population and human capital projections for Shared Socioeconomic Pathways - 2015 to 2100, Revision-2018. https://dare.iiasa.ac.at/105/; Lutz, Wolfgang, et al (eds.). Demographic and human capital scenarios for the 21st century 2018 assessment for 201 countries. Luxembourg: Publications Office of the European Union, 2018. https://ec.europa.eu/jrc/sites/jrcsh/files/ lutz_et_al_2018_demographic_and_human_capital.pdf; and OECD. Educational attainment and labour-force status y Population data. https://stats.oecd.org/.

⁹⁹ Even if the drop-out rate is reduced to 3% in 2050, the high proportion of 25-64 year olds with upper secondary education (39% of the total compared to 16% in the EU-8) limits the possibility of reaching the same structure as the EU-8 in 2050.

¹⁰⁰ A recent report concludes that the undergraduate and master's student population will increase by 300,000-600,000 between now and 2035. The reason for this increase is the combination of higher university enrolment rates and an increase in the population of the age cohorts in these educational stages (the result of the incorporation of the cohorts born between 1997 and 2008, which are larger due to immigration). In our analysis, we also project a growth in the number of university students up to 2030, albeit more modest since we do not incorporate potential students aged 25 and over and take into account the effects of both the upgrading of intermediate level vocational education and a more dynamic labour market. It is from 2030 onwards that demographic dynamics take hold and impact on the size of the university population. For further details, see: Puyol, Rafael. "Universitarios en España: Estudio sociodemográfico de su demanda futura (2030-2035)." UNIR, Nueva Revista de Política, Cultura y Arte, 2021. https://www.unir.net/wp-content/uploads/2021/02/ UNIVERSITARIOS-EN-ESPAN%CC%83A.pdf.

¹⁰¹ For further details on the elaboration of the graph, see the *Methodology* note number VI. For further details, see: Eurostat. Population on 1 January by age and sex [demo_pjan]; Population on 1st January by age, sex and type of projection [proj_19np]. Employment by sex, age and citizenship (1 000) [lfsa_egan]; Active population by sex, age and citizenship (1 000) [lfsa_agan]; Unemployment rates by sex, age and citizenship (%) [lfsa_urgan]; y Young people neither in employment nor in education and training by sex, age and labour status (NEET rates) [edat_ *lfse_20]*. https://ec.europa.eu/eurostat/data/database; and Department of Education and Vocational Training. Escolarización y entorno educativo. Escolarización y población. Escolarización y población de 0 a 29 años. https://www.educacionyfp.gob.es/inee/indicadores/sistema-estatal/ mapa-indicadores.html; and Department of Education and Vocational Training. Las cifras de la educación en España. Curso 2018-19. D5. La formación profesional, y D7. La educación universitaria. https://www. educacionyfp.gob.es/servicios-al-ciudadano/estadisticas/indicadores/ cifras-educacion-espana/2018-2019.html; and Department of Universities. Datos y cifras del Sistema Universitario Español. Publicación 2019-2020. Madrid, 2020. https://www.ciencia.gob.es/stfls/MICINN/ Universidades/Ficheros/Estadisticas/Informe_Datos_Cifras_Sistema_ Universitario_Espanol_2019-2020.pdf.

¹⁰² The number of public universities has increased from 36 in 1990 to 50 in the 2019- 2020 academic year. The 1990 figure is from García López and Simancas Gonzáles while the 2019 figure is from the Department of Education and Vocational Training. For further details, see: García López, Marcial and Esther Simancas González. "Historia de un secuestro: de la Iglesia a la Marca. Evolución histórica de la universidad en España." *Chasqui*, n.º 133, 2016. https://revistachasqui.org/index.php/chasqui/ article/view/2953; and Department of Education and Vocational Training. *Estructura Universitaria. Número de universidades con actividad por tipo y modalidad de la universidad.* http://estadisticas. mecd.gob.es/EducaDynPx/educabase/index.htm?type=pcaxis&path=/ Universitaria/EUCT/Serie//Estructura/&file=pcaxis.

¹⁰³ In the academic year 1985- 1986 there were 28,817 students enrolled in private universities while in the academic year 2019- 2020 provisional data suggest that this number was 318,783 students. Such high increases have not been seen in public universities, where the number of students enrolled has gone from 797,596 to 1,314,575 in the same period. For further details, see: Department of Education and Vocational Training. *Series históricas de estudiantes universitarios desde el curso 1985- 1986. Total SUE. Matriculados por tipo y modalidad de la universidad, nivel de estudio, sexo y rama de enseñanza. http://estadisticas.mecd.gob.es/EducaDynPx/educabase/ index.htm?type=pcaxis&path=/Universitaria/Alumnado/Nueva_ Estructura/Serie/TotalSUE/&file=pcaxis.*

¹⁰⁴ Fundación Conocimiento y Desarrollo. *Informe CYD 2019*. 2019. https://www.fundacioncyd.org/publicaciones-cyd/informe-cyd-2019/.

¹⁰⁵See: CEDEFOP, and Eurofound. *Skills forecast: trends and challenges to 2030*. Luxembourg: Publications Office of the European Union, CEDEFOP reference series, n.º 108, 2018. https://economix.org/a55ets/publications/CEDEFOP_Skills_Forecast_2030_-_Forecast_2018_1.pdf; and OECD. *Skills for 2030: Conceptual Learning Framework*. Paris: OECD Publishing, 2019. https://www.oecd.org/education/2030-project/teaching-and-learning/learning/skills/Skills_for_2030_concept_note.pdf.

¹⁰⁶ See, for example: CEDEFOP. *Skills forecast for Spain* 2018. Luxembourg: Publications Office of the European Union, 2018. https:// www.cedefop.europa.eu/files/cedefop_skills_forecast_2018_-_spain. pdf; Smit, Sven, Tilman Tacke, Susan Lund, James Manyika, and Lea Thiel. *The future of work in Europe: Automation, workforce transitions, and the shifting geography of employment*. McKinsey Global Institute, 2020. https://www.mckinsey.com/~/media/McKinsey/Industries/ Public%20and%20Social%20Sector; and World Economic Forum. *Future of Jobs Report 2018*. Geneva, 2018. http://www3.weforum.org/ docs/WEF_Future_of_Jobs_2018.pdf.

¹⁰⁷ Stiglitz, Joseph E., and Bruce C. Greenwald. *Creating a Learning Society: A New Approach to Growth, Development and Social Progress.* New York: Columbia University Press, 2014.

¹⁰⁸ See: Van Breugel, Gerla. "Identification and anticipation of skill requirements: Instruments used by international institutions and developed countries." *Economic Commission for Latin America (ECLA), Document projects.* Santiago: United Nations, 2017. https:// www.oitcinterfor.org/sites/default/files/file_publicacion/Identifi_ant_ skillsrequirements.pdf; Wilson, Rob. "Skills Forecasts in a Rapidly Changing World: Through a Glass Darkly." En McGrath, Simon, *et al.* (eds.) *Handbook of Vocational Education and Training Developments in the Changing World of Work.* New York: Springer, 2018. https:// doi.org/10.1007/978-3-319-49789-1_74-1; and Kriechel, Ben, Tomáš Rašovec, and Rob Wilson. "Skills Forecast." In ETF, ILO and CEDEFOP *Developing Skills Foresight, Scenarios and Forecasts: Guide To Anticipating And Matching Skills And Jobs Volume 2.* Part B. Luxembourg: Publications Office of the European Union, 2016. https:// doi.org/10.2816/376143.

¹⁰⁹ Martínez García, José S., and Pablo Molina Derteano. "Fracaso escolar, crisis económica y desigualdad de oportunidades educativas: España y Argentina." *Papers UAB*, 2019. https://papers.uab.cat/article/view/ v104-n2-martinez-molina; and Serrano, Lorenzo, *et al.* "El abandono educativo temprano: análisis del caso español." *Instituto Valenciano de Investigaciones Económicas*, 2013. http://web2016.ivie.es/wp-content/ uploads/2017/06/Informe_Abandono_Educativo_Temprano.pdf.

¹¹⁰ Even if the educational composition of the population beyond lower secondary education remains stable at current proportions, the demographic effect would reduce the number of potential tertiary education graduates by 2050. For further details, see: Eurostat. *Population on 1 January by age and sex [demo_pjan]; Population on 1st January by age, sex and type of projection [proj_19np]*. https:// ec.europa.eu/eurostat/data/database.

¹¹¹Denmark is taken as a reference for two main reasons: it is a world educational power and has a similar level of per capita income today as Spain will have in 2050 if it implements the changes set out in this *Strategy*.

¹¹² Public expenditure as a share of GDP would increase by only 4 tenths of a percentage point. For futher details, see the *Methodologic note* número VI. For more data and ideas:

¹¹³ Pardos, Zachary A., Zihao Fan, and Weijie Jiang. "Connectionist Recommendation in the Wild: On the utility and scrutability of neural networks for personalized course guidance." *User modeling and useradapted interaction*, 2018. https://arxiv.org/abs/1803.09535.

¹¹⁴ Australian Government. "Skills Match." Australian Government,

https://joboutlook.gov.au/career-tools/skills-match#/.

¹¹⁵ In 2016, only 30% of those who undertook formal training and 17% who undertook non-formal training did so on a distance basis. For further details, see: INE. *Encuesta sobre la participación de la población adulta en las actividades de aprendizaje en 2016*. https://www.ine.es/ dyngs/INEbase/es/operacion.htm?c=estadistica_C&cid=12547361767 59&menu=resultados&idp=1254735573113#!tabs-1254736194656.

¹¹⁶ The OECD is the aggregate indicator reported by the OECD. For further details, see: OECD. *Dashboard on priorities for adult learning*. http:// www.oecd.org/els/emp/skills-and-work/adult-learning/dashboard. htm. The "development subindex" of the *Global Human Capital Report* produced by the World Economic Forum offers a similar diagnosis. See: World Economic Forum. *The Global Human Capital Report 2017: Preparing People for the Future of Work*. Geneva, 2017. http://www3. weforum.org/docs/WEF_Global_Human_Capital_Report_2017.pdf.

¹¹⁷ OECD. "Skill measures to mobilise the workforce during the COVID-19 crisis." OECD, https://www.oecd.org/coronavirus/policy-responses/skill-measures-to-mobilise-the-workforce-during-the-covid-19-crisis-afd33a65/.

¹¹⁸ The literature is inconclusive on whether investment in human capital and re-skilling is counter-cyclical, pro-cyclical or even a-cyclical. Logically, one would expect that, during a period of economic difficulty such as the one that will occur in our country over the next few years, participation rates in re-qualification programmes will increase. After all, for workers who lose their jobs, acquiring new knowledge and skills can be a key route to re-employment. This was not what happened during the Great Recession of 2008. In that period, the participation of employed persons in requalification programmes hardly increased, and the participation of unemployed persons even decreased, despite the increase in unemployment and the collapse of traditional sectors such as construction. This trend was the result of several factors: the substantial cuts in funding for *in-company* training and training offered by the State; the precariousness in which many of those who became unemployed during the recession found themselves, which made it difficult to devote resources to anything other than basic survival; the very profile of these people, who were less likely to participate in retraining programmes; and the inadequacy of much of the training on offer. On this question, see, for example: Calero, Jorge. "El acceso a la formación permanente: efectos de la crisis económica." Revista de Ciencias y Humanidades de la Fundación Ramón Areces 7, 2012. https:// www.fundacionareces.es/fundacionareces/es/publicaciones/listadode-publicaciones/revista-fra-n-7.html?tipo=6; y Felgueroso, Florentino. "Claves para mejorar la educación y formación de adultos en España en la post-crisis." FEDEA, Reflexiones sobre el sistema educativo español, 2015. http://www.sociedadyeducacion.org/site/wp-content/uploads/ Claves-para-la-mejora-educacion-de-adultos.pdf.

¹¹⁹ Ernst & Young. *Las empresas españolas frente a la revolución del reskilling.* 2020. https://www.ey.com/es_es/workforce/las-empresas-espanolas-frente-a-la-revolucion-del-reskilling.

¹²⁰ This plan dedicates in its components 19 "National Plan for Digital Skills" and 20 "Strategic Plan for the Promotion of Vocational Training" more than 2,400 million euros to training for employment, through the reinforcement of active policies, training in digital skills, the evaluation and accreditation of professional skills, and greater access to professional training through the creation of "Aulas Mentor", among other things. In addition, component 23 "New public policies for a dynamic, resilient and inclusive labour market" dedicates additional funds for the training of the active population in order to improve their employability, and for the detection of training needs and their adaptation to the demands of the productive system. See: Government of Spain. *Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

¹²¹The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. It should be noted that the objective of the *European Skills Agenda* excludes work-guided training, hence the differences between the 43% (including work-guided training) attributed to Spain by Eurostat and the 30% (excluding work-guided training) used here. For further details, see: CIRCABC. *Participation in Education and Training (excluding guided on the job training)*. https://circabc.europa.eu/ui/group/d14c857a-601d-438a-b878-4b4cebd0e10f/library/c5a8b987-1e37-44d7-a20e-2c50d6101d27/details; and European Commission. "European Skills Agenda." European Commission, https://ec.europa.eu/social/main.jsp?catId=1223&langId=en.

¹²² When we disaggregate this information by gender, the percentage of women who participated in some formal activity was 9% compared to 8% for men. When we disaggregate this information by gender, the percentage of women who participated in some formal activity was 9% compared to 8% for men

¹²³ If we disaggregate this information by gender, the percentage of women who participated in some non-formal activity was 35.9% and 37.6% for men

¹²⁴ For each type of activity, the following are included: (i) adult education: initial basic education for adults; adult secondary education and similar; (ii) secondary education or High school: compulsory secondary education (years 1, 2 and 3); compulsory secondary education (year 4); high school and similar; iii) vocational training: intermediate and equivalent vocational training, plastic arts and design and sports education; higher and equivalent vocational training, plastic arts and design and sports education; iv) Undergraduate degree, diploma or equivalent: university degrees of 240 ECTS credits and equivalent; university diplomas and equivalent; university degrees of more than 240 ECTS credits and equivalent; bachelor's degrees and equivalent; v) Postgraduate degree (master's or Ph): official university master's degrees and equivalent; specialisations in Health Sciences by the residency system and similar; own university master's degrees of 60 ECTS or more for university graduates; PhD; vi) Official language schools: teaching in official language schools; vii) others: elementary music and dance teaching; level 1 professional certificates and similar; professional music and dance teaching and similar; initial professional qualification programmes and similar; level 2 professional certificates and similar; basic vocational training; level 3 professional certificates; short programmes requiring a second stage of secondary education and similar; own university degrees requiring a high school degree, lasting two years or more; own university expert or specialist degrees of less than 60 ECTS credits for university graduates

¹²⁵ For further details, see: INE. *Encuesta sobre la participación de la población adulta en las actividades de aprendizaje en 2016*. https:// www.ine.es/dyngs/INEbase/es/operacion.htm?c=estadistica_C&cid =1254736176759&menu=resultados&idp=1254735573113#!ta bs-1254736194656.

¹²⁶When comparing the INE survey on the participation of the adult population in learning activities in 2016 with the official data reported by the State in the same year, there is a wide difference. Thus, while in the INE survey the number of adults claiming to have participated in some formal or non-formal training activity was around 8,000,000, the official data reported was around 4,800,000. For further details, see: Eurostat. Participation rate in education and training by sex [trng_aes_100]. https://ec.europa.eu/eurostat/data/database; FUNDAE. Número de participantes formados y horas de formación por edad. https://www. fundae.es/publicaciones/series-estadisticas; INE. Población residente por fecha, sexo y edad (25-64 años). https://www.ine.es/dynt3/inebase/ es/index.htm?padre=1894&capsel=1895; INE. Encuesta sobre la participación de la población adulta en las actividades de aprendizaje en 2016. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c= estadistica C&cid=1254736176759&menu=resultados&idp=125 4735573113#!tabs-1254736194656; Department of Universities. Catálogo de datos. Estadística de estudiantes. Matriculados por tipo (Grado, Máster, Doctorado). https://www.universidades.gob.es/portal/ site/universidades/menuitem.78fe777017742d34e0acc310026041 a0/?vgnextoid=3b80122d36680710VgnVCM1000001d04140aRCRD; and Department of Education and Vocational Training. Enseñanzas no universitarias / alumnado matriculado / series / enseñanzas de régimen general (Alumnado matriculado en Grado Medio y Grado Superior). http://estadisticas.mecd.gob.es/EducaDynPx/educabase/index. htm?type=pcaxis&path=/Educacion/Alumnado/Matriculado/Series20/ SeriesAlumnado&file=pcaxis&l=s0; and Department of Education and Vocational Training. Alumnado matriculado en Enseñanzas de idiomas de 25 años o más. http://estadisticas.mecd.gob.es/EducaDynPx/ educabase/index.htm?type=pcaxis&path=/Educacion/Alumnado/ Matriculado/2016-2017RD/REIdiomas&file=pcaxis&l=s0; and Servicio Público de Empleo Estatal (State Public Employment Service). Número de trabajadores desempleados que han recibido formación. Data provided by SEPE (State Public Employment Service) on request.

¹²⁷ To estimate the number of working-age people whose skills will become outdated over the next few years, we carried out a simple exercise that takes as a starting point the rate of skills obsolescence reported by 4,000 Spanish workers in the ESJS survey conducted by CEDEFOP in 2014. The survey asks about the likelihood of becoming obsolete in the "next five years" The answer is scored from 0 (very unlikely) to 10 (very likely); here we have considered answers between 7 and 10 as high probability. In order to obtain an approximate number of working age people who will need to be re-skilled by 2050, the same answers have been assumed for the whole time axis. of the exercise and the results of the employed persons have been extrapolated for the rest of the working age population (considering here the population between 25 and 64 years old), based on Eurostat's demographic projections. Given that the revealed needs for re-skilling of the surveyed population vary according to their educational level, we take into account the change in the educational structure of the population expected by 2050 [see Fig. 23]. In particular, we applied the percentage of people by educational level who revealed in the survey that they had a need for re-qualification high to the projected population

in 2050. Thus, according to the survey, 19% of the population with no more than compulsory secondary education reported a high need for re-qualification, compared to 23% of those with secondary education (2nd stage) and 29% of those with higher education. These estimates are based on the assumption that the rate of skills obsolescence of recent years will continue into the future. This will be true for some sectors and occupations, but not for many others, where digitalisation or the ecological transition will bring about profound changes and make the need for re-skilling even greater. For further details and data, see: CEDEFOP. *European Skills and Jobs Survey (ESJS)*. https://www.cedefop.europa.eu/en/events-and-projects/projects/european-skills-and-jobs-survey-esjs; and Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]*. https://ec.europa.eu/eurostat/database.

¹²⁸ Department of Education and Vocational Training. Estudiantes matriculados en Grado y Ciclo Matriculados por nivel académico, tipo y modalidad de la universidad, tipo de centro, sexo, grupo de edad y rama de enseñanza. http://estadisticas.mecd.gob.es/EducaDynPx/ educabase/index.htm?type=pcaxis&path=/Universitaria/Alumnado/ Nueva_Estructura/GradoCiclo/Matriculados/&file=pcaxis.

¹²⁹ In line with estimates of tertiary graduates projected to 2030- 2050 and with empirical evidence collected in recent years, which shows that the rate of obsolescence is higher as the level of education increases. See: Murillo, Inés P. "Human Capital Obsolescence: Some Evidence for Spain." *International Journal of Manpower* 32, n.º 4, 2011. https:// doi.org/10.1108/01437721111148540; and Van Loo, Jasper B. "The Speed of Obsolescence: Evidence from the Dutch Public Sector." *Maastricht University*, 2007. https://files.eric.ed.gov/fulltext/ED504838. pdf.

¹³⁰ The National Plan for Recovery, Transformation and Resilience project takes important steps in this direction and dedicates in its component 20 "Reskilling and upskilling of the active population linked to professional qualifications" more than 855 million euros to the resizing of the vocational training offer, with 200,000 new vacancies; to the development of innovation and knowledge transfer projects between vocational training centres and companies; to the transformation of medium and higher level training cycles into bilingual cycles; to the conversion of classrooms into spaces for applied technology; and to the creation of entrepreneurship classrooms in public vocational training centres. See: Government of Spain. Recovery, Transformation and Resilience Plan. Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf.

¹³¹World Economic Forum "At least half of people who have a job fear they'll lose it in the next 12 months." World Economic Forum, https:// www.weforum.org/agenda/2020/10/more-than-half-of-workingadults-fear-for-their-jobs/.

¹³² The Spanish Circular Economy Strategy emphasises the need to provide training for the jobs called for to boost it. See: Department for Ecological Transition and Demographic Challenge *Estrategia Española de economía circular: España circular 2030.* Madrid, 2020. https://www. miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/economiacircular/espanacircular2030_def1_tcm30-509532.PDF. Another another example can be found in housing rehabilitation, where qualified personnel in this field will be required. At present, there are specific vocational training courses in this area, but it is essential to complement them with *in-company* training through dual training processes. For further details, see: Tucat, Pablo. *Reduciendo la pobreza energética en el largo plazo: cómo usar los fondos europeos para la rehabilitación de viviendas*. EsadeEcPol-Center for Economic Policy y Knowledge Sharing Network, 2021. https://itemsweb.esade.edu/research/EsadeEcPol_ KSNET_Pobreza.pdf.

¹³³ Eurostat. *Populations Projections [proj_19n]*. https://ec.europa.eu/ eurostat/data/database.

¹³⁴The maximum value assumes that all students who manage to avoid dropping out early are successful in obtaining a university degree. The minimum value assumes that these students obtain a post-compulsory secondary or tertiary qualification in the same proportions as observed during the 2005-2012 period (*final educational attainment by 2005-2012 trend*). For further details, see: Serrano, Lorenzo, *et al.* "El abandono educativo temprano: análisis del caso Español." *Instituto Valenciano de Investigaciones Económicas*, 2013. http://web2016. ivie.es/wp-content/uploads/2017/06/Informe_Abandono_Educativo_ Temprano.pdf.

¹³⁵ For example, Allen and de Grip find for the Netherlands that reskilling workers reduces the probability of losing their job by 11%. See: Allen, Jim, and Andries de Grip. "Does skill obsolescence increase the risk of employment loss?" *Applied Economics* 44, n.º 25, 2012. https:// doi.org/10.1080/00036846.2011.570727.

¹³⁶ On this question, see, for example: Card, David, Jochen Kluve, and Andrea Weber. "What Works? A Meta Analysis of Recent Active Labor Market Program Evaluations." *Journal of the European Economic Association* 16, n.º 3, 2018. https://doi.org/10.1093/jeea/ jvx028; Dengler, Katharina. "Effectiveness of Active Labour Market Programmes on the Job Quality of Welfare Recipients in Germany." *Journal of Social Policy* 48, n.º 4, 2019. https://doi.org/10.1017/ S0047279419000114; Grunau, Philipp and Julia Lang. "Requalification for the unemployed and the quality of the job match." *Applied Economics* 52, n.º 47, 2020. https://doi.org/10.1080/00036846.2020.17538 79; and Kruppe, Thomas, and Julia Lang. "Labour Market Effects of Requalification for the Unemployed. The Role of Occupations." *Applied Economics* 50, n.º 14, 2018. https://doi.org/10.1080/00036846.201 7.1368992.

¹³⁷ Specifically, the human capital index includes the years of schooling of the adult population and the educational performance according to: Feenstra, Inklaar, and Timmer. *Penn World Table*, version 9.1. *Human capital index, based on years of schooling and returns to education.* www.ggdc.net/pwt. Based on: Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer. "The Next Generation of the Penn World Table." *American Economic Review* 105, n.º 10, 2015. https://www. aeaweb.org/articles?id=10.1257/aer.20130954.

¹³⁸ For futher details, see the *Methodologic note* number V.

¹³⁹ The population aged 25-34 with a qualification higher than secondary education is defined as the percentage of people in this age range whose highest level of education is the second stage of secondary education (High school or Intermediate Level Vocational Training) or tertiary education (University or Higher Level Vocational Training). The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2019. For further details, see: Eurostat. *Population by educational attainment level, sex and age* (%) - main indicators [edat_lfse_03]. https://ec.europa.eu/eurostat/data/database. The population aged 25-34 with a qualification higher than secondary education is defined as the percentage of people in this age range whose highest level of education is the second stage of secondary education (University or Higher Level Vocational Training) or tertiary education (University or Higher Level Vocational Training). The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2019. For further details, see: Eurostat. Population by educational attainment level, sex and age (%) - main indicators [edat_lfse_03]. https://ec.europa.eu/eurostat/data/database.

¹⁴⁰ Public expenditure on education includes both expenditure on preprimary, primary and secondary education and expenditure on postcompulsory education (high school, vocational training and university). In 2018 (latest year available), post-compulsory education accounted for around 40% of total public expenditure on education in our country. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The latest available data for Spain is from 2018, while for the EU-8 and EU-27 it is from 2017. For further details, see: Department of Education and Vocational Training. *Gasto Público en educación en relación al P.I.B. por cobertura económica, tipo de administración y periodo*. http://www.educacionyfp.gob.es/serviciosal-ciudadano/estadisticas/economicas/gasto.html; and UNESCO. Government expenditure on education as a percentage of GDP (%). http://data.uis.unesco.org/#

¹⁴¹ Public expenditure on education of 5.5% of GDP is the result of increasing expenditure per student to current Danish levels and assuming a GDP evolution in line with the EU-8 convergence objective [see chapter 1]. The difference compared to the EU-8, which currently spends 6.1% of its GDP on education, is that the reduction in the number of students will be very sharp in the coming decades, allowing us to increase funding per student significantly without such a sharp increase as a percentage of GDP.

¹⁴² The STEM series is constructed from the data on *Natural sciences, mathematics and statistics, Information and Communication Technologies, and Engineering, manufacturing and construction.* The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. Data observed are the average from 2015 to 2018. For further details, see: Eurostat. Students enrolled in tertiary education by education level, *programme orientation, sex and field of education [educ_uoe_enrt03].* https://ec.europa.eu/eurostat/data/database.

¹⁴³ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. Data are the average from 2015 to 2018. For further details, see: Eurostat. *Individuals who have basic or above basic overall digital skills by sex [TEPSR_SP410]*. https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I/default/table?lang=en.

¹⁴⁴ 2025 target of the European Skills Agenda. For further details, see: European Commission. "European Skills Agenda." European Commission, https://ec.europa.eu/social/main. jsp?catId=1223&langId=en. ¹⁴⁵ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. Data observed are from 2016. For further details, see: Eurostat. *Number of foreign languages known (self-reported) by sex* [edat_aes_[21]. https://ec.europa.eu/eurostat/data/database.

¹⁴⁶ Guided on-the-job training is excluded. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by CIRCABC. Data observed are from 2016. For further details, see: CIRCABC. *Participation in education and training (excluding guided on-the-job training)*. https://circabc.europa.eu/ui/group/d14c857a-601d-438a-b878-4b4cebd0e10f/library/ac6f3889-ab25-4f75-9c7a-de997f65e2db?p =1&n=10&sort=modified_DESC%E2%80%A6.

¹⁴⁷ 2025 target of the European Skills Agenda. For further details, see: European Commission. "European Skills Agenda." European Commission, https://ec.europa.eu/social/main. jsp?catId=1223&langId=en

¹⁴⁸ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. Data observed are from 2016. For further details, see: Eurostat. *Participation rate in education and training by labour status* [trng_aes_103]. https://ec.europa.eu/eurostat/data/database.

¹⁴⁹ Spending on active training policies includes the spending aimed at both the employed and unemployed population. The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries when these are available. Data are the average from 2015 to 2018. For further details, see: De la Rica, Sara. "Políticas activas de empleo: Una panorámica." *FEDEA*, Policy Papers, n.º 2015/01, 2015. http://documentos.fedea.net/pubs/fpp/2015/01/FPP2015-01.pdf; y OCDE. Public expenditure as a percentage of GDP. 20: Training. https:// stats.oecd.org/.

¹⁵⁰ Datos únicamente disponibles para España. For further details, see: FUNDAE. Formación en las empresas. Informe anual 2016. Madrid, 2017. https://www.fundae.es/docs/default-source/publicaciones-yevaluaciones/publicaciones-estad%C3%ADstica/formaci%C3%B3nen-las-empresas-2016.pdf; y FUNDAE. *Formación para el empleo: Balance de la situación 2019*. Madrid, 2019. https://www.fundae.es/ docs/default-source/publicaciones-y-evaluaciones/publicacionesestad%C3%ADstica/balance-de-situación-2019.pdf

¹⁵¹ See: Bourgeois, Ania, et al. Adult Education and Training in Europe: Widening Access to Learning Opportunities. Luxemburgo: Publications Office of the European Union, 2015. https://op.europa. eu/en/publication-detail/-/publication/aaeac7ed-7bad-11e5-9fae-01aa75ed71a1/language-en; y Felgueroso, Florentino. "Claves para mejorar la educación y formación de adultos en España en la postcrisis."FEDEA, Reflexiones sobre el sistema educativo español, 2015. http://www.sociedadyeducacion.org/site/wp-content/uploads/ Clavespara-la-mejora-educacion-de-adultos.pdf

152 Por ejemplo, el Informe de prospección y detección de necesidades formativas del Observatorio de las Ocupaciones del SEPE, o el Observatorio Profesional del Instituto Nacional de las Cualificaciones y su Red de Alerta. Para más detalles, véase: Instituto Nacional de las Cualificaciones. "El Observatorio Profesional del INCUAL." Instituto Nacional de las Cualificaciones, https://incual.mecd.es/elobservatorioprofesional; Instituto Nacional de las Cualificaciones. "Red de alerta del Observatorio Profesional." Instituto Nacional de las Cualificaciones, https://incual.mecd.es/red-de-alerta; y Servicio Público de Empleo Estatal. "Prospección y Detección de Necesidades Formativas." Servicio Público de Empleo Estatal, https://www.sepe.es/ HomeSepe/que-es-elsepe/observatorio/necesidades-formativas/verresultados.html?documentType=prospecciones&..

¹⁵³ Australian Government. "Skills Match." Australian Government, https://joboutlook.gov.au/career-tools/skills-match#/.

¹⁵⁴ The analysis of the hypothetical alternative involves the study of the employment trajectories of a group of people who have followed a training course with another - control - group of people with similar characteristics who have not followed the course. See: Kluve, Jochen. "The Effectiveness of European Active Labor Market Programs." *Labour Economics* 17, n.º 6, 2010. https://doi.org/10.1016/j. labeco.2010.02.004.

¹⁵⁵ Republic of Korea. *Lifelong Education Act 2009*. 2009. https://uil. unesco.org/document/republic-korea-lifelong-education-act-2009issued-2009.

¹⁵⁶ Republic of Uruguay. EC 1139, Ley 18.437. 2008. http://www.unesco. org/education/edurights/media/docs/58baed0210eec2bac6760c53f1 316bfa470a2e99.pdf

¹⁵⁷ See UNESCO's collection of lifelong learning policies and strategies: UNESCO Institute for Lifelong Learning. *Collection of Lifelong Learning Policies and Strategies*. 2020. https://uil.unesco.org/lifelong-learning/ lifelong-learning-policies/policies

¹⁵⁸UNESCO. 2ndo Informe Mundial sobre El Aprendizaje y La Educación de Adultos: Repensar la Alfabetización a lo Largo de Toda la Vida: Hamburg, Germany: UNESCO Institute for Lifelong Learning, 2013. https://unesdoc.unesco.org/ark:/48223/pf0000225875

¹⁵⁹ Participation in *lifelong learning* is closely linked to the breadth of learning options available. The more courses, the more participation. See: Stenberg, Anders. "Comprehensive Education for the Unemployed – Evaluating the Effects on Unemployment of the Adult Education Initiative in Sweden." *Labour* 19, n.º 1, 2005. https://doi.org/10.1111/ j.1467-9914.2005.00293.x.

¹⁶⁰ European Commission. *Employment and Social Developments in Europe in 2018. Annual Review 2018.* Luxembourg: Publications Office of the European Union, 2018. https://ec.europa.eu/social/main.jsp?cat Id=738&langId=en&pubId=8110

¹⁶¹CEDEFOP. European guidelines for validating non-formal and informal learning. Luxembourg: Publications Office of the European Union, 2016. https://www.cedefop.europa.eu/files/3073_en.pdf

^{In} France, for example, the 2002 Law on Social Modernisation (art. 134) stipulates that all persons with at least three years of experience are entitled to recognition of knowledge gained in practice. See: Légifrance. *LOI n° 2002-73 du 17 janvier 2002 de modernisation sociale*. https://www.legifrance.gouv.fr/eli/loi/2002/1/17/MESX0000077L/jo/texte

^{162.}Official Gazette of the Basque Country. RESOLUCIÓN de 30 de julio de 2020, del Viceconsejero de Formación Profesional y del Director General de Lanbide-Servicio Vasco de Empleo, por la que se convoca el procedimiento de evaluación y acreditación de las competencias profesionales adquiridas por la experiencia laboral o vías no formales de formación para el año 2020. 2020. https://www.euskadi.eus/gobierno-vasco/-/eli/es-pv/res/2020/07/30/(4)/dof/spa/html/

¹⁶³ In France, for example, the 2002 Law on Social Modernisation (art. 134) stipulates that all persons with at least three years of experience are entitled to recognition of knowledge gained in practice. See: Légifrance. *LOI n° 2002-73 du 17 janvier 2002 de modernisation sociale*. https://www.legifrance.gouv.fr/eli/loi/2002/1/17/MESX0000077L/jo/ texte

¹⁶⁴Kompetanse Norge. "Validation of prior learning." Kompetanse Norge, http://www.vox.no/English/Validation-of-prior-learning/

¹⁶⁵ For more information, see: Mon Compte Formation, https://www. moncompteactivite.gouv.fr/cpa-public/ and Skills Future, https://www. skillsfuture.gov.sg/AboutSkillsFuture

¹⁶⁶ European Commision. "El portal EURES de la movilidad profesional." European Comission, https://ec.europa.eu/eures/public/es/homepage

¹⁶⁷ European Commision. "ERASMUS+" European Comission, https:// ec.europa.eu/programmes/erasmus-plus/node_es

¹⁶⁸ Department of Education and Vocational Training. Plan de Modernización de la Formación Profesional. 2020. https://www. lamoncloa.gob.es/serviciosdeprensa/notasprensa/educacion/ Documents/2020/220720-Plan_modernizacion_FP.pdf

¹⁶⁹ Studies show that in countries where there is more on-the-job training, there is higher participation in adult education. See: Groenez, Steven, Ella Desmedt, and Ides Nicaise. "Participation in Lifelong Learning in the EU-15: The Role of Macro- Level Determinants." *Paper presented in the ECPR Conference*, 2007. https://limo.libis.be/primoexplore/fulldisplay?docid=LIRIAS1896929&context=L&vid=Lirias&s earch_scope=Lirias&tab=default_tab&lang=en_US&fromSitemap=1

¹⁷⁰ Hampf, Franziska, and Ludger Woessmann. "Vocational vs. General Education and Employment over the Life-Cycle: New Evidence from PIAAC." NBER Working Paper, n.º 10298, 2016. http://ftp.iza.org/ dp10298.pdf

¹⁷¹ Percentage of graduates who get a job in the first 12-24 months after graduation.

CHALLENGE 4: BECOMING A CARBON-NEUTRAL, SUSTAINABLE AND CLIMATE-Resilient Society

¹Steffen, W., *et al.* "The Anthropocene: conceptual and historical perspectives." *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 369, n°. 1938, 2011. https://doi.org/10.1098/rsta.2010.0327; and Steffen, W., *et al.* "The Trajectory of the Anthropocene: The Great Acceleration." *The Anthropocene Review* 2, n.º 1, 2015. https://doi.org/10.1177/2053019614564785.

² Variation between 1950 and 2020. For further details, see: United Nations. *Total Population by sex (thousands)*. https://population.un.org/wpp/DataQuery/.

³Variation between 1950 and 2015. For further details, see: Our World in Data. *PIB mundial ajustado por inflación. Based on New Maddison Project Database and World Bank.*. https://ourworldindata.org/grapher/ world-gdp-over-the-last-two-millennia?tab=table.

⁴ Variation between 1950 and 2020. For further details, see: United Nations. *Life expectancy*. https://population.un.org/wpp/DataQuery/.

⁵ Extreme poverty defined as living on less than 1.90 international dollars per day. International dollars are adjusted for price differences among countries and for inflation. Variation between 1950 and 2015. For further details, refer to: Our World in Data. *World population living in extreme poverty, 1820-2015. Based on Ravallion, 2016 and World Bank.* https://ourworldindata.org/grapher/world-population-in-extreme-poverty-absolute.

⁶Up to 2017. For further details, refer to: International Resource Panel. *Global Resources Outlook 2019: Natural Resources for the Future We Want.* Nairobi: United Nations Environment Programme, 2019. https:// www.resourcepanel.org/reports/global-resources-outlook.

⁷ Up to 2014. Interpolación lineal en años sin datos. For further details, refer to: Hannah Ritchie. *Water Use and Stress 1950-2014. Based on World Bank and Global International Geosphere-Biosphere Programme.* https://ourworldindata.org/water-use-stress.

⁸Up to 2018. For further details, refer to: Global Carbon Atlas. *Country emissions* 1970-2018. Data for 2017 and 2018 are preliminary. http://www.globalcarbonatlas.org/en/CO2-emissions.

⁹ Global Footprint Network. "World footprint." Global Footprint Network, https://www.footprintnetwork.org/our-work/ecologicalfootprint/#:~:text=World%20Footprint&text=Today%20humanity%20 uses%20the%20equivalent,we%20use%20in%20a%20year.

¹⁰ Of the 9 planetary boundaries (or basic earth processes), we have exceeded four of them: climate change, biodiversity, land use change and biogeochemical flows. For three others, we are still in the safe zone: stratospheric ozone depletion, freshwater use and ocean acidification; and two others have not been quantified: atmospheric aerosol loading and the introduction of new entities. On this question, see: Rockström, J., *et al.* "Planetary boundaries: exploring the safe operating space for humanity." *Ecology and Society* 14, n.º 2, 2009. https://doi.org/10.5751/ES-03180-140232; and Steffen, W., *et al.* "Planetary boundaries: Guiding human development on a changing planet." *Science* 347, n.º 6223, 2015. https://doi.org/10.1126/science.1259855.

¹¹On this question, see, among others: Ceballos, G., *et al.* "Accelerated modern human-induced species losses: entering the sixth mass extinction." *Science Advances*, n.º 5, 2015. https://doi.org/10.1126/sciadv.1400253; and Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. *Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* E. S. Bonn: IPBES secretariat, 2019. https://jpbes.net/global-assessment.

¹²On this question, see, among others: IPCC. *Climate change 2013: the physical science basis: contribution of Working Group I to the Fifth* Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press, 2013. https://www.ipcc.ch/report/ar5/wg1/; and Ripple, W. J., et al. "World scientists' warning to humanity: a second notice." BioScience 67, n.º 12, 2017. https://doi.org/10.1093/biosci/bix125.

¹³ The data in the figure are from the following sources: World population: United Nations. Total population by sex. https://population. un.org/wpp/DataQuery/; Global GDP: Roser, Max. Economic Growth. A partir de Banco Mundial y New Maddison Project Database. 2011 USD ajustado por inflación. Https://ourworldindata.org/economic-growth;; Global exports: Ortiz-Ospina, Esteban, and Diana Beltekian. Trade and Globalization. Based on Federico, Giovanni and Antonio Tena-Junguito. "A tale of two globalizations: gains from trade and openness 1800-2010." London: Centre for Economic Policy Research, 2016. Value of overall exports in constant prices relative to 1913. https:// ourworldindata.org/trade-and-globalization; Energy consumption: Ritchie, Hannah. Energy. Based on Statistical Review of World Energy and Vaclav Smil. Energy Transitions: Global and National Perspectives. ABC-CLIO, LLC, 2017. Energía primaria directa. Interpolación lineal en años sin datos. https://ourworldindata.org/energy; Water consumption: Ritchie, Hannah. Water Use and Stress. Based on World Bank and Global International Geosphere-Biosphere Programme. Interpolación lineal en años sin datos. https://ourworldindata.org/water-use-stress; Extraction of fossil fuels and non-metallic minerals: WU Vienna. Material flows by material group 2020. http://www.materialflows.net/visualisationcentre/data-visualisations/?_inputs_&sidebar=%22bar_chart_1%22; Nitrogen fertiliser consumption: Roser, Max, and Hannah Ritchie. Fertilizers. A partir de FAO. https://ourworldindata.org/fertilizers; and CO, Emissions: Global Carbon Atlas. Emissions. Data for 2017 and 2018 are preliminary. www.globalcarbonatlas.org.

¹⁴ G20 members generate 75% of global greenhouse gas (GHG) emissions. For further details, refer to: United Nations Development Programme. *Informe sobre la disparidad en las emisiones de 2019*. Nairobi, 2019. https://wedocs.unep.org/bitstream/ handle/20.500.11822/30798/EGR19ESSP.pdf?sequence=17.

¹⁵ Since 2005, aviation emissions have increased by 70%, now accounting for more than 2% of GHG global emissions. For further details, refer to: European Commission. "Reducing emissions from aviation." European Commission, https://ec.europa.eu/clima/policies/transport/aviation_en; y Ritchie, Hannah, and Max Roser. Annual total CO₂ emissions, by world region. Based on Carbon Dioxide Information Analysis Center and Global Carbon Project. https://ourworldindata.org/

grapher/annual-co-emissions-by-region?time=earliest..latest.

¹⁶ Interpolación lineal en años sin datos. The acronym BRICS refers to Brazil, Russia, India, China and South Africa. See: Ritchie, Hannah. *Water Use and Stress 1950-2014. Based on World Bank and Global International Geosphere-Biosphere Programme.* https://ourworldindata. org/water-use-stress.

¹⁷ Ritchie, Hannah, and Max Roser. *Annual total CO₂ emissions, by world region. Based on Carbon Dioxide Information Analysis Center and Global Carbon Project.* https://ourworldindata.org/grapher/annual-co-emissions-by-region?time=earliest..latest.

¹⁸ The ecological footprint measures the area of land and water that a population or activity requires to produce the resources it consumes and absorb the waste it generates. In this study, we include in the ecological footprint CO emissions, the extent of fishing grounds, urbanised land, crop land, forest and grazing land, related to five basic consumption components: food, housing, mobility, goods and services. The ecological footprint is measured in global hectares, and is compared to "biocapacity," which is the capacity of ecosystems to regenerate what people or an activity demand from it. If the ecological footprint exceeds the biocapacity, an "ecological deficit" situation arises. For further details, refer to: Global Footprint Network. "Glossary." Global Footprint Network, https://www.footprintnetwork.org/resources/glossary.

¹⁹ One example of this is food waste. In Spanish households, around 4.3% of the amount of food purchased is wasted, of which almost 90% are unprocessed products (wasted as bought), generating a water footprint of more than 130 litres per person per day. For further details, refer to: Blas, A., Alberto Garrido, and Bárbara Willaarts. "Food consumption and waste in Spanish households: Water implications within and beyond national borders." *Ecological Indicators* 89. 2018. https://doi.org/10.1016/j.ecolind.2018.01.057; and Government of Spain. *Plan de acción para la implementación de la Agenda 2030: Hacia una Estrategia Española de Desarrollo Sostenible*. Madrid, 2018. https://www.agenda2030.gob.es/recursos/docs/Plan_de_Accion_para_la_Implementacion_de_la_Agenda_2030.pdf.

²⁰Global Footprint Network. *Country trends. Spain. Ecological Footprint* (*number of earths*), 1961-2017. http://data.footprintnetwork.org/#/co untryTrends?cn=203&type=earth.

²¹ Calculated from countries' total emissions data, as reflected in their National Inventories. These inventories do not consider emissions produced outside the territory, associated with the consumption of imported products. For example, the agri-food sector of our country produces a high amount of GHGs in other countries in the process of generating animal feed, also associated with high deforestation. For further details, refer to: European Commission. *The impact of EU consumption on deforestation: Comprehensive analysis of the impact of EU consumption on deforestation*. Luxembourg: Publication Office of the European Union, 2013. https://doi.org/10.2779/822269.

²² Department for Ecological Transition and Demographic Challenge Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2018. https://www.miteco.gob.es/es/calidad-y-evaluacionambiental/temas/sistema-espanol-de-inventario-sei-/Inventario-GEI. aspx.

²³ Emission intensity (the rate at which pollutants are emitted during an activity) shows a reduction from 371 tonnes of carbon dioxide

equivalent per million euros of GDP in 2008 to 264 tonnes in 2019. See: Eurostat. GDP and main components (output, expenditure and income). [nama_10_gdp]; y Greenhouse gas emissions by source sector 1990-2018 [env_air_gge] (GEI no incluye "usos del suelo, cambios de usos del suelo y silvicultura" ni "memorandum items"). https://ec.europa.eu/ eurostat/data/database.

²⁴ The EU-8, EU-27 and OECD are constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. Data are provisional. See: Global Carbon Atlas. *Territorial Per capita (tCO₂/person)*. http://www.globalcarbonatlas.org/en/CO₂-emissions.

²⁵ The EU-27 is the value reported by Eurostat. The EU-8 is the sum of the values of the individual countries. See: Eurostat. *Greenhouse gas emissions by source sector 1990-2018 [env_air_gge]. (Does not include "land use, land use change and forestry" nor "memorandum items").* https://ec.europa.eu/eurostat/data/database.

²⁶ For further details, refer to: Burck, J., *et al. Climate change performance index. Resultados 2020.* 2019. https://www.climatechange-performance-index.org/sites/default/files/documents/ ccpi-2020-resultados_-_los_principales_resultados_del_indice_de_ desempeno_frente_al_cambio_climatico_2020.pdf; and Camargo, J., *et al.* "Mind the climate policy gaps: climate change public policy and reality in Portugal, Spain and Morocco." *Climatic Change* 161, 2020. https://doi.org/10.1007/s10584-019-02646-9.

²⁷Gago, A., et al. Impuestos energético-ambientales en España: situación y propuestas eficientes y equitativas. Fundación Alternativas, 2019. https://www.fundacionalternativas.org/public/storage/publicaciones_ar chivos/58ce043c930b1da7b5d92cffac6f5215.pdf.

²⁸ Conchado, A., Laura Díaz Anadón, and Pedro Linares. *Innovación en Energía en España: Análisis y Recomendaciones*. Economics for Energy y Belfer Center for Science and International Affairs, 2013. https://eforenergy.org/docpublicaciones/informes/Informe_2012.pdf.

²⁹ Arbués, F., Jaime Sanaú, and José M^a Serrano. "El precio del agua en las ciudades: efectos del modelo de gestión." In Luis Caramés Viéitez (dir.). Madrid: Funcas, *Economía de las ciudades. Papeles de Economía Española*, n.º 153, 2017. 48-64. https://www.funcas.es/wp-content/ uploads/Migracion/Articulos/FUNCAS_PEE/153art05.pdf.

³⁰ The EU-8 is calculated as the simple average of the values of the individual countries. For further details on the construction of the EU-8, see the Metodologic Note number I. See also: Eurostat. *Environmental Tax Revenues [env_ac_tax]*. https://ec.europa.eu/eurostat/data/database; and Steffen, W., *et al. Impuestos energético-ambientales en España: situación y propuestas eficientes y equitativas*. Fundación Alternativas, Documento de Trabajo Sostenibilidad, n.º 2, 2019. https://www.fundacionalternativas.org/public/storage/publicaciones_archivos /58ce043c930b1da7b5d92cffac6f5215.pdf.

³¹ Eco-innovation means any form of innovation that represents a major advance towards the target of sustainable development. The European Commission's "Eco-innovation Index" is a composite index that assesses a country's performance, considering aspects such as investment, patents and publications, material and emissions intensity in the economy, and the socio-economic impacts of eco-innovation. Spain's score in the "Eco-innovation Index" was 104 in 2019, slightly above the EU average (100) but below the EU-8 average (124). Moreover, over the last decade, our country has not managed to climb up the European ranking. The EU-28 country with the highest score was Luxembourg (165) and the lowest score was Bulgaria (34). For further details, see: European Commission and Eco-Innovation Observatory. *EU Eco-Innovation Index 2019*. 2019. https://ec.europa.eu/environment/ ecoap/sites/ecoap_stayconnected/files/eio_brief_eu_eco-innovation_ index_2019.pdf.

³² On this question, see, among others: Conchado, A., Laura Díaz Anadon, and Pedro Linares. *Innovación en Energía en España: Análisis y Recomendaciones*. Economics for Energy y Belfer Center for Science and International Affairs, 2013. https://eforenergy.org/docpublicaciones/ informes/Informe_2012.pdf; and Pérez Fernández de Retana, Maialen. *Eco-innovation in Spain. EIO Country Profile 2016-2017*. European Commission, 2018. https://ec.europa.eu/environment/ecoap/sites/ ecoap_stayconnected/files/field/field-country-files/spain_eio_country_ profile_2016-2017_0.pdf.

³³ Eurostat. *Total GBAORD by NABS 2007 socio-economic objectives* [gba_nabsfin07]. https://ec.europa.eu/eurostat/data/database.

³⁴Energy intensity is defined as the ratio of energy consumption per unit of output (GDP), and emissions intensity or carbon intensity is defined as the ratio among the emissions per unit of energy produced. See: Díaz, Antonia, Gustavo A. Marrero, and Luis A. Puch. "Cambio climático, crecimiento económico y el papel de las tecnologías energéticas." In Javier Andrés (coord.). *Crecimiento Económico*. Madrid: Funcas, Papeles de Economía Española, n.º 164. 2019. 120-133. https:// www.funcas.es/wp-content/uploads/2020/08/PEE164art09.pdf; y Serrano-Puente, Darío. "Are we moving towards an energy-efficient low-carbon economy? An input-output LMDI decomposition of CO₂ emissions for Spain and the EU28." *Banco de España, Documentos de Trabajo*, n.º 2104. 2021. https://www.bde.es/f/webbde/SES/Secciones/ Publicaciones/PublicacionesSeriadas/DocumentosTrabajo/21/Files/ dt2104e.pdf.

³⁵ Department for Ecological Transition and Demographic Challenge Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2019. Madrid, 2021. https://www.miteco.gob.es/es/calidady-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/ documentoresumeninventariogei-ed2021_tcm30-524841.pdf.

³⁶ Eurostat. Complete energy balances [nrg_bal_c]; Energy intensity [nrg_ ind_ei]. Energy intensity of GDP in chain linked volumes; GDP and main components (output, expenditure and income). [nama_10_gdp]; and Greenhouse gas emissions by source sector 1990-2018 [env_air_gge] (GHG does not include "land use, land use change and forestry" nor "memorandum items");https://ec.europa.eu/eurostat/data/database.

³⁷ Urban transport accounts for only 35% of energy consumption and emissions from land transport in Spain, with interurban transport being the main contributor to emissions in this sector. See: Economics for Energy. Estrategias para la descarbonización del transporte terrestre en España. Un análisis de escenarios. Vigo, 2021. https://eforenergy.org/ docpublicaciones/informes/informe_transporte.pdf.

³⁸ Between 1990 and 2018, emissions associated with transport in our country increased by 54%, almost double the average increase in the EU-28 over the same period. In the period 2013-2018, the increase in emissions in the sector was 13%, compared to a 3% increase in

total emissions. For further details, refer to: European Environment Agency. *Evolution of GHG emissions from transport in the EU-28*. Https://www.eea.europa.eu/data-and-maps/daviz/evolution-of-ghgemissions-in-2#tab-chart_2;; and Department for Ecological Transition and Demographic Challenge. *Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2018*. https://www.miteco. gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanolde-inventario-sei-/Inventario-GEI.aspx.

³⁹ European Environment Agency. *Annual European Union greenhouse* gas inventory 1990–2017 and inventory report 2019. Copenhague, 2019. https://www.eea.europa.eu/publications/european-uniongreenhouse-gas- inventory-2019.

⁴⁰ This increase has prevented greater fuel efficiency from translating into lower emissions. Sanz, Alfonso, Pilar Vega, and Miguel Mateos. *Las cuentas ecológicas del transporte en España*. Madrid: Ecologistas en Acción and Grupo de Estudios y Alternativas, 2014. https://spip. ecologistasenaccion.org/IMG/pdf/info_cuentas-ecologicas.pdf.

⁴¹ European Commission. *Taxation Trends in the European Union*. Luxembourg: Publications Office of the European Union, 2019. https:// ec.europa.eu/taxation_customs/sites/taxation/files/taxation_trends_ report_2019.pdf.

⁴² Such as the "Plan de Fomento de las Energías Renovables (2000-2010)" approved in 1999, and the "Plan de Energías Renovables 2005-2010", approved in 2005. See: Department of Science and Technology. *Plan de Fomento de las Energías Renovables en España* 2000-2010. Madrid, 1999. https://www.idae.es/uploads/documentos/ documentos_4044_PFER2000-10_1999_1cd4b316.pdf; and Department of Industry, Commerce and Tourism. Plan de Energías Renovables en España 2005-2010. Madrid, 2005. https://www.idae. es/uploads/documentos/documentos_PER_2005-2010_8_de_ gosto-2005_Completo.(modificacionpag_63)_Copia_2_301254a0.pdf.

⁴³ According to Red Eléctrica de España, 43% of electricity generation in 2020 was renewable, compared to 20.7% in 2007. The share of primary energy generated from renewables has also increased from 8.3% in 2004 to 18% in 2019. For further details, see: Eurostat. *Share of energy from renewable sources [NRG_IND_REN]*. https://ec.europa.eu/ eurostat/databrowser/view/NRG_IND_REN__custom_238329/default/ table?lang=en; and Red Eléctrica de España. *Evolución de la generación renovable y no renovable* (%). https://www.ree.es/es/datos/generacion/ evolucion-renovable-no-renovable.

⁴⁴ International Energy Agency. *Review and analysis of PV* self-consumption policies. 2016. https://iea-pvps.org/wpcontent/uploads/2020/01/IEA-PVPS_-_Self-Consumption_ Policies_-_2016_-_2.pdf; and European Parliament. *Solar energy policy in the EU and the Member States, from the perspective of the petitions received*. Bruselas, 2016. https://www.europarl.europa.eu/RegData/ etudes/STUD/2016/556968/IPOL_STU(2016)556968_EN.pdf.

⁴⁵ The other two sectors that, together with transport and electricity generation, account for most of the country's emissions are industry and agriculture and livestock farming. Industry is the second largest greenhouse gas emitting sector, accounting for 20% of emissions in 2018, similar to the EU-27 average (18%). The minerals industry, due to cement production, is the largest emitter, followed by the chemical and metal industries. Since 1990, emissions in this sector

have declined slightly due to efficiency gains and a shift in the relative weight of the different industries in this sector, partly due to the effects of the economic crisis of 2008 and 2012. The agriculture and livestock sector is the fourth largest emitter. In the case of agricultural production, almost half of the emissions are associated with the production and use of fertilisers, in addition to emissions linked to irrigation and the high use of fossil fuels for mechanical traction. In the livestock sector, emissions are now seven times higher than at the beginning of the last century. This increase is a response to changing dietary patterns and the sector's transition towards industrialisation of production systems. For further details, refer to: Department for Ecological Transition and Demographic Challenge *Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2018.* https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/

⁴⁶ Department for Ecological Transition and Demographic Challenge Informe de seguimiento de Planes Hidrológicos y Recursos Hídricos en España. Año 2018. Madrid, 2019. https://www.miteco.gob.es/es/ agua/temas/planificacion-hidrologica/memoria_infoseg_2018_tcm30-482594.pdf.

⁴⁷On this question, see, among others: Aguilera, E., *et al.* "Emisiones de gases de efecto invernadero en el sistema agroalimentario y huella de carbono de la alimentación en España." *Real Academia de Ingeniería de España*, 2020. http://www.raing.es/sites/default/files/INFORME_ RAING_23102020%20%2814.12h%29.pdf; and Blas, A., *et al.* "A comparison of the Mediterranean diet and current food consumption patterns in Spain from a nutritional and water perspective." *Science of The Total Environment* 664, 2019. https://doi.org/10.1016/j. scitotenv.2019.02.111.

⁴⁸ The entire food system production chain generates between 21% and 37% of total global GHG emissions It is also estimated that more than one third of the world's land area and almost 75% of freshwater resources are devoted to crop or livestock production, a major cause of desertification and biodiversity loss on a global scale. For further details, see, among others: Castellani, V., A. Fusi, and S. Sala. Consumer Footprint. Basket of Products indicator on Food. Luxembourg: Publications Office of the European Union, 2017. https:// doi.org/10.2760/66876; Gerber, P.J., et al. Tackling Climate Change through Livestock. A global assessment of emissions and mitigation opportunities. Rome: FAO, 2013. http://www.fao.org/publications/card/ en/c/030a41a8-3e10-57d1-ae0c-86680a69ceea/; Greenpeace. La insostenible huella de la carne en España. Diagnóstico del consumo y la producción de carne y lácteos en España. Madrid, 2018. https:// es.greenpeace.org/es/wp-content/uploads/sites/3/2018/03/INFORME-CARNEv5.pdf; IPBES. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Bonn: IPBES secretariat, 2019. https://ipbes.net/global-assessment; IPCC. "Summary for Policymakers." In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. 2019. https://www.ipcc.ch/srccl/; Monteiro, C.A., et al. Ultra-processed foods, diet quality, and health using the NOVA classification system. Rome: FAO, 2019; Sala S., et al. Indicators and Assessment of the environmental impact of EU consumption. Consumption and Consumer Footprint for assessing and monitoring EU policies with Life Cycle Assessment. Luxembourg: Publications Office

of the European Union, 2019. https://doi.org/10.2760/403263; and Searchinger, T. *et al. Creating a Sustainable Food Future. A Menu of Solutions to Feed Nearly 10 Billion People by 2050.* World Resources Institute, 2019. https://research.wri.org/sites/default/files/2019-07/ WRR_Food_Full_Report_0.pdf.

⁴⁹ European Environment Agency. *Environmental indicator report: environmental impacts of production-consumption systems in Europe.* Luxembourg: Publications Office of the European Union, 2014. http:// www.eea.europa.eu/publications/environmental-indicator-report-2014.

⁵⁰ For further details, see: European Topic Centre on Waste and Materials in a Green Economy. *Electronics and obsolescence in a circular economy*. Mol, 2020. https://www.eionet.europa.eu/etcs/etc-wmge/products/ electronics-and-obsolescence-in-a-circular-economy; and Eurostat. *Waste electrical and electronic equipment (WEEE) by waste management operations [env_waselee]*. https://ec.europa.eu/eurostat/data/database.

⁵¹ Blas, A., *et al.* "A comparison of the Mediterranean diet and current food consumption patterns in Spain from a nutritional and water perspective." *Science of The Total Environment* 664, 2019. https://doi. org/10.1016/j.scitotenv.2019.02.111.

⁵² Despite the fact that the world economy uses 30% less resources today to produce one euro of GDP than 30 years ago, global resource consumption has continued to grow. For further details, refer to: SERI, GLOBAL 2000, Friends of the Earth Europe. *Overconsumption? Our use of the world's natural resources*. Vienna/ Brussels, 2009. https://www. foeeurope.org/publications/2009/Overconsumption_Sep09.pdf;.

⁵³ Font Vivanco, D., *et al.* "The foundations of the environmental rebound effect and its contribution towards a general framework." *Ecological Economics* 125, 2016. https://doi.org/10.1016/j.ecolecon.2016.02.006.

⁵⁴ El Observatorio Crítico de la Energía. ¿Qué hacemos frente a la emergencia climática? 2019. http://observatoriocriticodelaenergia. org/wp-content/uploads/2019/12/Qu%C3%A9-hacemos-frente-a-la- emergencia-clim%C3%A1tica.pdf.

⁵⁵ Apart from the aforementioned factors, governance difficulties in areas such as the review of concessions have also contributed to limiting the potential favourable effect of efficiency improvements on water consumption savings. On this question, see, among others: Jiménez, M., and D. Isidoro. "Efectos de la modernización de la comunidad de regantes de Almudévar (Huesca) sobre el cultivo del maíz." *Tierras de Castilla y León Agricultura* 193, 2012. http://hdl. handle.net/10532/1958; and Lecina, S., Daniel Isidoro, Enrique Playán, and Ramón Aragüés. "Efecto de la modernización de regadíos sobre la cantidad y la calidad de las aguas: la cuenca del Ebro como caso de estudio." Madrid: Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, 2009. http://hdl.handle.net/10261/20127.

⁵⁶ In 1998, the estimated water demand at a national level was 30,750 hm3/year; in 2009, it was 30,792 hm3 /year; and in 2013-14, 30,983 hm3 /year. For further details, see: Department of the Environment. Libro Blanco del agua en España. 2000. http://www.cedex.es/CEDEX/LANG_ CASTELLANO/ORGANISMO/CENTYLAB/CEH/Documentos_Descargas/ LB_LibroBlancoAgua.htm; and Department for Ecological Transition and Demographic Challenge. *Informe de seguimiento de Planes Hidrológicos y Recursos Hídricos en España. Año 2018.* Madrid, 2019. https://www. miteco.gob.es/es/agua/temas/planificacion-hidrologica/memoria_ infoseg_2018_tcm30-482594.pdf; and Department for Ecological Transition. Síntesis de los planes hidrológicos españoles. Segundo ciclo de la DMA (2015-2021). Madrid: Directorate General for Water. State Secretariat for the Environment, 2018. https://www.miteco.gob.es/ es/agua/temas/planificacion-hidrologica/libro_sintesis_pphh_web_ tcm30-482083.pdf.

⁵⁷Spain's Ecological Footprint can be measured in the number of planets Earth that would be needed if all of humanity lived as we do in our country. It is the ratio of a country's per capita footprint to the Earth's available per capita biological capacity (1.6 in 2019). For further details, see: Global Footprint Network. *Ecological Footprint (number of earths)*, 1961-2016. http://data.footprintnetwork.org.

⁵⁸ Of the 58 AEMET observatories analysed, 37 had at least five years in the period 2011-2018 with annual average temperatures within the warmest 20% of the reference period (1971-2000). In terms of population, 32 million Spaniards could already be considered to be affected by climate change, with an accumulation of very warm years in the last decade, longer summers and more frequent tropical nights. For further details, refer to: State Meteorological Agency. "Efectos del Cambio Climático en España." Agencia Estatal de Meteorología, http:// www.aemet.es/es/noticias/2019/03/Efectos_del_cambio_climatico_ en_espanha.

⁵⁹ Feyen L., et al. Climate change impacts and adaptation in Europe. JRC PESETA IV final report. Luxembourg: Publications Office of the European Union, 2020. https://doi.org/10.2760/171121.

⁶⁰ The global average temperature was about 1°C higher than in preindustrial times in 2017. This increase has been significantly higher in some regions, such as Spain. For further details, refer to: State Meteorological Agency. "El primer informe anual del estado del clima muestra una España más cálida y con menor disponibilidad de agua que hace 50 años." Agencia Estatal de Meteorología, http://www.aemet.es/ es/noticias/2020/07/Informe_anual_estado_del_clima_2019; y IPCC. "Summary for Policymakers." In Masson-Delmotte, V., et. al. (eds.). Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. 2018. https://www.ipcc. ch/sr15/chapter/spm/.

⁶¹The term "summer" refers to the period in which the maximum temperature, for 7 consecutive days from 1 May onwards, equals or exceeds the average of the maximum temperatures recorded between 18 and 24 June in the period 1981-2010. The end of it is obtained by recording the period in which the maximum temperature, for 7 consecutive days and from 31 October backwards, equals or exceeds the average of the maximum temperatures recorded between 18 and 24 September in the period 1981-2010. See: State Meteorological Agency. "Efectos del Cambio Climático en España." Agencia Estatal de Meteorología, http://www.aemet.es/es/noticias/2019/03/Efectos_del_ cambio_climatico_en_espanha.

⁶² While cold spells have been reduced by 25%. For further details, refer to: State Meteorological Agency. "El calor como nueva normalidad." Agencia Estatal de Meteorología, http://www.aemet.es/es/noticias/2019/12/Rueda_prensa_invierno_2019.

⁶³ Tied with 2017. For further details, see: State Meteorological Agency. Avance Climático Nacional de mayo de 2020. Department for Ecological Transition and Demographic Challenge, 2020. http://www.aemet.es/ documentos/es/noticias/2020/Avanceclimaticonacionalmayo2020.pdf.

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¹²⁷ International Renewable Energy Agency. *Country Rankings. Installed capacity (MW).* https://www.irena.org/Statistics/View-Data-by-Topic/Capacity-and-Generation/Country-Rankings.

¹²⁸ Spain ranks 15th out of 130 countries analysed according to the World Energy Council's "Trilemma Index". Considering 18.8 million households (latest available data, 2019), the average total energy consumption per household is 9,262 kWh, including heating, cooling, domestic hot water, cooking, lighting, appliances and other uses. The annual generation of electricity from renewable sources in our country is 109,269 GWh (latest available data, 2020). See: INE. Encuesta continua de hogares. Año 2019. https://www.ine.es/dyngs/INEbase/ es/operacion.htm?c=Estadistica_C&cid=1254736176952&menu=ulti Datos&idp=1254735572981; and Department for Ecological Transition and Demographic Challenge. Instituto para la Diversificación y Ahorro de la Energía. Estudios, informes y estadísticas. Consumo para usos y energías del sector residencial (2010-2018). https://www.idae.es/ sites/default/files/estudios_informes_y_estadisticas/cons_usos_resid_ eurostat_web_2010-18_ok.xlsx; and Red eléctrica de España. "Las renovables alcanzan el 43,6% de la generación de energía eléctrica en 2020, su mayor cuota desde que existen registros." Red eléctrica de España, https://www.ree.es/es/sala-de-prensa/actualidad/nota-deprensa/2020/12/las-renovables-alcanzan-el-43-6-por-ciento-de-lageneracion-de-2020-su-mayor-cuota-desde-existen-registros.

¹²⁹ The 2019 data have shown a fall in the level of total emissions nationally of 6% from 2018 levels (the sharpest year-on-year drop since 2013), mainly due to almost 30% reduction in emissions associated with coal-fired electricity generation. For further details, refer to: Department for Ecological Transition and Demographic Challenge Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2019. https://www.miteco.gob.es/es/calidady-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/ documentoresumeninventariogei-ed2021_tcm30-524841.pdf.

¹³⁰ This process is part of the "Energy and Climate Strategic Framework", which has a "Fair Transition Strategy" as an essential pillar to favour the employability and inter-sectoral mobility of workers in the sectors undergoing reconversion. On this question, see: Department for Ecological Transition and Demographic Challenge *Estrategia de Transición Justa*. Madrid, 2020. https://www.miteco.gob.es/images/ es/documentoetj_tcm30-514300.pdf; and Reuters. "Europe steams towards coal exit – research." Reuters, https://www.reuters.com/article/ us-europe-climatechange-coal-idUSKCN24M32C.

¹³¹ International Renewable Energy Agency. *Country rankings. Electricity capacity. Total renewable energy.* https://www.irena.org/Statistics/View-Data-by-Topic/Capacity-and-Generation/Country-Rankings.

¹³² Ibid.

¹³³Per capita water consumption for urban public water supply has been reduced by 17.6%, from 165 litres/person/day in 2001 to 136 litres/ person/day in 2016. On this question, see: INE. *Encuestas del agua 2001*. Madrid: Nota de prensa, 2003. https://www.ine.es/prensa/np288. pdf; and *Estadística sobre el suministro y saneamiento de agua*. https:// www.ine.es/dynt3/inebase/index.htm?type=pcaxis&path=/t26/p067/ p01/serie&file=pcaxis&L=0.

¹³⁴ Water productivity has increased by 48% between 2000 and 2016. For further details, see: Eurostat. *Water productivity* [*T2020_RD210*]. https://ec.europa.eu/eurostat/data/database.

¹³⁵Berbel, Julio, and Jaime Espinosa-Tasón. "La gestión del regadío ante la escasez del agua." *Fedea, Estudios sobre la Economía Española*, n.º 2020/34, 2020. https://documentos.fedea.net/pubs/eee/eee2020-34. pdf. ¹³⁶ European Commission. The EU Blue Economy Report. Luxembourg: Publications Office of the European Union, 2020. https://blueindicators. ec.europa.eu/sites/default/files/2020_06_BlueEconomy-2020-LD_ FINAL-corrected-web-acrobat-pro.pdf.

¹³⁷ Variation between 2000 and 2018. For further details, see: Eurostat. *Energy productivity [T2020_RD310]*. https://ec.europa.eu/eurostat/data/database.

¹³⁸ The variation in productivity in the use of materials and their consumption between 2000 and 2019 is mainly due to the environmental policies adopted, the economic changes that have occurred in recent years (financial crisis, tertiarisation of the economy, reduction in the weight of the construction sector, which is very intensive in the use of materials), and the reduction in the import of fossil fuels. For further details, see: European Environment Agency. "Resource Efficiency." European Environment Agency, https://www.eea.europa. eu/airs/2018/resource-efficiency-and-low-carbon-economy/resourceefficiency; and Eurostat. *Resource productivity and domestic material consumption (DMC) [SDG_12_20]*. https://ec.europa.eu/eurostat/data/ database.

¹³⁹ In 2000, 653 kg/inhabitant. In 2018, 475 kg/inhabitant. In the EU-27, constructed as the simple average of the values of the individual countries, in 2018 it was 480 kg/inhabitant. For further details, see: Eurostat. *Municipal waste by waste management operations [ENV_ WASMUN]*. https://ec.europa.eu/eurostat/data/database.

¹⁴⁰ Eurostat. *Recycling rate of municipal waste* [T2020_RT120]. https:// ec.europa.eu/eurostat/data/database.

¹⁴¹Eurostat. *Recycling rate of e-waste [CEI_WM050]*. https://ec.europa. eu/eurostat/data/database.

¹⁴² The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Eurostat. *Municipal waste by waste management operations [env_wasmun]*. https://ec.europa.eu/eurostat/data/database.

¹⁴³ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. Eurostat. *Recycling rate of e-waste* [*CEI_WM050*]. https://ec.europa.eu/eurostat/data/database.

¹⁴⁴Organic production has been regulated in Spain since 1989, the year in which the Regulatory Committee for Organic Agriculture (CRAE) was created. In 1993 the first EC Regulation came into force. For further details, see: Department of Agriculture, Fisheries and Food. "La Producción Ecológica." Department of Agriculture, Fisheries and Food, https://www.mapa.gob.es/es/alimentacion/temas/produccion-eco/.

¹⁴⁵ Spain accounted for 17% of the total organic surface area in the EU-27 in 2018. For further details, see: Eurostat. *Organic crop area by agricultural production methods and crops (from 2012 onwards) [ORG_CROPAR]*. https://ec.europa.eu/eurostat/databrowser/view/org_cropar/default/table?lang=en.

¹⁴⁶Department of Agriculture, Fisheries and Food. "La superficie ecológica crece el 4,8 % en 2019 y se sitúa en 2,35 millones de hectáreas." Department of Agriculture, Fisheries and Food, https://www.mapa. gob.es/es/prensa/ultimas-noticias/la-superficie-ecol%C3%B3gicacrece-el-48--en-2019-y-se-sit%C3%BAa-en-235-millones-dehect%C3%A1reas/tcm:30-541106#:~:text=Galer%C3%ADa%20 de%20v%C3%ADdeos-,La%20superficie%20ecol%C3%B3gica%20

crece%20el%204%2C8%20%25%20en%202019%20y,2%2C35%20 millones%20de%20hect%C3%A1reas.

¹⁴⁷ In 2017, the number of organic livestock farms reached 7,790. For further details see: Department for Ecological Transition. *Perfil Ambiental de España 2018*. Madrid, 2019. https://www.miteco.gob.es/ es/calidad-y-evaluacion-ambiental/publicaciones/pae2018_tcm30-504010.pdf.

¹⁴⁸Eurostat. *Area under organic farming* [SDG_02_40]. https://ec.europa.eu/eurostat/data/database.

¹⁴⁹ Department for Ecological Transition and Demographic Challenge "Plan Nacional de Adaptación al Cambio Climático." Department for Ecological Transition and Demographic Challenge, https://www. miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidady-adaptacion/plan-nacional-adaptacion-cambio-climatico/default.aspx.

¹⁵⁰ Díaz, J., *et al.* "Time trend in the impact of heat waves on daily mortality in Spain for a period of over thirty years (1983-2013)." *Environmental Int*ernational 116, 2018. https://doi.org/10.1016/j. envint.2018.04.001.

¹⁵¹However, efforts in this field need to be substantially increased in the future. Department for Ecological Transition and Demographic Challenge *Plan Nacional de Adaptación al Cambio Climático*. Madrid, 2020. https://www.miteco.gob.es/es/cambio-climatico/temas/impactosvulnerabilidad-y-adaptacion/pnacc-2021-2030_tcm30-512163.pdf.

¹⁵²Score obtained in the *Environmental Performance Index 2020*. For further details, see: Environmental Performance Index. *EPI Score*. https://epi.yale.edu/epi-results/2020/component/epi.

¹⁵³ In 2020, humanity's ecological footprint was reduced by 9.3% compared to 2019 according to data from the Global Footprint Network. However, the increase of single-use plastics associated with the pandemic poses a major challenge to curb pollution and move towards a more sustainable and circular use of plastics. On these questions, see: European Environment Agency. "Air quality and COVID-19." European Environment Agency, https://www.eea.europa.eu/themes/ air/air-quality-and-covid19; European Environment Agency. "COVID-19 and Europe's environment: impacts of a global pandemic." European Environment Agency, https://www.eea.europa.eu/post-corona-planet/ covid-19-and-europes-environment/#sdfootnote5; Global Footprint Network. "Earth Overshoot Day is August 22, more than three weeks later than last year." Earth Overshoot day, https://www.overshootday. org/newsroom/press-release-june-2020-english/;and United Nations Environment Programme. Informe sobre la disparidad en las emisiones del 2020. Nairobi, 2020. https://wedocs.unep.org/bitstream/ handle/20.500.11822/34438/EGR20ESS.pdf?sequence=35.

¹⁵⁴ Freire-González, Jaume, and David Font Vivanco. "Pandemics and the Environmental Rebound Effect: Reflections from COVID-19." *Environmental and Resource Economics* 76, 2020. https://doi. org/10.1007/s10640-020-00448-7.

¹⁵⁵ International Energy Agency. *Global Energy Review: CO₂ Emissions in 2020*. Paris, 2021. https://www.iea.org/articles/global-energy-review-co2-emissions-in-2020.

¹⁵⁶ European Commission. Stepping up Europe's 2030 climate ambition. Investing in a climate-neutral future for the benefit of our people. Brussels, 2020. https://ec.europa.eu/clima/sites/clima/files/

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¹⁵⁷ The commitments recently made by the US and China (two of the world's largest emitters of greenhouse gases) to achieve climate neutrality by mid-century are a step in the right direction. Fulfilling these commitments will be essential to achieving the goals of the Paris Agreement. On this question, see: The White House. "President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies." The White House, https://www.whitehouse.gov/ briefing-room/statements-releases/2021/04/22/fact-sheet-presidentbiden-sets-2030-greenhouse-gas-pollution-reduction-target-aimedat-creating-good-paying-union-jobs-and-securing-u-s-leadership-onclean-energy-technologies/; and Department of Foreign Affairs of the People's Republic of China. "Statement by H.E. Xi Jinping President of the People's Republic of China at the General Debate of the 75th Session of The United Nations General Assembly." Department of Foreign Affairs of the People's Republic of China, https://www.fmprc.gov.cn/mfa_eng/ zxxx_662805/t1817098.shtml.

¹⁵⁸ Greenhouse gases emitted in the last century will remain in the atmosphere for decades, inexorably altering the climate of our planet and causing transformations which, in the case of our country, will be particularly severe. See: Department for Ecological Transition and Demographic Challenge *Plan Nacional de Adaptación al Cambio Climático 2021-2030*. Madrid, 2020. https://www.miteco.gob.es/ es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/ pnacc-2021-2030_tcm30-512163.pdf.

¹⁵⁹ United Nations Environment Programme *Informe sobre la disparidad en las emisiones de 2019*. Nairobi, 2019. https://wedocs. unep.org/bitstream/handle/20.500.11822/30798/EGR19ESSP. pdf?sequence=17.

¹⁶⁰ To limit the global temperature increase to 1.5°C, global emissions would have to be 25 gigatonnes CO -eq by 2030. Under a current policy scenario, global emissions in 2030 would reach 59 gigatonnes. On this question, see, among others: IPCC. "Summary for Policymakers." In Masson-Delmotte, V., *et. al.* (eds.). *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.* Intergovernmental Panel on Climate Change, 2018. https://www.ipcc. ch/sr15/chapter/spm/; and United Nations Environment Programm. Informe sobre la disparidad en las emisiones del 2020. Nairobi, 2020. https://wedocs.unep.org/bitstream/handle/20.500.11822/34438/ EGR20ESS.pdf?sequence=35.

¹⁶¹ LFuture climate scenarios can be classified into two types: 1) those based on temperature increase thresholds (1.5°C, 2°C, 3°C); and 2) those based on greenhouse gas concentration trajectories (Representative Concentration Pathways or RCPs). The table shows the increase in global average temperature from pre-industrial values (1850-1900) that each of the RCPs would lead to:

Trajectory	Global average temperatu- re increase compared to pre-industrial levels		Concentration of $\mathrm{CO}_{\mathrm{Sree}}$ in the atmosphere	
	Period 2046-2065	Period 2091-2100	2100	2020
RCF 2.5	16*0	16*0	421,000	410 -
RC#4.5	2.0 *C	2.4%	588 ppm	
RC# 5.0	1.9*0	2.8*0	670 ppm	
RCP 8.5	26%	4.3*0	936 ppm	

In order to provide a consistent picture between the results of different analyses, the impacts presented in this report correspond, unless otherwise specified, to the 2°C temperature increase scenario or the RCP 4.5 scenario, without adaptation measures. For further details, see: Feyen L., et al. Climate change impacts and adaptation in Europe. JRC PESETA IV final report. Luxemburgo: Publications Office of the European Union, 2020. https://doi.org/10.2760/171121; Global Monitoring Laboratory. Trends in Atmospheric Carbon Dioxide. https://www.esrl. noaa.gov/gmd/ccgg/trends/monthly.html; e IPCC. Climate change 2013: the physical science basis: contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press, 2013. https://www.ipcc.ch/ report/ar5/wg1/.

¹⁶² OECD. Global Material Resources Outlook to 2060 Economic Drivers and Environmental Consequences. Paris: OECD Publishing, 2019. https://doi.org/10.1787/9789264307452-en.

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¹⁶⁷ In a moderate emissions mitigation scenario (RCP 4.5). For further details, refer to: Bastin, Jean-Francois, *et al.* "Understanding climate change from a global analysis of city analogues." *PLOS ONE* 14, n.º 10, 2019. https://doi.org/10.1371/journal.pone.0217592.

¹⁶⁸ Department for Ecological Transition and Demographic Challenge *Plan Nacional de Adaptación al Cambio Climático 2021-2030*. Madrid, 2020. https://www.miteco.gob.es/es/cambio-climatico/temas/ impactos-vulnerabilidad-y-adaptacion/pnacc-2021-2030_tcm30-512163.pdf.

¹⁶⁹ Data for the European countries of the Mediterranean sub-region, in a 2°C temperature increase scenario. For further details, refer to: Cammalleri C., *et al. Global warming and drought impacts in the EU*. Luxembourg: Publications Office of the European Union, 2020. https:// doi.org/10.2760/597045.

¹⁷⁰ Data corresponding to a moderate emissions mitigation scenario (RCP 4.5) without adaptation, in which the annual costs associated with flooding on the Spanish coasts will be 600 million euros in 2050. By the same year, in a scenario of a 2°C increase without adaptation, this will add up to more than 700 million euros per year in damages caused by flooding of our rivers. For further details, refer to: Dottori, F., *et al. Adapting to rising river flood risk in the EU under climate change*. Luxembourg: Publications Office of the European Union, 2020. https://doi.org/10.2760/14505; and Vousdoukas M., *et al. Adapting to rising coastal flood risk in the EU under climate change*. Luxembourg: Publications Office of the European Union, 2020. https://doi.org/10.2760/14505; and Vousdoukas M., *et al. Adapting to rising coastal flood risk in the EU under climate change*. Luxembourg: Publications Office of the European Union, 2020. https://doi.org/10.2760/14505; and Vousdoukas M., *et al. Adapting to rising coastal flood risk in the EU under climate change*. Luxembourg: Publications Office of the European Union, 2020. https://doi.org/10.2760/14505; and Vousdoukas M., *et al. Adapting to rising coastal flood risk in the EU under climate change*. Luxembourg: Publications Office of the European Union, 2020. https://doi.org/10.2760/1450570.

¹⁷¹Climate and hydrological evidence and projections for Spain show that water bodies may be seriously affected by climate change, with a significant decrease in water resources expected, as well as a higher frequency of extreme events and impacts on water-dependent ecosystems. The average run-off reductions projected for Spain as a whole for the RCP 4.5 emissions scenario are 11% for 2040-2070 (compared to the 1961-2000 control period). In some basins in the south and east of Spain and in island territories, these values could exceed 20% reduction. Droughts are also expected to occur more frequently. On this question, see, among others: Bisselink, B., et al. Climate change and Europe's water resources. Luxembourg: Publications Office of the European Union, 2020, https://doi.org/10.2760/15553; Centro de Estudios y Experimentación de Obras Públicas. Evaluación del impacto del cambio climático en los recursos hídricos y sequías en España. Madrid, 2017. http://www.cedex.es/NR/rdonlyres/3B08CCC1-C252-4AC0-BAF7-1BC27266534B/145732/2017 07 424150001 Evaluaci%C3%B3n_cambio_clim%C3%A1tico_recu.pdf; and World Resources Institute. "Aqueduct Water Risk Atlas." World Resources Institute, https://www.wri.org/resources/maps/aqueduct-water-riskatlas.

¹⁷² In a scenario of a 2°C temperature increase, aquifer recharge in our country could be reduced by 3,272 hm3/year, which would be equivalent to 15% of the amount of water extracted annually for irrigation from rivers and aquifers. For further details, refer to: Department for Ecological Transition and Demographic Challenge *Plan Nacional de Adaptación al Cambio Climático 2021-2030*. Madrid, 2020. https://www.miteco.gob.es/es/cambio-climático/temas/impactosvulnerabilidad-y-adaptacion/pnacc-2021-2030_tcm30-512163.pdf.

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¹⁷⁴Centro de Estudios y Experimentación de Obras Públicas. *Evaluación del impacto del cambio climático en los recursos hídricos y sequías en España*. Madrid: Centro de Estudios Hidrográficos, 2017. http://www. cedex.es/NR/rdonlyres/3B08CCC1-C252-4AC0-BAF7-1BC272665

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¹⁷⁷ Under a moderate emissions mitigation scenario. For further details, refer to: Department of Agriculture, Food and Environment. *Impactos del cambio climático en los procesos de desertificación en España*. Madrid, 2016. https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/impactos-desertificacion_tcm30-178355.pdf.

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¹⁹⁰ Medina Martín, F. Impactos, vulnerabilidad y adaptación al cambio climático en el sector agrario: Aproximación al conocimiento y prácticas de gestión en España. Madrid: Oficina Española de Cambio Climático. Department of Agriculture, Food and Environment, 2015. https://www. miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-yadaptacion/impactos_vulnerabilidad_adaptacion_cambio_climatico_ sector_agrario__tcm30-178448.pdf.

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¹⁹² For the period 2026-2045, the models project similar values of sea level rise for the moderate mitigation scenario (RCP 4.5) and the high emissions scenario (RCP 8.5). The largest differences are seen for the period (2081-2100), due to the thermal inertia of the seas and oceans. By the end of the century, in an RCP 4.5 scenario, average sea level rises would be between 55 cm and 70 cm along the Spanish coast, with the highest values in the Canary Islands, Balearic Islands and western Cantabrian coast. In a high emissions scenario (RCP 8.5), sea level rise would reach 75 cm along the entire Spanish coast, especially in Galicia, the Balearic Islands (> 80 cm) and the Canary Islands, where sea level rise values of around 1 m are projected. For further details, refer to: Losada, I.J., et al. Elaboración de la metodología y bases de datos para la proyección de impactos del cambio climático a lo largo de la costa española. Department for Ecological Transition and Demographic Challenge, 2020 https://www.adaptecca.es/sites/default/ files/documentos/2019_metodologia_y_bbdd_proyeccion_impactos_

de_cc_costa_espanola.pdf.

¹⁹³Toimil, A., *et al.* "Estimating the risk of loss of beach recreation value under climate change." *Tourism Management* 68, 2018. https://doi. org/10.1016/j.tourman.2018.03.024.

¹⁹⁴ Izaguirre, C., *et al.* "Climate change risk to global port operations." *Nature Climate Change*, 2020. https://doi.org/10.1038/ s41558-020-00937-z.

¹⁹⁵Losada, I.J., *et al. Elaboración de la metodología y bases de datos para la proyección de impactos del cambio climático a lo largo de la costa española*. Department for Ecological Transition and Demographic Challenge, 2020 https://www.adaptecca.es/sites/default/files/ documentos/2019_metodologia_y_bbdd_proyeccion_impactos_de_ cc_costa_espanola.pdf.

¹⁹⁶ Cramer W., *et al.* "MedECC 2020 Summary for Policymakers." In W. Cramer, J. Guiot J, K. Marini (eds.). *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report.* Marseille: Union for the Mediterranean, Plan Bleu, and UNEP/MAP, 2020. En prensa. https:// www.medecc.org/wp-content/uploads/2020/11/MedECC_MAR1_SPM_ ENG.pdf.

¹⁹⁷ Losada, I., C. Izaguirre, and P. Diaz. *Cambio climático en la costa española*. Madrid: Spanish Climate Change Office, Department for Agriculture, Food and Environment, 2014. https://www.miteco.gob.es/es/cambio-climatico/publicaciones/publicaciones/2014%20 INFORME%20C3E%20final_tcm30-178459.pdf.

¹⁹⁸ The European Commission estimates that a global temperature increase of 2°C will result in annual welfare losses for southern Europe (Bulgaria, Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia and Spain) of 43 billion euros (equivalent to 1.4% of these countries' GDP). However, the limited nature of such studies should be taken into account, given the difficulty of considering all possible impacts of climate change and their interactions, as well as possible irreversible tipping points. Thus, economic estimates may give overly conservative results. For further details, refer to: Ciscar, J. C. "Impactos del Cambio Climático en España: Una revisión parcial." In María José Sanz, and Mikel González-Enguino (eds.). Transition to a decarbonised economy. Madrid: FUNCAS, Papeles de Economía Española, n.º153, 2020. 2-8. https://www.funcas.es/revista/transicion-hacia-una-economia-bajaen-carbono-en-espana-abril-2020/; and Szewczyk, W., et al. Economic analysis of selected climate impacts. Luxembourg: Publications Office of the European Union, 2020. https://doi.org/10.2760/845605.

¹⁹⁹Losses compared to current productivity levels, under a 2°C increase scenario, in outdoor activities and without adaptation measures. For further details, refer to: Flouris, Andreas D., *et al.* "Workers' health and productivity under occupational heat strain: a systematic review and meta-analysis." *The Lancet Planetary Health* 2, n.º 12, 2018. https://doi.org/10.1016/S2542-5196(18)30237-7; y Gosling S.N., J. Zaherpour, and D. Ibarreta. *PESETA III: Climate change impacts on labour productivity*. Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2760/07911.

²⁰⁰ On this question, see, among others: Barrios, Salvador, and J. Nicolás Ibañez. "Time is of the essence: adaptation of tourism demand to climate change in Europe." *Climatic Change* 132, n.º 4, 2015. https://doi.org/10.1007/s10584-015-1431-1; Gómez, M. *Impactos*,

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²⁰¹ Due to the greater impact it will have on labour productivity in economic sectors such as agriculture or industry, with greater relative weight in some regions. For further details, refer to: International Monetary Fund. *World Economic Outlook: Global Manufacturing Downturn, Rising Trade Barriers*. Washington D.C., 2019. http://dx.doi. org/10.5089/9781513508214.081.

²⁰² In 2019, almost 1,900 environmental catastrophes triggered 24.9 million new internal displacements in 140 countries and territories, three times the number of new migrations within the same state due to conflict or violence. Climate change and growing environmental crises could intensify migratory movements. According to some estimates, the number of migrants in the world could double by 2060 as a result of climate change. For further details, see: Internal Displacement Monitoring Centre. *Global Report on Internal Displacement*. 2020. https://www.internal-displacement.org/sites/default/files/publications/ documents/2020-IDMC-GRID.pdf; International Organization for Migration. *World Migration Report 2020*. New York: UN, 2019. https:// doi.org/10.18356/b1710e30-en; and Missirian, A. and W. Schlenker. "Asylum applications respond to temperature fluctuations." *Science* 358, n.º 6370, 2017. https://doi.org/10.1126/science.aa00432.

²⁰³ On this question, see, among others: Chancel, Lucas. *Unsustainable Inequalities*. Cambridge: Harvard University Press, 2020. https://www. hup.harvard.edu/catalog.php?isbn=9780674984653&content=bios; Islam, N. and J. Winkel. "Climate Change and Social Inequality." *UN Department of Economic and Social Affairs (DESA) Working Papers* 152, 2017. https://doi.org/10.18356/2c62335d-en; and Roy, J., P. Tschakert and H. Waisman. "Sustainable Development, Poverty Eradication and Reducing Inequalities." In Masson-Delmotte, V., *et. al. Global Warming of* 1.5°C. *An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Intergovernmental Panel on Climate Change, 2018. https://www.ipcc.ch/site/assets/uploads/2018/11/sr15_chapter5.pdf.

²⁰⁴ Data corresponding to a moderate emissions mitigation scenario (RCP 4.5) without adaptation. In a high emissions scenario without adaptation, high temperatures alone would be responsible for the deaths of 1,400 people per year in 2050, rising to more than 12,000 in the second half of the century. For further details, refer to: Díaz J., Sáez M., Carmona R., *et al.* "Mortality attributable to high temperatures over the 2021-2050 and 2051-2100 time horizons in Spain: Adaptation and economic estimate." *Environmental Res*earch 172, 2019. https:// doi.org/10.1016/j.envres.2019.02.041; Sanz, M.J., and E. Gálan. *Impactos y riesgos derivados del cambio climático en España.* Madrid: Department for Ecological Transition and Demographic Challenge, 2020. https://www.miteco.gob.es/es/cambio-climatico/temas/ impactos-vulnerabilidad-y-adaptacion/impactosyriesgosccespanaw ebfinal_tcm30-518210.pdf; and Ščasný, et al. Non-market impacts: health. Deliverable of the H2020 COACCH project. 2020. https://www. coacch.eu/wp-content/uploads/2020/04/D2.6-Non-market-impactshealth-final-version.pdf.

²⁰⁵ Díaz, J., *et al.* "Will there be cold-related mortality in Spain over the 2021–2050 and 2051–2100 time horizons despite the increase in temperatures as a consequence of climate change?" *Environmental Research* 176, 2019. https://doi.org/10.1016/j.envres.2019.108557.

²⁰⁶ Department for Ecological Transition and Demographic Challenge *Plan Nacional de Adaptación al Cambio Climático 2021-2030*. Madrid, 2020. https://www.miteco.gob.es/es/cambio-climatico/temas/ impactos-vulnerabilidad-y-adaptacion/pnacc-2021-2030_tcm30-512163.pdf.

²⁰⁷ Even at very low concentrations, ozone can be harmful to the respiratory and cardiovascular system. In addition, this pollutant also contributes to global warming and damages vegetation, significantly reducing crop productivity. Although its formation depends mainly on emissions in urban areas, it is mainly rural areas that are affected. For further details, refer to: Department for Ecological Transition and Demographic Challenge "Ozono, efectos en salud y ecosistemas." Department for Ecological Transition and Demographic Challenge, https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/atmosfera-y-calidad-del-aire/calidad-del-aire/salud/ozono. aspx; and WHO. *Health risks of ozone from long-range transboundary air pollution.* Copenhague: Publications WHO Regional Office for Europe, 2008. https://www.euro.who.int/__data/assets/pdf_file/0005/78647/E91843.pdf.

²⁰⁸ Martin, J.L., *et al.* "Aspectos clave para un plan de adaptación de la biodiversidad terrestre de Canarias al cambio climático". In Herrero, A., and Zavala, M.A (eds.). *Los Bosques y la Biodiversidad frente al Cambio Climático: Impactos, Vulnerabilidad y Adaptación en España*. Madrid: Department of Agriculture, Food and Environment, 2015. 573-580. https://www.miteco.gob.es/es/cambio-climatico/temas/impactosvulnerabilidad-y-adaptacion/cap53-aspectosclaveparaunplandeadap taciondelabiodiversidadterrestredecanarias_tcm30-70255.pdf.

²⁰⁹ High temperatures are associated with aggravation and mortality from neurodegenerative diseases. See: Linares C., *et al.* "Effect of heat waves on morbidity and mortality due to Parkinson's disease in Madrid: A time-series analysis." *Environment International* 89–90, 2016. https:// doi.org/10.1016/j.envint.2016.01.017.

²¹⁰ European Centre for Disease Prevention and Control. Assessing the potential impacts of climate change on food-and waterborne diseases in Europe. Stockholm: ECDC, 2012.https://www.ecdc.europa.eu/en/publications-data/assessing-potential-impacts-climate-change-food-and-waterborne-diseases-europe.

²¹¹ Lake, Iain, *et al.* "Climate change and future pollen allergy in Europe." *Environmental Health Perspectives* 125, 2017. http://dx.doi. org/10.1289/EHP173.

²¹² Paz, S., *et al.* "Health." In W. Cramer, J. Guiot, and J. K. Marini (eds.). *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report.* Marseille: Union for the Mediterranean, Plan Bleu, and UNEP/

MAP, 2020. On the press. https://www.medecc.org/wp-content/ uploads/2020/11/MedECC_MAR1_5_2_Health.pdf.

²¹³ Recent evidence also points to a possible association of rising temperatures with increased rates of antimicrobial resistance. For further details, refer to: FAO. *Climate change: Unpacking the burden on food safety*. Rome: Food safety and quality series n.º 8, 2020. https://doi.org/10.4060/ca8185en; and Interagency Coordination Group on Antimicrobial Resistance. *No time to wait: Securing the future from drug-resistant infections report to the Secretary-General of the United Nations*. 2019. https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_final_summary_EN.pdf?ua=1.

²¹⁴ Spanish Agency for Medicines and Health Products. *Plan Nacional Frente a la Resistencia a los Antibióticos 2019-2021*. Madrid, 2019. http://www.resistenciaantibioticos.es/es/system/files/field/files/ pran_2019-2021_0.pdf?file=1&type=node&id=497&force=0.

²¹⁵ O'Neil, J. *Tackling drug-resistant infections globally: final report and recommendations*. Review of Antimicrobial Resistance, 2016. https://amr-review.org/sites/default/files/160518_Final%20paper_with%20 cover.pdf.

²¹⁶ Geissen, V., *et al.* "Emerging pollutants in the environment: A challenge for water resource management." *International Soil and Water Conservation Research* 3, n.º 1, 2015. https://doi.org/10.1016/j. iswcr.2015.03.002.

²¹⁷ Zhang, Q., *et al.* "A Review of Microplastics in Table Salt, Drinking Water, and Air: Direct Human Exposure." *Environmental Science and Technology* 54, n.º 7, 2020. https://doi.org/10.1021/acs.est.9b04535.

²¹⁸Climate Action Tracker Project. "Temperatures 1990-2100." Climate Action Tracker, https://climateactiontracker.org/global/temperatures/.

²¹⁹ IPCC. "Summary for Policymakers." En Masson-Delmotte, V., *et al.* (eds.). *Global Warming of* 1.5°C. *An IPCC Special Report on the impacts of global warming of* 1.5°C *above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Intergovernmental Panel on Climate Change,* 2018. https://www.ipcc.ch/sr15/chapter/spm/.

²²⁰ It is important to note that the estimate does not include the full range of potential economic impacts caused by climate change due to complexities in their valuation or quantification. For further details, see: Szewczyk, W., *et al. Economic analysis of selected climate impacts*. Luxembourg: Publications Office of the European Union, 2020. https:// doi.org/10.2760/845605.

²²¹United Nations. *Paris Agreement*. Paris, 2015. https://unfccc.int/sites/ default/files/english_paris_agreement.pdf.

²²² United Nations. *Paris Agreement*. Paris, 2015. https://unfccc.int/sites/ default/files/english_paris_agreement.pdf.

²²³ In September 2020, the EU raised the ambition of the 2030 greenhouse gas emissions reduction target. On average, the EU as a whole will have to reduce its emissions by 55% below 1990 levels by that date. In the case of Spain, at present, the PNIEC establishes a decrease of 23% compared to 1990 levels. For further details, refer to: European Commission. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social*

Committee and the Committee of the Regions. Stepping up Europe's 2030 climate ambition. Investing in a climate-neutral future for the benefit of our people. Brussels, 2020. https://ec.europa.eu/clima/sites/clima/ files/eu-climate-action/docs/com_2030_ctp_en.pdf; and Department for Ecological Transition and Demographic Challenge.. *Plan Nacional Integrado de Energía y Clima 2021-2030*. Madrid, 2020. https://www. miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf.

²²⁴Economics for Energy. *Escenarios para el sector energético en España* 2030-2050. Vigo, 2017. https://eforenergy.org/docpublicaciones/ informes/informe_2017.pdf.

²²⁵ The overall rate of return on investments to improve resilience is very high. Therefore, adaptation measures not only serve to prevent possible negative impacts of climate change, but also have important economic benefits and avoid future costs. So-called nature-based solutions, which are inspired and supported by the functioning of ecosystems, are set to play a key role in this process. These include measures such as the restoration of coastal ecosystems to slow erosion and mitigate the impacts of rising seas, reforestation to preserve water quantity and quality, and the creation of natural flood zones to retain water during periods of extreme rainfall. In addition to being key to climate change adaptation, these solutions are one of the cheapest and most effective ways of absorbing CO, and help preserve ecosystems and biodiversity. For further details, see: Global Commission on Adaptation. Adapt now: A global call for leadership on climate resilience. 2019. Https://gca.org/ reports/adapt-now-a-global-call-for-leadership-on-climate-resilience/;; Department for Ecological Transition and Demographic Challenge. Plan Nacional de Adaptación al Cambio Climático 2021-2030. Madrid, 2020. https://www.miteco.gob.es/es/cambio-climatico/temas/impactosvulnerabilidad-y-adaptacion/pnacc-2021-2030_tcm30-512163.pdf; and United Nations Environment Programme. Adaptation Gap Report 2020. Nairobi, 2021. https://www.unep.org/resources/adaptation-gapreport-2020.

²²⁶ According to the energy balance carried out by the Institute for Energy Diversification and Saving (IDAE), electricity consumption over final energy in 2018 was 23%. Depending on the long-term scenarios, as established by the European Commission, the ratios of electricity consumption to final energy in 2050 will reach values between 41% and 53%. For further details, refer to: European Commission. *A Clean Planet for all A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy*. Brussels, 2018. https:// ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_ analysis_in_support_en_0.pdf; and Instituto para la Diversificación y Ahorro de la Energía. *Consumo final de energía 2018 (avance)*. http:// sieeweb.idae.es/consumofinal/.

²²⁷ Department for Ecological Transition and Demographic Challenge. *Estrategia de Descarbonización a Largo Plazo 2050. Anexos.* Madrid, 2020. https://www.miteco.gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf.

²²⁸ From 2022 onwards, the contribution of coal to the Spanish electricity mix is expected to be negligible.

²²⁹ Department for Ecological Transition and Demographic Challenge *Estrategia de almacenamiento energético*. Madrid, 2021. https://www. miteco.gob.es/es/prensa/estrategiaalmacenamiento_tcm30-522655. pdf. ²³⁰ There is a need to develop battery production systems that are responsible, circular and fair, with a fundamental change in the way materials are sourced and these technologies are produced and used. For further details, refer to: World Economic Forum. A Vision for a Sustainable Battery Value Chain in 2030. Unlocking the Full Potential to Power Sustainable Development and Climate Change Mitigation. Geneva, 2019 http://www3.weforum.org/docs/WEF_A_Vision_for_a_ Sustainable_Battery_Value_Chain_in_2030_Report.pdf.

²³¹ In Spain, 100% of electricity will come from renewable sources. See: Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050. Anexos.* Madrid, 2020. https://www.miteco.gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf.

²³² Red Eléctrica de España. Estructura de la generación por tecnologías 2019. https://www.ree.es/es/datos/generacion/estructura-generacion.

²³³ International Renewable Energy Agency. *Country rankings.* https://www.irena.org/Statistics/View-Data-by-Topic/Capacity-and-Generation/Country-Rankings.

²³⁴Energy community means an association, cooperative, partnership, non-profit organisation or other legal entity that is controlled by local shareholders or members, generally value-oriented rather than profitoriented, engaged in distributed generation and in carrying out the activities of a distribution system operator, supplier or aggregator at a local level, including on a cross-border basis. See: Instituto para la Diversificación y Ahorro de la Energía. *Guía para el Desarrollo de Instrumentos de Fomento de Comunidades Energéticas Locales*. Madrid, 2019. https://www.idae.es/sites/default/files/documentos/ publicaciones_idae/guia_para-desarrollo-instrumentos-fomento_ comunidades_energeticas_locales_20032019_0.pdf.

²³⁵ In Germany, for example, distributed generation accounts for half of all PV generation, covering 9% of the country's electricity mix in 2019. For further details, refer to: Fraunhofer Institute for Solar Energy Systems. *Photovoltaics report*. Freiburg, 2020. https://www.ise. fraunhofer.de/content/dam/ise/de/documents/publications/studies/ Photovoltaics-Report.pdf.

²³⁶ According to IRENA (International Renewable Energy Agency), over the last decade (2010 to 2019), the average balanced cost (LCOE measure) of solar PV energy has decreased by 82% (from 0.38\$/kWh to 0.07\$/kWh); concentrating solar by 49% (from 0.35\$/kWh to 0.18\$/ kWh); onshore wind by 44% (from 0.09\$/kWh to 0.05\$/kWh); and offshore wind by 25% (from 0.16\$/kWh to 0.12\$/kWh). The average cost of lithium batteries dropped from 1,160\$/kWh in 2010 to 156\$/ kWh in 2019 (an 87% reduction). On this question, see, among others: BloombergNEF. "Battery Pack Prices Fall As Market Ramps Up With Market Average At \$156/kWh In 2019." BloombergNEF, https://about. bnef.com/blog/battery-pack-prices-fall-as-market-ramps-up-withmarket-average-at-156-kwh-in-2019/; BloombergNEF. European Energy Transition Outlook. 2021; and International Renewable Energy Agency. Renewable Power Generation Costs in 2019. Abu Dhabi, 2020. https://www.irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019.

²³⁷ The European Union has a "European Union Hydrogen Strategy" and the Spanish Government has a "Renewable Hydrogen Roadmap", included in the Integrated Energy and Climate Plan (PNIEC) 20212030. The "Recovery, Transformation and Resilience Plan" project also earmarks 1.5 billion euros for its development. On this question, see: European Commission. *A hydrogen strategy for a climate-neutral Europe*. Brussels, 2020. https://ec.europa.eu/energy/sites/ener/files/ hydrogen_strategy.pdf; Government of Spain. *Recovery, Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia. pdf; and Department for Ecological Transition and Demographic Challenge.. *Hoja de Ruta del Hidrógeno: Una apuesta por el hidrógeno Renovable*. Madrid, 2020. https://www.miteco.gob.es/images/es/ hojarutadelhidrogeno_tcm30-513830.pdf.

²³⁸ It can also be introduced as a raw material in the chemical industry and refineries, which currently use hydrogen from fossil sources. For further details, refer to: Department for Ecological Transition and Demographic Challenge *Hoja de Ruta del Hidrógeno: Una apuesta por el hidrógeno Renovable.* Madrid, 2020. https://www.miteco. gob.es/images/es/hojarutadelhidrogeno_tcm30-513830.pdf; and Vitoria, M., *et al.* "The role of storage technologies throughout the decarbonisation of the sector-coupled European energy system." *Energy Conversion and Management* 201, 2019. https://doi.org/10.1016/j. enconman.2019.111977.

²³⁹ Department for Ecological Transition and Demographic Challenge Hoja de Ruta del Hidrógeno: Una apuesta por el hidrógeno Renovable.
2020. https://www.miteco.gob.es/images/es/hojarutadelhidrogeno_ tcm30-513830.pdf.

²⁴⁰ Economic diversification and the reconversion of territories affected by ecological transition are included in the Spanish Government's Fair Transition Strategy, and are supported by European funding through the Fair Transition Funds. For further details, see: European Commission. "Fuentes de financiación de la transición justa." European Commission, https://ec.europa.eu/info/strategy/priorities-2019-2024/europeangreen-deal/actions-being-taken-eu/just-transition-mechanism/justtransition-funding-sources_es; and Department for Ecological Transition and Demographic Challenge. Estrategia de Transición Justa. Madrid, 2020. https://www.miteco.gob.es/images/es/documentoetj_tcm30-514300.pdf.

²⁴¹Cramer, W., *et al.* "MedECC 2020 Summary for Policymakers." In W. Cramer, J. Guiot, and J. K. Marini (eds.). *Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report.* Marseille: Union for the Mediterranean, Plan Bleu , and UNEP/MAP, 2020. *En prensa.* https:// www.medecc.org/wp-content/uploads/2020/11/MedECC_MAR1_SPM_ ENG.pdf.

²⁴² Refer to: Global Wind Energy Council. *Supply Side Analysis* 2019. https://gwec.net/wind-turbine-sizes-keep-growing-as-industryconsolidation-continues/; and Schmela, Michael. *EU Market Europe For Solar Power 2019 - 2023*. Solar Power Europe, 2019. https://www. solarpowereurope.org/wp-content/uploads/2019/12/SolarPower-Europe_EU-Market-Outlook-for-Solar-Power-2019-2023_.pdf?cf_ id=5387.

²⁴³ The PNIEC analyses the impact of the effect of the policies and measures set out in the PNIEC against a baseline scenario without additional measures. The net annual employment generated is estimated at between 253,000 and 348,000 people per year in the period 2021-2030. The ELP assesses the additional effect of policies needed to decarbonise the economy in the period 2031-2050, with its baseline scenario being the PNIEC target scenario until 2030 and no additional policies thereafter. The net annual employment generated is estimated at between 140,000 and 300,000 people per year. See: Department for Ecological Transition and Demographic Challenge *Impacto económico, de empleo, social y sobre la salud pública del Plan Nacional Integrado de Energía y Clima 2021-2030*. Madrid, 2020. https://www.miteco.gob.es/images/es/informesocioeconomicopniecco mpleto_tcm30-508411.pdf; and Department for Ecological Transition and Demographic Challenge.. *Estrategia de Descarbonización a Largo Plazo 2050. Anexos.* Madrid, 2020. https://www.miteco.gob.es/es/ prensa/anexoelp2050_tcm30-516147.pdf.

²⁴⁴ Recent studies agree that the transition to a decarbonised economy can have positive effects on employment and economic activity, especially for countries or regions dependent on fossil fuels. For further details, refer to, among others: International Renewable Energy Agency. *Transforming the Energy System – and holding the line on the rise of global temperatures*. Abu Dhabi, 2019. https://www.irena. org/publications/2019/Sep/Transforming-the-energy-system; and OECD. *Investing in Climate, Investing in Growth*. Paris: OECD Publishing, 2017. https://doi.org/10.1787/9789264273528-en.

²⁴⁵ Department for Ecological Transition and Demographic Challenge.
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 https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109.
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²⁴⁶ Estimates of savings from reduced fossil fuel imports have been made under the following assumptions. (i) the vehicle fleet in the year 2019 (latest available data) consisted of 34.4 million units, of which 24.5 million were passenger cars; (ii) the consumption of motor fuels in 2019 was 28.832 kilo tonnes (1 tonne = 7.33 barrels of oil); (iii) the estimated price per barrel of brent for 2030 in euros at constant 2016 prices is 100.77 according to the PNIEC, and it is assumed that by 2050, according to the ELP, this could be close to 120; (iv) it is established that all fossil automotive fuel (gasoline and diesel) that is no longer consumed by substitution with electric vehicles is equal to the fossil fuel that is no longer imported; and (v) the energy that will power electric vehicles will be 100% of renewable sources. See: CORES. Informe estadístico anual 2019. https://www.cores.es/es/publicaciones; Department of Interior. Dirección General de Tráfico. Parque de vehículos. Anuario 2019. https://www.dgt.es/es/seguridad-vial/estadisticas-e-indicadores/ parque-vehiculos/tablas-estadisticas/; and Department for Ecological Transition and Demographic Challenge. Plan Nacional Integrado de Energía y Clima 2021-2030. Madrid, 2020. https://www.miteco.gob. es/images/es/pnieccompleto tcm30-508410.pdf; and Department for Ecological Transition and Demographic Challenge.. Estrategia de Descarbonización a Largo Plazo 2050. Anexos. Madrid, 2020. https:// www.miteco.gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf.

²⁴⁷ However, the electrification of the car fleet faces two challenges to its sustainability: managing the use of rare elements (such as lithium) and the need to implement strategies for the reuse, recycling and disposal of batteries at the end of their useful life. In addition, electric vehicles do not completely eliminate emissions of air pollutants harmful to health (such as particulate matter from tyre wear, brakes and pavement abrasion), nor do they solve congestion and public space occupation problems. For further details, refer to: United Nations Environment Programme. Foresight brief: Challenges for the growth of the electric vehicle market. 2020. https://wedocs.unep.org/bitstream/ handle/20.500.11822/33111/FB17.pdf?sequence=7&isAllowed=y; and Khan, R. K., and Mark A. Strand. "Road dust and its effect on human health: a literature review." *Epidemiology and Health* 40, 2018. https:// doi.org/10.4178/epih.e2018013.

²⁴⁸ This category includes advanced biofuels, such as those made from waste, or electro-fuels, made from carbon dioxide and water using electricity. While these provide continuity to existing propulsion systems and logistical supply systems, they do not fully address local pollutant emissions problems and are constrained by the efficiency limits of existing combustion engines. There are also challenges in the manufacturing processes of these fuels to make them cost-effective. On this question, see, among others: Lehtveer, Mariliis, Selma Brynolf, and Selma Brynolf. "What Future for Electrofuels in Transport? Analysis of Cost Competitiveness in Global Climate Mitigation." Environmental Science and Technology 53, n.º3, 2019. https://pubs.acs.org/ doi/10.1021/acs.est.8b0524; Department for Ecological Transition and Demographic Challenge. Estrategia de Descarbonización a Largo Plazo 2050. Anexos. Madrid, 2020. https://www.miteco.gob.es/es/prensa/ anexoelp2050_tcm30-516147.pdf; and Transport and Environment. What role is there for electrofuel technologies in European transport's low carbon future?. 2017. https://www.transportenvironment.org/ sites/te/files/publications/2017_11_Cerulogy_study_What_role_elect rofuels_final_0.pdf.

²⁴⁹ For further details, see: European Commission. *On the road to automated mobility: An EU strategy for mobility of the future*. Brussels, 2018. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52018DC0283; and Jones, E. C., and B. D. Leibowicz. "Contributions of shared autonomous vehicles to climate change mitigation." *Transportation Research Part D: Transport and Environment* 72, 2019. https://doi.org/10.1016/j.trd.2019.05.005.

²⁵⁰ On this question, see, among others: Commission of Experts on Energy Transition. *Análisis y propuestas para la descarbonización*. 2018. http://www6.mityc.es/aplicaciones/ transicionenergetica/informe_cexpertos_20180402_veditado.pdf; Llevat, M., and G. Llobet. *El Futuro del Ferrocarril de Mercancías en España*. Fedea, Policy Papers, n.º 2016/25, 2016. https:// documentos.fedea.net/pubs/fpp/2016/12/FPP2016-25.pdf; and Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109. pdf.

²⁵¹The International Air Transport Association estimates that pre-COVID passenger traffic levels will not recover until 2024. See: International Air Transport Association. "Recovery Delayed as International Travel Remains Locked Down." International Air Transport Association, https://www.iata.org/en/pressroom/pr/2020-07-28-02/.

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²⁵³ International Civil Aviation Organization. *Destination green. The Next Chapter. Environmental report.* 2019. https://www.icao.int/ environmental-protection/Pages/envrep2019.aspx. ²⁵⁴ International Maritime Organization. *Fourth IMO Greenhouse Gas Study*. 2020. https://theicct.org/news/fourth-imo-ghg-study-finalreportpr-20200804.

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https://www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410. pdf.

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Transition Law" which, together with the "Integrated National Energy and Climate Plan (PNIEC)" and the "Fair Transition Strategy", form the three pillars of the "Strategic Energy and Climate Framework" approved by the Spanish Government in 2019. Spain has also developed a "Long Term Decarbonisation Strategy 2050", with ambitious emission mitigation plans, and a "Circular Economy Strategy 2030", with the aim of building a resource-efficient economy that generates more value using less materials. Moreover, the "National Plan for Adaptation to Climate Change 2021-2030" promotes a coordinated and proactive action to address the effects of climate change. For further details, refer to: Department for Ecological Transition and Demographic Challenge "Marco Estratégico de Energía y Clima: Una oportunidad para la modernización de la economía española y la creación de empleo." Department for Ecological Transition and Demographic Challenge, https://www.miteco.gob.es/es/cambio-climatico/participacion-publica/ marco-estrategico-energia-y-clima.aspx.

²⁹⁸ It should be noted that over the last decades we have not seen a reduction in total water demand in Spain. Efficiency improvements have been offset by an increase in irrigated area and population supplied.

²⁹⁹ The draft of the "Recovery, Transformation and Resilience Plan" provides for more than 3 billion euros for the deployment of renewable energies in its component 7, and around 1.4 billion euros in its component 8 to improve electricity infrastructure and storage systems. For further details, see: Government of Spain. *Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf.

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³⁰³ Target of 90% reduction from the 1990 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109. pdf. Target of 90% reduction from the 1990 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge Estrategia de Descarbonización a Largo Plazo 2050. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109. pdf.

³⁰⁴ Total annual demand for consumptive uses (water, once used, is not returned to the environment where it was abstracted or is not returned in the same way as it was abstracted): supply, agricultural use, industrial use and other consumptive uses. The observed figure is from 2013/2014. See: Department for Ecological Transition and Demographic Challenge Informe de seguimiento de Planes Hidrológicos y Recursos Hídricos en España. Año 2018. Madrid, 2019. https://www.miteco.gob. es/es/agua/temas/planificacion-hidrologica/memoria infoseg 2018 tcm30-482594.pdf. Total annual demand for consumptive uses (water, once used, is not returned to the environment where it was abstracted or is not returned in the same way as it was abstracted): supply, agricultural use, industrial use and other consumptive uses. The observed figure is from 2013/2014. See: Department for Ecological Transition and Demographic Challenge Informe de seguimiento de Planes Hidrológicos y Recursos Hídricos en España. Año 2018. Madrid, 2019. https://www. miteco.gob.es/es/agua/temas/planificacion-hidrologica/memoria_ infoseg_2018_tcm30-482594.pdf.

³⁰⁵ To compensate for the reduction in average water resources availabilities estimated by CEDEX, an average reduction in water demand of 5% by 2030 would be necessary, and of and 15% by 2050. This would result in a decrease in demand of 1,000 hm³ for each planning cycle (6 years). See: Centro de Estudios y Experimentación de Obras Públicas. *Evaluación del impacto del cambio climático en los recursos hídricos y sequías en España*. Madrid: Centro de Estudios Hidrográficos, 2017. http://www.cedex.es/NR/rdonlyres/3B08CCC1-C252-4AC0-BAF7-1BC27266534B/145732/2017_07_424150001_ Evaluaci%C3%B3n_cambio_clim%C3%A1tico_recu.pdf.

³⁰⁶ Primary energy intensity is defined as the ratio between the energy consumption and the gross domestic product (equivalent kilogram oil / thousands of euros). In the case of Spain, the current figure is in line with that reported in the ELP for 2015. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. Energy intensity [nrg_ind_ei]. Energy intensity of GDP in chain linked volumes (2010). https://ec.europa.eu/eurostat/data/database.Primary energy intensity is defined as the ratio between the energy consumption and the gross domestic product (equivalent kilogram oil / thousands of euros). In the case of Spain, the current figure is in line with that reported in the ELP for 2015. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. Energy intensity [nrg_ind_ei]. Energy intensity of GDP in chain linked volumes (2010). https://ec.europa.eu/ eurostat/data/database.

³⁰⁷ Target of 23% reduction from the 1990 level according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge *Plan Nacional Integrado de Energía y Clima 2021-2030.* Madrid, 2020. https://www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410. pdf.

³⁰⁸ Target of 63% reduction from the 2015 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109. pdf. Target of 63% reduction from the 2015 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge Estrategia de Descarbonización a Largo Plazo 2050. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109. pdf.

³⁰⁹ This percentage is calculated in accordance with the rules set out in Directive 2009/28/EC. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. *Share of energy from renewable sources* [*NRG_IND_REN*]. *Renewable energy sources in electricity*.https:// ec.europa.eu/eurostat/data/database. This percentage is calculated in accordance with the rules set out in Directive 2009/28/EC. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. Share of energy from renewable sources [NRG_IND_REN]. Renewable energy sources in electricity. https://ec.europa.eu/eurostat/ data/database.

³¹⁰ Target for 2030 according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge *Plan Nacional Integrado de Energía y Clima 2021-2030*. Madrid, 2020. https://www. miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf. Target for 2030 according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge Plan Nacional Integrado de Energía y Clima 2021-2030. Madrid, 2020. https://www.miteco.gob.es/images/es/ pnieccompleto_tcm30-508410.pdf.

³¹¹Target for 2050 according to the ELP. See: Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/ prensa/documentoelp_tcm30-516109.pdf. Target for 2050 according to the ELP. See: Department for Ecological Transition and Demographic Challenge Estrategia de Descarbonización a Largo Plazo 2050. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109.pdf.

³¹² Environmental tax revenues include taxes on energy, transport, pollution and resource use. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. *Environmental Tax Revenues [env_ac_tax]. Percentage of gross domestic product (GDP).* https://ec.europa.eu/eurostat/data/database.Environmental tax revenues include taxes on energy, transport, pollution and resource use. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. Environmental Tax Revenues ferv_ac_tax]. Percentage of gross domestic product (GDP). https://ec.europa.eu/eurostat/data/database.

³¹³ This level of environmental revenue collection was achieved by countries such as Denmark between 1996 and 2007. See: Eurostat. *Environmental Tax Revenues [env_ac_tax]. Percentage of gross domestic* *product (GDP).* https://ec.europa.eu/eurostat/data/database.This level of environmental revenue collection was achieved by countries such as Denmark between 1996 and 2007. See: Eurostat. Environmental Tax Revenues [env_ac_tax]. Percentage of gross domestic product (GDP). https://ec.europa.eu/eurostat/data/database.

³¹⁴ It is defined as the proportion of the total utilised agricultural area occupied by organic farming (includes existing organically farmed areas and areas under conversion). The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. The observed figure is from 2019. See: Eurostat. Area under organic farming [SDG_02_40]. Percentage of total utilised agricultural area. Utilised agricultural area excluding kitchen gardens. Total fully converted and under conversion to organic farming. https://ec.europa.eu/eurostat/data/database. It is defined as the proportion of the total utilised agricultural area occupied by organic farming (includes existing organically farmed areas and areas under conversion). The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. The observed figure is from 2019. See: Eurostat. Area under organic farming [SDG 02 40]. Percentage of total utilised agricultural area. Utilised agricultural area excluding kitchen gardens. Total fully converted and under conversion to organic farming. https:// ec.europa.eu/eurostat/data/database.

³¹⁵ Target for 2030 according to the European Commission. See: European Commission. *Farm to Fork Strategy: for a fair, healthy and environmentally-friendly food system*: Brussels, 2020. https://ec.europa. eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_strategyinfo_en.pdf. Target for 2030 according to the European Commission. See: European Commission. Farm to Fork Strategy: for a fair, healthy and environmentally-friendly food system. Brussels, 2020. https:// ec.europa.eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_ strategy-info_en.pdf.

³¹⁶ The value corresponds to the sum of hectares resulting from protective afforestation, productive afforestation and afforestation of agricultural land. Annual average over the decade 2009-2018. On this question, see: Department for Ecological Transition and Demographic Challenge *Anuario de Estadística Forestal. Resultados Estadísticos Principales de 2018.* https://www.miteco.gob.es/es/ biodiversidad/estadisticas/aef_2018_resumen_tcm30-521680.pdf.The value corresponds to the sum of hectares resulting from protective afforestation, productive afforestation and afforestation of agricultural land. Annual average over the decade 2009-2018. On this question, see: Department for Ecological Transition and Demographic Challenge Anuario de Estadística Forestal. Resultados Estadísticos Principales de 2018. https://www.miteco.gob.es/es/biodiversidad/estadisticas/ aef_2018_resumen_tcm30-521680.pdf.

³¹⁷ In line with the Long Term Decarbonisation Strategy 2050..See: Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050. Anexos.* Madrid, 2020. https://www.miteco.gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf. n line with the Long Term Decarbonisation Strategy 2050. See: Department for Ecological Transition and Demographic Challenge Estrategia de Descarbonización a Largo Plazo 2050. Anexos. Madrid, 2020. https://www.miteco.gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf. ³¹⁸ In line with the Long Term Decarbonisation Strategy 2050..See: See: Department for Ecological Transition and Demographic Challenge *Estrategia de Descarbonización a Largo Plazo 2050. Anexos.* Madrid, 2020. https://www.miteco.gob.es/es/prensa/anexoelp2050_tcm30-516147.pdf.

³¹⁹ Component 12 "Spain Industrial Policy 2030" of the draft of the "Recovery, Transformation and Resilience Plan" will allocate more than 2.2 billion euros to support strategic projects for industrial transition through the "Programme to Boost Industrial Competitiveness and Sustainability". Component 12 also includes a "Plan to support the implementation of waste legislation and the promotion of the circular economy". See: Government of Spain. *Recovery, Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf.

³²⁰ On this question, see, among others: European Commission. *Circular Economy Action Plan.* Luxembourg: Publications Office of the European Union, 2020. https://ec.europa.eu/environment/ circular-economy/pdf/new_circular_economy_action_plan.pdf; and European Parliament and Council of the European Union. *Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment* Brussels, 2019. https://eur-lex.europa.eu/legal-content/ ES/TXT/?uri=CELEX%3A32019L0904.

³²¹ FAO, OIE, WHO, UN System Influenza Coordination, UNICEF and World Bank. *Contributing to One World, One Health*. 2008. https://www. oie.int/doc/ged/D5720.PDF.

³²² Among other aspects, synergies between different environmental health risks should be considered in prevention and risk plans (e.g. between heat and air pollution), potential new risks from emerging pollutants should be monitored and regulated, and public awareness of the relationship between health and environment should be raised. For further details, see: Vandyck, T., *et al.* "Air quality co-benefits for human health and agriculture counterbalance costs to meet Paris Agreement pledges." *Nature Communications* 9, 2018. https://doi.org/10.1038/ s41467-018-06885-9; WHO. *Heat and health in the WHO European Region: updated evidence for effective prevention*. Copenhague: Publications WHO Regional Office for Europe, 2021. https://www.euro. who.int/en/health-topics/environment-and-health/Climate-change/ publications/2021/heat-and-health-in-the-who-european-regionupdated-evidence-for-effective-prevention-2021.

³²³ This is the economic cost of an additional tonne of CO emitted into the atmosphere on economic activities, social welfare and ecosystems.

³²⁴ In 2018, environmental tax revenue in our country accounted for 1.8% of GDP, compared to 2.4% in the EU-27. The weight of energy taxes in energy prices is lower than the average weight in the EU-23 (population-weighted average of the 23 EU OECD countries). This strengthening of environmental taxation will bring important co-benefits, such as reduced emissions of air pollutants. For further details, refer to: Eurostat. Environmental Tax Revenues. [env_ac_tax]. https://ec.europa. eu/eurostat/data/database; and Gago, A., *et al.* Impuestos energéticoambientales en España: situación y propuestas eficientes y equitativas. Fundación Alternativas, Documento de Trabajo Sostenibilidad n.º 2, 2019. https://www.fundacionalternativas.org/public/storage/ publicaciones_archivos/58ce043c930b1da7b5d92cffac6f5215.pdf. ³²⁵ This mechanism, included in EU plans, may provide an incentive for third countries to incorporate measures similar to those of the EU in order to avoid having to pay this adjustment. Moreover, it can protect sectors that would otherwise face disadvantageous international competition. On the other hand, it will make European efforts more effective by incorporating climate costs into products from third countries.

³²⁶ The climate income, also known as the carbon dividend, is envisaged as a "basic income" that all citizens receive to help them change their consumption and investment patterns. It has already been implemented in other countries, such as Canada or Switzerland, and there are different citizen proposals for its implementation at a national and European level. See: Citizens Climate Initiative. "Apoyo a la Iniciativa Ciudadana Climática Europea." Citizens Climate Initiative, https://citizensclimateinitiative.eu/es/; and Economists' statement. "Economists' statement on carbon dividends organized by the climate leadership council." Economists' statement, https://www. econstatement.org.

³²⁷ Part of these funds could be used to support territories whose activities contribute to the maintenance of ecosystem services to reduce the risks associated with climate change (forest fires, droughts, floods, etc.). European Commission. "Fuentes de financiación de la transición justa." European Comission, https://ec.europa.eu/info/strategy/ priorities-2019-2024/european-green-deal/actions-being-taken-eu/ just-transition-mechanism/just-transition-funding-sources_es.

³²⁸Chan, G., *et al.* "Six principles for energy innovation." *Nature* 552, n.º 7683, 2017. https://doi.org/10.1038/d41586-017-07761-0.

³²⁹ Goldstein, A.P., *et al.* "Patenting and business outcomes for cleantech startups funded by ARPA-E." *Nature Energy*, 2020. https://doi.org/10.1038/s41560-020-00683-8.

³³⁰ According to different studies, support for research and innovation in small and medium-sized enterprises by the public sector can have significant positive effects and indicates that relatively small amounts can result in large returns for small firms. For further details, refer to: Doblinger, C., K. Surana, and L.D. Anadon. "Governments as partners: the role of alliances in U.S. cleantech startup innovation." *Research Policy* 48, n.º 6, 2019. https://doi.org/10.1016/j.respol.2019.02.006; Goldstein, A.P., *et al.* "Patenting and business outcomes for cleantech startups funded by ARPA-E." *Nature Energy*, 2020. https:// doi.org/10.1038/s41560-020-00683-8; Howell, S. T. "Financing innovation: evidence from R&D grants." *American Economic Review* 107, 2017. https://doi.org/10.1257/aer.20150808; Pless, J. "Are "Complementary Policies" Substitutes? Evidence from R&D Subsidies in the UK." 2019. https://mitsloan.mit.edu/shared/ods/documents/?P ublicationDocumentID=5545.

³³¹ In line with the Long Term Decarbonisation Strategy 2050. See: Department for Ecological Transition and Demographic Challenge. *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109.pdf.

³³² Economics for Energy. Estrategias para la descarbonización del transporte terrestre en España. Un análisis de escenarios. Vigo, 2021. https://eforenergy.org/docpublicaciones/informes/informe_ transporte.pdf. ³³³ Modal shift is the most efficient and effective measure, and is one of the main measures envisaged in the PNIEC 2021-2030. Economics for Energy. *Estrategias para la descarbonización del transporte terrestre en España. Un análisis de escenarios.* Vigo, 2021. https://eforenergy.org/ docpublicaciones/informes/informe_transporte.pdf; and Department for Ecological Transition and Demographic Challenge.. *Plan Nacional Integrado de Energía y Clima 2021-2030.* Madrid, 2020. https://www. miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf.

³³⁴ The "Recovery, Transformation and Resilience Plan" project will allocate more than 2.2 billion euros to support strategic projects for industrial transition in its component 12 "Spain Industrial Policy 2030". Among other sectors, support will be given to the development of the automotive sector and electric vehicles. Likewise, component 1 of the "Sustainable, safe and connected mobility shock plan in urban and metropolitan environments" includes an "Incentive plan for the installation of recharging points, the acquisition of electric and fuel cell vehicles and innovation in electromobility, recharging and green hydrogen", with a budget of close to 2 billion euros. See: Government of Spain. *Recovery, Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

³³⁵ This requires stable and gradual programming over time to mitigate impacts, a scheme that anticipates and addresses the effects on economic activity and income distribution, and a mechanism that periodically adjusts tax rates in line with inflation to avoid reducing their weight in real terms. For further details, refer to: Gago, A., *et al. Impuestos energético-ambientales en España: situación y propuestas eficientes y equitativas*. Fundación Alternativas, 2019. https://www. fundacionalternativas.org/public/storage/publicaciones_archivos/58c e043c930b1da7b5d92cffac6f5215.pdf.

³³⁶ With regard to local transport, the draft of the "National Recovery, Transformation and Resilience Plan" devotes, in its component 6 "Sustainable, safe and connected mobility" 1.6 billion euros to encourage greater use of its services, improving their accessibility, quality and advancing in digitalisation, among other measures. See: Government of Spain. *Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

³³⁷ The draft of the "Recovery, Transformation and Resilience Plan" dedicates in its component 6 "Sustainable, Safe and Connected Mobility" almost 4 billion euros to the promotion of Trans-European Transport Networks. This is intended to build new rail infrastructure on the Atlantic and Mediterranean corridors and modernise the existing network, among other things. On this question, see: AIReF. Estudio infraestructuras de transporte. Evaluación del gasto público 2019. Madrid, 2020. https://www.airef.es/wp-content/uploads/2020/07/ INFRAESTRUCTURAS/ESTUDIO_INFRAESTRUCTURAS_ SPENDINGREVIEW.pdf; Europe on Rail. Hop on the train: A Rail Renaissance for Europe. How the 2021 European Year of Rail can support the European Green Deal and a sustainable recovery. Bonn, Berlin, 2020. https://germanwatch.org/sites/germanwatch.org/files/ Hop%20on%20the%20Train.%20A%20Rail%20Renaissance%20 for%20Europe_0.pdf; y Gobernment of Spain. Recovery, Transformation and Resilience Plan. Madrid, 2021. https://www.lamoncloa.gob.es/

presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf.

³³⁸ For more details on the challenges of taxation in the aviation sector see: Gago, A., *et al. Impuestos energético-ambientales en España: situación y propuestas eficientes y equitativas.* Fundación Alternativas, Documento de Trabajo Sostenibilidad n.º 2, 2019. https://www. fundacionalternativas.org/public/storage/publicaciones_archivos/58c e043c930b1da7b5d92cffac6f5215.pdf.

³³⁹ National Hydrological Plan; Spanish River Basin Hydrological Plans; National Plan for Purification, Drainage, Efficiency, Saving and Reuse (under preparation). The draft of the "Recovery, Transformation and Resilience Plan" will also help to make progress on this front. Thus, in its component 3 "Environmental and digital transformation of the agri-food and fisheries system" and its component 5 "Preservation of coastal space and water resources", it will allocate over 2.5 billion euros to a more efficient management of water resources, in line with the recommendations included in this *Strategy*. For further details, see: Government of Spain. Recovery, Transformation and Resilience Plan. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf; and Department for Ecological Transition and Demographic Challenge.. "Agua. Planes y Estrategias." Department for Ecological Transition and Demographic Challenge, https://www.miteco.gob.es/es/agua/planes-y-estrategias/.

³⁴⁰ For further details, see: Clark, Michael A., *et al.* "Multiple health and environmental impacts of foods." *Proceedings of the National Academy of Sciences* 116, n.º 46, 2019. https://doi.org/10.1073/ pnas.1906908116; EAT. *Diets for a Better Future: Rebooting and Reimagining Healthy and Sustainable Food Systems in the G20*. EAT Lancet Commission on Food, Planet, and Health, 2020. https://eatforum. org/content/uploads/2020/07/Diets-for-a-Better-Future_G20_ National-Dietary-Guidelines.pdf; y WHO. "Healthy diet." WHO, https:// www.who.int/news-room/fact-sheets/detail/healthy-diet.

³⁴¹Department of Agriculture, Food and Environment. *Más alimento, menos desperdicio. Estrategia 2017–2020.* Madrid, 2017. https:// menosdesperdicio.es/sites/default/files/documentos/relacionados/ estrategia_17-20.pdf.

³⁴² Such as the "Practical guide to reduce food waste in schools". For further details, refer to: Department of Agriculture, Food and Environment. *Guía práctica para reducir el desperdicio alimentario en centros educativos*. Madrid, 2014. https://www.miteco.gob.es/ es/ceneam/recursos/pag-web/guia-reducir-alimentos-centroeducativos.aspx. ³⁴³ République française. "L'affichage environnemental des produits et des services." Ministère de la Transition écologique, https://www. ecologie.gouv.fr/laffichage-environnemental-des-produits-et-desservices-hors-alimentaire.

³⁴⁴ Carbon Trust. "Product carbon footprint certification and labelling." Carbon Trust, https://www.carbontrust.com/what-we-do/assuranceand-certification/product-carbon-footprint-label?kw=%20carbon-%20 footprint-%20label-Broad.

³⁴⁵ The draft of the "Recovery, Transformation and Resilience Plan" includes in its component 4 "Conservation and restoration of ecosystems and their biodiversity" specific investments for sustainable forest management. See: Government of Spain. *Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf.

³⁴⁶ A Land Bank is an instrument to facilitate rural land leasing contracts between landowners and farmers, with the aim of mitigating the abandonment of farmland. Autonomous regions such as Galicia, Aragon and Asturias already have these instruments in place. For further details, refer to: Santiago, Diana. "La organización administrativa del banco de tierras de Galicia: la sociedad pública bantegal y la comisión técnica de precios y valores." *Dereito* 19, n.º1,2010. https:// minerva.usc.es/xmlui/bitstream/handle/10347/7941/03.Santiago. pdf?sequence=1&isAllowed=y.

³⁴⁷ This measure is relevant because more than half of the fires are caused by the use of fire in agricultural and livestock practices. For further details, see: Department of Agriculture, Food and Environment. ¿Qué sabemos de los incendios forestales? Madrid, 2015. https:// www.mapa.gob.es/es/desarrollo-rural/estadisticas/tripticoincendiosjunio2015v6_tcm30-419121.pdf.

³⁴⁸ Department for Ecological Transition and Demographic Challenge "Plan de Acción de Educación Ambiental para la Sostenibilidad." Centro Nacional de Educación Ambiental, https://www.miteco.gob.es/es/ ceneam/plan-accion-educacion-ambiental/documento-participacionexperta-paeas.aspx.

³⁴⁹ This institution should have the following characteristics: 1) be a politically relevant, but not politically prescriptive public body; 2) be independent, with criteria of transparency and inclusiveness; 3) be in charge of developing sectoral and policy projections, assessments and monitoring; and 4) foster the relationship between science and policy, through multi-directional "science-planning-management" coordination and exchange (including the public and private sectors), for the identification of knowledge gaps, co-creation, co-design and co-development of R&D&I.

CHALLENGE #5: GET OUR WELFARE STATE READY FOR A Longer-Living Society

¹Pinilla Pallejà, Rafael, and Francisco José Goerlich Gisbert. *Esperanza de vida en España a lo largo del siglo XX. Las tablas de mortalidad del Instituto Nacional de Estadística*. Bilbao: Fundación BBVA, Documentos de trabajo, n.º 11, 2006. https://www.fbbva.es/wp-content/uploads/2017/05/dat/DT_2006_11.pdf.

²The figure corresponds to the year 2017. For further details, see: OECD. *Health Status*. https://stats.oecd.org/.

³ See Epidemiological Transition and Health Transition theories. Refer to: Frenk, Julio, *et al.* "Elements for a Theory of the Health Transition." *Health Transition Review* 1, n.º 1, 1991. www.jstor.org/ stable/40608615; Olshansky, S. Jay, and A. Brian Ault. "The Fourth Stage of the Epidemiologic Transition: The Age of Delayed Degenerative Diseases." *The Milbank Quarterly* 64, n.º 3, 1986. https://www.jstor. org/stable/3350025?seq=1; and Omran, Abdel R. "The Epidemiologic Transition: A Theory of the Epidemiology of Population Change." *The Milbank Memorial Fund Quarterly* 49, n.º 4, 1971. https://doi. org/10.1111/j.1468-0009.2005.00398.x.

⁴The "cardiovascular revolution" has led to a considerable reduction in deaths from heart and cerebrovascular diseases and has been key to the reduction in mortality among the elderly population in recent decades. For further details see: García González, Juan M. "¿Por qué vivimos más? Descomposición por causa de la esperanza de vida española de 1980 a 2009." *Revista Española de Investigaciones Sociológicas* 148, 2014. https://doi.org/10.5477/cis/reis.148.39; and Robles González, Elena. "¿De qué se mueren los ancianos en España?" *Estudios Geográficos* 70, 2009. https://doi.org/10.3989/estgeogr.0465.

⁵ On the one hand, there is a gender gap in life expectancy in favour of women, which has been maintained over time (in 2019, women aged 65 had a life expectancy of 23.4 years, compared to 19.5 years for men). On the other hand, higher educational attainment is associated with higher survival at all ages. The relationship between the two factors, gender and educational attainment, also indicates that the higher the level of education attained, the smaller the gap in survival between men and women. For further details, see: Requena, Miguel. "La desigualdad ante la muerte: educación y esperanza de vida en España." *Perspectives Demogràfiques*, n.º 006, 2017. https://ddd.uab.cat/record/174321.

⁶ Data for the period 1908-74 are from the *Human Mortality Database* nd those from 1975 to 2019, from the INE. For further details, see: Human Mortality Database. *Life expectancy at the age of 65 in Spain*. https://www.mortality.org/; and INE. *Tablas de mortalidad*. *Tablas de mortalidad por año, sexo, edad y funciones*. https://www.ine.es/dyngs/ INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736177004& menu=resultados&idp=1254735573002.

⁷Belenes, Raimon. "Un balance personal de 25 años de gestión sanitaria moderna en el Sistema Nacional de Salud." *Gaceta Sanitaria* 17, n.º 2, 2003. https://www.scielosp.org/article/gs/2003.v17n2/150-156/.

⁸Official State Gazette. *Spanish Constitution*. Madrid, 1978. https://www.boe.es/eli/es/c/1978/12/27/(1)/con.

⁹ Official State Gazette. Ley 14/1986, de 25 de abril, General de Sanidad.

Madrid, 1986. https://www.boe.es/eli/es/l/1986/04/25/14/con.

¹⁰ See, among others: García Armesto, Sandra, et al. Spain: Análisis del sistema sanitario. Sistemas sanitarios en transición. 2011. https:// www.mscbs.gob.es/organizacion/sns/planCalidadSNS/pdf/equidad/ observatorioEuropeo/EspanaAnalisisSistemaSanitario2010.pdf; and Jiménez Palacios, Alfonso. "El Sistema Nacional de Salud 20 años después." Revista de Administración Sanitaria Siglo XXI 4, n.º 2, 2006. https://www.elsevier.es/es-revista-revista-administracion-sanitariasiglo-xxi-261-articulo-el-sistema-nacional-salud-20-13091840.

¹¹ Variation between 1978 and 2018. The health expenditure reported here does not include long-term care services. For further details, see: OECD. *Health expenditure and financing*. https://stats.oecd.org/.

¹²The average number of years of schooling increased from 15 in 1980 to 39 in 2017. See: Carreras, Albert, and Xavier Tafunell Sambola. *Estadísticas históricas de España, siglos XIX-XX*. Bilbao: Fundación BBVA, 2006. https://www.fbbva.es/wp-content/uploads/2017/05/ dat/DE_2006_estadisticas_historicas.pdf; and WHO. *The Global Health Observatory. Medical doctors (per 10 000 population)*. https://www.who. int/data/gho.

¹³ Official State Gazette. Real Decreto 1088/1989, de 8 de septiembre, por el que se extiende la cobertura de la asistencia sanitaria de la Seguridad Social a las personas sin recursos económicos suficientes. Madrid, 1989. https://www.boe.es/eli/es/rd/1989/09/08/1088.

¹⁴ Official State Gazette. *Ley 16/2003, de 28 de mayo, de cohesión y calidad del Sistema Nacional de Salud.* Madrid, 2003. https://www.boe. es/eli/es/l/2003/05/28/16/con; and *Real Decreto-ley 7/2018, de 27 de julio, sobre el acceso universal al Sistema Nacional de Salud.* Madrid, 2018. https://www.boe.es/eli/es/rdl/2018/07/27/7.

¹⁵ The main rankings of quality and efficiency in the world's healthcare sectors place Spain in a good relative position. For example, our health care system ranks 19th out of 195 according to the Health Access and Quality Index and 15th out of 195 according to the Global Health Security Index. For further details, see: GBD 2016 Healthcare Access and Quality Collaborators. "Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016."The Lancet 391, n.º 10136, 2018. http:// dx.doi.org/10.1016/S0140-6736(18)30994-2; Health Consumer Powerhouse. Euro Health Consumer Index 2018 report. 2019.https:// healthpowerhouse.com/media/EHCI-2018/EHCI-2018-report.pdf; Nuclear Threat Initiative, Johns Hopkins Center for Health Security, and The Economist Intelligence Unit. Global health security index: Building collective action and accountability. 2019. https://www.ghsindex.org/ wp-content/uploads/2020/04/2019-Global-Health-Security-Index. pdf; and Tandon, Ajay, Christopher J.L. Murray, Jeremy A. Lauer, and David B. Evans. "Measuring overall health system performance for 191 countries." World Health Organization, GPE Discussion Paper, n.º 30, 2000. https://www.who.int/healthinfo/paper30.pdf.

¹⁶ OECD. Spain: Country Health Profile 2019, State of Health in the EU.

Paris: OECD Publishing; Brussels: European Observatory on Health Systems and Policies, 2019. https://doi.org/10.1787/8f834636-en.

¹⁷ Eurostat. Self-reported unmet needs for medical examination by sex, age, main reason declared and income quintile [hlth_silc_08]. https:// ec.europa.eu/eurostat/data/database.

¹⁸ Department for Health. Nota de prensa: España revalida en 2019 su liderazgo mundial en donación de órganos y aporta el 20% de los donantes de la UE y el 6% del mundo. Madrid, 2020. http://www.ont. es/Documents/07.09.2020%20NPONT%20RegistroMundial_.pdf.

¹⁹See: Global Observatory on Donation and Transplantation. *Newsletter Transplant. International Figures on Donation and Transplantation* 2019. 2020. http://www.ont.es/publicaciones/Documents/NEWSLETTER%20 2020_baja.pdf; and Matesanz, Rafael (ed.). *El modelo español de coordinación y trasplantes*. Madrid: Aula Médica, 2008. http://www. ont.es/publicaciones/Documents/modeloespanol.pdf.

²⁰ Department for Health. *Nota de prensa: España revalida en 2019 su liderazgo mundial en donación de órganos y aporta el 20% de los donantes de la UE y el 6% del mundo*. Madrid, 2020. http://www.ont. es/Documents/07.09.2020%20NPONT%20RegistroMundial_.pdf .

²¹ Unmet health care needs due to cost, distance or waiting times. The low and high income population corresponds to the first and fifth income quintile, respectively. See: Eurostat. *Self-reported unmet needs for medical examination by sex, age, main reason declared and income quintile [hlth_silc_08]*. https://ec.europa.eu/eurostat/data/database.

²² Global Observatory on Donation and Transplantation. *Global Data*. http://www.transplant-observatory.org/data-charts-and-tables/.

²³ Official State Gazette. Ley 26/1990, de 20 de diciembre, por la que se establecen en la Seguridad Social prestaciones no contributivas. Madrid, 1990. https://www.boe.es/eli/es/l/1990/12/20/26.

²⁴ In addition, the ratio of contributory pensions to total population has risen from 12% in 1980 to 21% in 2019 For further details, refer to: INE. *Cifras de población. Población residente por fecha, sexo y edad.* https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_ C&cid=1254736176951&menu=resultados&idp=1254735572981 ; and Department of Education and Vocational Training. *Estadísticas. Prestaciones de Seguridad Social y otra protección social.* https:// expinterweb.mitramiss.gob.es/series/.

²⁵ Variable expressed in constant 2015 euros (base year). 2020, the average from January to November of the average amount of the contributory retirement pension is shown. See: AMECO. *National consumer price index (All-items) [ZCPIN]*. https://ec.europa.eu/ economy_finance/ameco/user/serie/SelectSerie.cfm; and Department of Education and Vocational Training. *Estadísticas. Prestaciones de Seguridad Social y otra protección social*. https://expinterweb.mitramiss. gob.es/series/.

²⁶ This number of benefit recipients, although insufficient, is 2.6 times higher than in 2008. In December 2008, there were 422,846 beneficiaries of the System for Autonomy and Care for Dependency with benefits; in January 2021, this figure rose to 1,120,233 people. For further details, see: Instituto de Mayores y Servicios Sociales. *Estadísticas. Sistema para la Autonomía y Atención a la Dependencia. Histórico. Informes publicados.* https://www.imserso.es/imserso_01/

documentacion/estadisticas/info_d/estadisticas/est_inf/inf_gp/2020/ index.htm.

²⁷ According to the WHO, health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Therefore, the health of an individual or a population cannot be assessed solely on the basis of the prevalence of physical illness or mental disorders (negative health), but must also incorporate the possibility of developing one's physical, intellectual and social potential to the best of one's ability (positive health). On this issue, see: WHO "Constitution." WHO, https://www.who.int/about/who-weare/constitution.

²⁸Inequality in health at older ages is a reflection of inequality throughout the life cycle. Thus, women expect to live longer, but in poorer health; people with lower levels of education also live fewer years and more of them in poor health; and there are regional divergences between people living in the north of Spain and in the rest of the country. For further details, see: Costa-Font, Joan, Cristina Hernández-Quevedo, and Dolores Jiménez-Rubio. "Income inequalities in unhealthy lifestyles in England and Spain." Economics & Human Biology 13, 2014. https:// doi.org/10.1016/j.ehb.2013.03.003; Gispert, Rosa, Miguel Ruíz-Ramos, María Arán Barés, Francisco Viciana, and Guillém Clot-Razquin. "Diferencias en la esperanza de vida libre de discapacidad por sexo y Comunidades Autónomas en España." Revista Española de Salud Pública 81, n.º 2, 2007. http://scielo.isciii.es/scielo.php?script=sci_ar ttext&pid=S1135-57272007000200006; Gómez Redondo, Rosa, and Celia Fernández-Carro. "Personas mayores, Discapacidad y Dependencia." In Department of Health, Social Services and Equality, State Secretariat for Social Services and Equality and Instituto de Mayores y Servicios Sociales (eds.). Informe 2014: Las Personas Mayores en España. Datos Estadísticos Estatales y por Comunidades Autónomas. Madrid: Instituto de Mayores y Servicios Sociales, Colección Documentos, Serie Documentos Estadísticos, n.º 22029, 2016. 329-42; Martín, Unai, Antía Domínguez-Rodríguez, and Amaia Bacigalupe. "Desigualdades sociales en salud en población mayor: una aportación desde la salud pública al debate sobre el retraso de la edad de jubilación en España." Gaceta Sanitaria 33, n.º 1, 2019. https://doi. org/10.1016/j.gaceta.2017.10.010; Pujol Rodríguez, Rogelio, Antonio Abellán, and María Puga. "Evolución y diferencias territoriales de la Esperanza de Vida Libre de Discapacidad a los 65 años en España." In XIV Congreso Nacional de la Población. Seville: AGE, 2014; Requena, Miguel. "La desigualdad ante la muerte: educación y esperanza de vida en España." Perspectives Demogràfiques, n.º 006, 2017. https://ddd. uab.cat/record/174321. https://ddd.uab.cat/record/174321; and Solé-Auró, Aïda, Unai Martín, and Antía Domínguez Rodríguez. "Educational Inequalities in Life and Healthy Life Expectancies among the 50-Plus in Spain." International Journal of Environmental Research and Public Health 17, n.º 3558, 2020. https://doi.org/10.3390/ijerph17103558.

²⁹ Eurostat. *Healthy life years by sex (from 2004 onwards) [hlth_hlye]*. https://ec.europa.eu/eurostat/data/database.

³⁰ INE. Encuesta Nacional de Salud. Encuesta 2017. Valoración del estado de salud percibido en los últimos 12 meses según sexo y grupo de edad. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Esta distica_C&cid=1254736176783&menu=resultados&idp=125473557 3175#ltabs-1254736195650.

³¹OECD. Family Database. https://stats.oecd.org/.

³² INE. Indicadores demográficos básicos. Indicador Coyuntural de Fecundidad según orden del nacimiento y nacionalidad (española/ extranjera) de la madre. https://www.ine.es/dyngs/INEbase/es/ operacion.htm?c=Estadistica_C&cid=1254736177003&menu=result ados&idp=1254735573002#Itabs-1254736195380.

³³ Planelles Romero, Joaquín. "El futuro de la población. La población del futuro." In Economists withour Borders. *Demografía: Cambios en el modelo Reproductivo*. Dossieres EsF, n.º 36, 2020. 28-33. https:// ecosfron.org/wp-content/uploads/2020/01/Dossieres-EsF-36-DEMOGRAF%C3%8DA.pdf.

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³⁵On this question, see, among others: Castro-Martín, Teresa, and Teresa Martín-García. "La fecundidad en España: entre las más bajas del mundo y sin muchas perspectivas de recuperación." In Juan Manuel García González, and Dolores Puga (coords.). *Retos demográficos*, Madrid: Funcas, Panorama Social, n.º 23, 2016. 11-26. https://www. funcas.es/revista/retos-demograficos-julio-2016/; Esteve, Albert, and Rocío Treviño. "Los grandes porqués de la (in) fecundidad en España." *Perspectives Demogràfiques*, n.º 015, 2019. https://ddd.uab. cat/record/174321. *Encuesta de Fecundidad. Encuesta 2018*. https:// www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid =1254736177006&menu=resultados&idp=1254735573002#!ta bs-1254736195659.

³⁶ Pérez Díaz, Julio. "Duración de la vida, natalidad y migraciones en España." *Economiaz, Revista vasca de Economía* 96, n.º 2, 2019. https:// EconPapers.repec.org/RePEc:ekz:ekonoz:2019203.

³⁷ INE. *Migraciones exteriores. Saldo migratorio con el extranjero*. https:// www.ine.es/jaxiT3/Datos.htm?t=24403#!tabs-tabla.

³⁸ INE. Cifras de población. Población residente por fecha, sexo y edad. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_ C&cid=1254736176951&menu=resultados&idp=1254735572981.

³⁹ The minimum working age in Spain is 16 years, but to facilitate international comparison, it is presented as from 15 years and up to 64 years.

⁴⁰ The data correspond to the values as of 1 January. For further details see: INE. *Cifras de población. Población residente por fecha, sexo y edad.* https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C &cid=1254736176951&menu=resultados&idp=1254735572981.

⁴¹Dependency ratio measured as the population aged 65 and over out of the population aged 15-64. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Eurostat. *Old-age-dependency ratio* [*tps00198*]. https://ec.europa.eu/eurostat/data/database. For further details on the construction of the EU-8, see the*Apunte metodológico* número I.

⁴² This number of years is calculated on the basis of the effective retirement age. The average for both genders is shown. The EU-8 and the OECD are constructed as the simple average of the values of the individual countries. For 1970 and 1986, the EU-8 does not include Germany due to lack of data. For further details, see: OECD. *Expected* number of years in retirement, by sex. https://stats.oecd.org/.

⁴³ The activity rate by age group is defined as the ratio of the active population (employed and unemployed) to the total population in each age group. For further details, see: INE. *Encuesta de Población Activa. Tasas de actividad por sexo y grupo de edad*. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176918&m enu=resultados&idp=1254735976595#!tabs-1254736195128.

⁴⁴WHO. *Active ageing: a policy framework.* Madrid, 2002. https://www. who.int/ageing/publications/active ageing/en/.

⁴⁵ In Spain, some regional studies suggest that a not insignificant percentage of people over 55 would prefer to combine their working hours with a partial pension rather than opt for retirement. For further details, refer to: Del Barrio, Elena, Olga Mayoral, and Mayte Sancho (Matia Instituto Gerontológico). *Estudio sobre las condiciones de vida de las personas de 55 y más años en Euskadi*. Vitoria-Gasteiz: Servicio Central de Publicaciones del Gobierno Vasco, Documentos de Bienestar Social, n.º 77, 2015. https://www.matiainstituto.net/es/publicaciones/ estudio-sobre-las-condiciones-de-vida-de-las-personas-de-55-y-masanos-en-euskadi.

⁴⁶ OECD.Ageing and Employment Policies: United States 2018: Working Better with Age and Fighting Unequal Ageing, Ageing and Employment Policies. Paris: OECD Publishing, 2018. https://doi. org/10.1787/9789264190115-en.

⁴⁷ Del Barrio, Elena, Olga Mayoral, and Mayte Sancho (Matia Instituto Gerontológico). *Estudio sobre las condiciones de vida de las personas de 55 y más años en Euskadi*. Vitoria-Gasteiz: Servicio Central de Publicaciones del Gobierno Vasco, Documentos de Bienestar Social, n.º 77, 2015. https://www.matiainstituto.net/es/publicaciones/estudiosobre-las-condiciones-de-vida-de-las-personas-de-55-y-mas-anosen-euskadi.

⁴⁸ National and international evidence suggests that higher labour force participation of older people tends to be associated with higher employment and lower unemployment among young people. However, in the case of Portugal and Italy, some studies, although not all available, suggest that there is a substitution effect in the short and medium term. See: Böheim, René, and Thomas Nice. "The effect of early retirement schemes on youth employment." IZA World of Labor 70, 2019. https:// doi.org/10.15185/izawol.70.v2; and Boldrin, Michele, Pilar García-Gómez, and Sergi Jiménez-Martín. "Social Security Incentives, Exit from the Workforce and Entry of the Young", and Gruber, Jonathan, Kevin Milligan, and David A. Wise. "Introduction and Summary." In Jonathan Gruber and David A. Wise (eds.). Social Security Programs around the world: the relationship to youth employment. Chicago: University of Chicago Press, 2010. 261-94. http://www.nber.org/ chapters/c8250. For more details on the case of Portugal, see: Martins, Pedro S., Alvaro A. Novo, and Pedro Portugal. "Increasing the Legal Retirement Age: The Impact on Wages, Worker Flows and Firm Performance." IZA Discussion Papers, n.º 4187, 2009. https://www.iza. org/publications/dp/4187/increasing-the-legal-retirement-age-theimpact-on-wages-workerflows- and-firm-performance. On the case of Italy, see: Boeri, Tito, Pietro Garibaldi, and Espen R. Moen. "A Clash of Generations? Increase in Retirement Age and Labor Demand for Youth." CEPR Discussion Paper, n.º DP11422, 2016. https://ssrn.com/ abstract=2820077; Bovini, G., and M. Paradisi. "Labor substitutability and the impact of raising the retirement age." Working Paper, 2019. https://scholar.harvard.edu/files/paradisi/files/paradisi_jmp.pdf; and Carta, Francesca, Francesco D'Amuri, and Till M. von Wachter. "Workforce aging, pension reforms, and firm outcomes." *NBER Working Paper*, n.º 28407, 2021. https://doi.org/10.3386/w25695. https://www. nber.org/papers/w28407.

⁴⁹ It should be noted that this was not always the case. When looking at the activity rates of people over 55 in the 1970s, they were higher. This, together with improvements in health, suggests that the potential for employment in older cohorts is high and has increased in recent years. In particular, "residual labour capacity" (measured as the difference between the activity rate in the 1970s and today, at constant mortality) has increased by more than 10 years in the last three decades. Refer to: García-Gómez, Pilar, Sergi Jiménez-Martín, and Judit Vall Castelló. "Health Capacity to Work at Older Ages: Evidence from Spain." In David A. Wise (ed.). *Social Security Programs and Retirement around the World: The Capacity to Work at Older Ages*. Chicago: University of Chicago Press, 2017. 269-300. https://www.nber.org/chapters/c13746.

⁵⁰ The activity rate by age group is defined as the ratio of the active population (employed and unemployed) to the total population in each age group. The UE-8, the EU-27 and the OECD are constructed as the simple average of the values of the individual countries. For further details, see: OECD. *LFS by sex and age – indicators*. https://stats.oecd. org/.

⁵¹ Herce San Miguel, José A. "Longevidad y mercado de trabajo." *Economiaz, Revista vasca de Economía*, n.º 96, 2019. https://www. euskadi.eus/web01-a2reveko/es/k86aEkonomiazWar/ekonomiaz/abr irArticulo?idpubl=92®istro=10.

⁵² In the case of self-employed workers, the percentage of the pension received when combined with work is up to 100% of the pension (provided that the self-employed person can prove that he or she has at least one employee). See: Department for Labour, Migration and Social Security. *Proyecto de presupuestos: Ejercicio 2021.* Madrid, 2020. http://www.seg-social.es/wps/wcm/connect/wss/7fad23dd-65cf-4ff4-baf3-50c5d2fabf61/202120003.pdf?MOD=AJPERES&CVID=.

⁵³ Among the factors that may explain the reduced use of the current active retirement scheme (in force since 2013), the following should be highlighted: the low level of public awareness of this structure; the fact that it is only allowed from the legal retirement age and with a full contribution history (entitlement to 100% of the regulatory base); the loss of pension income (in general, 50% of the pension to which one would be entitled if this structure were not used); and the disincentive for employers to continue to maintain workers with acquired salary rights (e.g., payment of three years' salary). In addition to active retirement, there are other modalities in Spain that allow the compatibility between pension and work according to a series of criteria: partial retirement (in force since 1984 and reformed in 2001) and flexible retirement (in force since 2002). Only partial retirement has reached relevant figures in the total number of pension registrations granted under the figures that allow compatibility, partly due to the fact that it does not establish penalty coefficients for early retirement. Refer to: Department for Labour, Migration and Social Security. Proyecto de presupuestos: Ejercicio 2021. Madrid, 2020. http://www.seg-social.es/wps/wcm/ connect/wss/7fad23dd-65cf-4ff4-baf3-50c5d2fabf61/202120003. pdf?MOD=AJPERES&CVID=; and Sánchez Martín, Alfonso R., and Sergi Jiménez Martín. "La compatibilidad del trabajo y el cobro de pensión en España: análisis institucional en el contexto europeo." FEDEA, Estudios sobre la Economía Española, n.º 2021/10, 2021. https://documentos. fedea.net/pubs/eee/eee2021-11.pdf.

⁵⁴ Official State Gazette. *Real Decreto-ley 28/2018, de 28 de diciembre,* para la revalorización de las pensiones públicas y otras medidas urgentes en materia social, laboral y de empleo. Madrid, 2018. https:// www.boe.es/boe/dias/2018/12/29/pdfs/BOE-A-2018-17992.pdf.

⁵⁵ The production of manufacturing goods with medium-high technological content accounted for 4% of employment in Spain in 2019, as compared to 5% on average in the EU-8. The difference is wider in the case of knowledge-intensive services: while in Spain they account for 36% of total employment, in the EU-8 this figure rises to 46%. See: Eurostat. *Employment in high and medium-high technology manufacturing sectors and knowledge-intensive service sectors* [tsc00011]. https://ec.europa.eu/eurostat/data/database.

⁵⁶ Spain has an unfavourable position compared to neighbouring countries in terms of the proportion of older workers in companies with less than 10 employees, regardless of their level of education, which may limit the adaptation of tasks throughout the life cycle. For further details, see: Anghel, Brindusa, and Aitor Lacuesta. "Envejecimiento, productividad y situación laboral." Banco de España, *Artículos Analíticos, Boletín Económico*, n.º 1/2020, 2020. https://www.bde. es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/ ArticulosAnaliticos/20/T1/descargar/Fich/be2001-art2.pdf.

⁵⁷ Moreover, the proportion of workers in training decreases with age. For further details, see: *Ibid*.

⁵⁸ If the contributory pension does not reach a statutory minimum, it is supplemented up to that amount. This minimum supplement is financed by general taxation.

^{5°} Between 1980 and 2012, the difference between contributory social security expenditure and revenue has been positive. For further details, see: De la Fuente, Ángel, Miguel Ángel García Díaz, and Alfonso R. Sánchez. "La salud financiera del sistema público de pensiones español. Análisis retrospectivo, proyecciones de largo plazo y factores de riesgo." *FEDEA, Estudios sobre la Economía Española*, n.º 2017/04, 2017. *https://documentos.fedea.net/pubs/eee/eee2017-04.pdf*.

⁶⁰ The number of pension registrations, which had declined somewhat in the early 2000s, increased from 2005 onwards, always remaining above 230,000 and reaching its highest level ever in 2018 (328,159 new registrations). In this regard, see: Department for Inclusion, Social Security and Migration. *Estadística de histórico de pensiones*. https://w6.seg-social.es/ProsaInternetAnonimo/OnlineAccess?ARQ. SPM.ACTION=LOGIN&ARQ.SPM.APPTYPE=SERVICE&ARQ. IDAPP=ESTA0001.

⁶¹Banco de España. *Informe Anual 2018*. Madrid, 2019. https://www. bde.es/bde/es/secciones/informes/Publicaciones_an/Informe_anual/ index2018.html.

⁶² It includes the minimum pension supplement. Excluding the minimum pension supplement, public expenditure on contributory pensions would stand at 10.2% of GDP. For further details, see: INE. *Contabilidad Nacional Anual de España: principales agregados. GDP at market prices.* https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C &cid=1254736177057&menu=resultados&idp=1254735576581; and

Department for Inclusion, Social Security and Migration. *eSTADISS: Estadísticas de pensiones*. https://bit.ly/3j27PBN.

⁶³ Social security contributions fell from 108.1 billion euros in 2008 to 98.2 billion euros in 2013. See: Department for Inclusion, Social Security and Migration. *Estadísticas. Presupuesto aprobado. Ingresos.* http://www.seg-social.es/wps/portal/wss/internet/EstadisticasPresup uestosEstudios/Estadisticas/EST66/EST67.

⁶⁴ European Commission. *The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070).* Luxembourg: Publications Office of the European Union, 2018. https:// doi.org/10.2765/615631.

⁶⁵ However, the possibility of retirement at the age of 65 is maintained for those who have contributed for at least 38 years and six months. In this regard, see: Official State Gazette. *Ley 27/2011, de 1 de agosto, sobre actualización, adecuación y modernización del sistema de Seguridad Social.* Madrid, 2011. https://www.boe.es/buscar/doc. php?id=BOE-A-2011-13242.

⁶⁶ On this question, see: Instituto de Actuarios Españoles. *Factor de equidad actuarial del sistema contributivo de pensiones de jubilación español.* 2020. https://www.actuarios.org/wp-content/ uploads/2020/09/Informe-IAE-sobre-el-Factor-de-Equidad-Actuarial-del-Sistema-Contributivo-de-Pensiones-de-Espana.pdf; and Moraga, María, and Roberto Ramos. "Una estimación del rendimiento financiero del sistema de pensiones." Banco de España, *Artículos Analíticos, Boletín Económico*, n.º 3/2020, 2020. https://www.bde. es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/ ArticulosAnaliticos/20/T3/descargar/Fich/be2003-art24.pdf.

⁶⁷ The situation is particularly adverse for older women and for selfemployed and non-standard workers, who are becoming increasingly important in our society. In fact, retirement pensions for the selfemployed scheme, which is characterised by widespread adherence to minimum contribution bases during working life, were 41% lower than the average pensions received in the general scheme in 2019. For further details, see: Social Protection Committee, and European Commission. *The 2018 Pension Adequacy Report Vol. II: Country Profiles.* Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2767/653851; and Department for Inclusion, Social Security and Migration. *eSTADISS: Estadísticas de pensiones.* https:// bit.ly/3j27PBN.

⁶⁸ On this question, see: Centro de Investigaciones Sociológicas. Barómetro de marzo 2018. Avance de resultados. Madrid: Estudio, n.º 3207, 2018. http://datos.cis.es/pdf/Es3207mar_A.pdf; and Salvetti & Llombart, and Educo. El papel de los abuelos en la crisis económica. 2015. http://envejecimiento.csic.es/documentacion/biblioteca/registro. htm?id=59808.

⁶⁹ In 2019, the percentage of people over 65 years of age at risk of poverty or social exclusion in our country was 16%, compared to 14% in the EU-8 (calculated as the simple average of the values for each country), although lower than for people aged 18-64 (27%). For further details, see: Eurostat. *People at risk of poverty or social exclusion by age and sex [ilc_peps01]*. https://ec.europa.eu/eurostat/ data/database.

⁷⁰ OECD. *Pensions at a Glance 2019: OECD and G20 Indicators*. Paris: OECD Publishing, 2019. https://doi.org/10.1787/b6d3dcfc-en.

⁷¹ AIReF. Evaluación del gasto público 2019: Beneficios Fiscales. 2020. https://www.airef.es/wp-content/uploads/2020/PDF-WEB-BF-1. pdf#page=75.

⁷² For further details, see: Social Protection Committee and European Commission. *The 2018 Pension Adequacy Report Vol. I: Current and Future Income Adequacy in Old Age in the EU.* Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2767/406275; and OECD. *Pensions at a Glance 2019: OECD and G20 Indicators.* Paris: OECD Publishing, 2019. https://doi.org/10.1787/b6d3dcfc-en. On the Swedish experience of pension reform, refer to: Boada-Penas, María del Carmen. "Reformas del sistema de pensiones: La Experiencia Sueca." *FEDEA, Documento de Trabajo,* n.º 2021/03, 2021. https://documentos. fedea.net/pubs/dt/2021/dt2021-03.pdf.

⁷³ It should be considered that social contributions in Spain are already higher than in the EU average, and that recourse to general taxation would obscure the direct and transparent relationship between income and benefits typical of a pay-as-you-go system. Moreover, by being borne by the whole population, an increase in general taxation would reduce pensions in net terms. For further details see: Hernández de Cos, Pablo, Juan Francisco Jimeno, and Roberto Ramos. "El sistema público de pensiones en España: Situación actual, retos y alternativas de reforma." *Documentos Ocasionales*, n.º 1701, Banco de España, 2017. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/17/Fich/do1701.pdf.

⁷⁴ Official Gazette of the Spanish Parliament. *Informe de evaluación y reforma del Pacto de Toledo*. Madrid, 2020. https://www.congreso.es/public_oficiales/L14/CONG/BOCG/D/BOCG-14-D-187.PDF.

⁷⁵ Ministerio de Inclusión, Seguridad Social y Migraciones. "¿Qué gastos no contributivos financia la Seguridad Social?" Department for Inclusion, Social Security and Migration, https://revista.seg-social.es/2020/10/29/ que-son-los-gastos-impropios-de-la-seguridad-social/.

⁷⁶ The implementation of a notional accounts system, in which the public pension is calculated on the basis of the social security contributions made by the worker since entering the labour market, their life expectancy at the time of retirement and the expected economic conditions, is another of the alternatives envisaged. An important point to mention is the need for economic and demographic projections to change smoothly and not to be overly responsive to cyclical changes in the economy in the short term. To the extent that initial pensions end up being higher or lower than they should have been, due to a prediction error, it would be necessary to provide for an additional adjustment by, for example, an annual revaluation below or above the CPI, respectively. For further details, see: Devesa, José Enrique, and Rafael Domenech. "Sostenibilidad y suficiencia. Las cuentas nocionales como un mecanismo de disciplina." In Instituto Santalucía (ed.). Pensiones del futuro. Madrid: Instituto Santalucía. https://institutosantalucia.es/ pensiones-del-futuro/; and Devesa, Enrique, and Rafael Domenech. "Las cuentas nocionales individuales: elemento central de la reforma del sistema de pensiones en España." FEDEA, Policy Papers, n.º 2021/02, 2021. https://documentos.fedea.net/pubs/fpp/2021/02/ FPP2021-02.pdf.

⁷⁷ Grupo De Trabajo De Análisis Del Gasto Sanitario - IGAE. "Informe del grupo de trabajo de análisis del gasto sanitario." 2005. https:// www.hacienda.gob.es/Documentacion/Publico/PortalVarios/ FinanciacionTerritorial/Autonomica/IGTGS2005.pdf. ⁷⁸The health expenditure reported here does not include long-term care services. For data, see: OECD. *Health expenditure and financing*. https:// stats.oecd.org/.

⁷⁹ Zweifel, Peter, Stefan Felder, and Markus Meiers. "Ageing of population and health care expenditure: a red herring?" *Health Economics* 8, n.º 6, 1999. https://doi.org/10.1002/(SICI)1099-1050(199909)8:6<485::AID-HEC461>3.0.CO;2-4.

⁸⁰ On this question, see: Breyer, Friedrich, Joan Costa-Font, and Stefan Felder. "Ageing, health, and health care." *Oxford Review of Economic Policy* 26, n.º 4, 2010. https://doi.org/10.1093/oxrep/grq032; Carreras, Marc, Pere Ibern, and José María Inoriza. "Ageing and healthcare expenditures: Exploring the role of individual health status." *Health Economics* 27, n.º 5, 2018. https://doi.org/10.1002/hec.3635; and Costa-Font, Joan, and Cristina Vilaplana-Prieto. "More Than One Red Herring'? Heterogeneous Effects of Ageing on Healthcare Utilisation." *Health Economics*, 2020. https://doi.org/10.1002/hec.4035.

⁸¹ It should be noted that Spain has a significant tax collection gap with respect to the most developed countries in Europe [see chapter 8]. This conditions the availability of resources to spend, among other things, on public health spending.

⁸²The health expenditure reported here does not include long-term care services. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Eurostat. *Expenditure for selected health care functions by health care financing schemes [HLTH_SHA11_HCHF]*. https://ec.europa.eu/eurostat/data/ database.

⁸³ In the last decade, most of the public health budget has been devoted to hospitals, with less weight given to primary care. See: Department of Health. *Estadística de Gasto Sanitario Público (EGSP). Serie 2002-2019* (*Gasto sanitario público según criterio de devengo: Gasto real). Servicios hospitalarios y especializados y Servicios primarios de salud.* https:// www.mscbs.gob.es/estadEstudios/estadisticas/inforRecopilaciones/ gastoSanitario2005/home.htm.

⁸⁴ In 2018, in Spain, spending on preventive and public health services accounted for 2.1% of current health expenditure, while in the EU-8 this was 2.7%. When comparing this per capita expenditure in the same year at current prices and in PPPs, the differences are of a greater magnitude: in Spain it was 73 dollars per person compared to an EU-8 average of 144 dollars. Data corresponding to the EU-27 have been constructed as the simple average of the values of the individual countries. For further details, see: OECD. *Health expenditure and financing. Preventive care.* https://stats.oecd.org/Index.aspx?DataSetCode=SHA#.

⁸⁵ In 2018, in Spain, spending on preventive and public health services accounted for 2.1% of current health expenditure, while in the EU-8 this was 2.7%.

⁸⁶ Dependency is understood as the limitation, in many different forms and degrees, to carry out daily activities due to physical or cognitive problems.

⁸⁷ Martín Palomo, María Teresa. "El *care*, un debate abierto: de las políticas de tiempos al *social care.*" *Cuestiones de género: de la igualdad y la diferencia*, n.º 4, 2009. http://dx.doi.org/10.18002/cg.v0i4.3817.

⁸⁸ Informal care is care provided by a person, usually from the affective environment of the cared-for person, who is not a professional caregiver and therefore does not enjoy employment rights such as salary, predetermined working hours or holidays. On this question, see: Triantafillou, J., *et al. Informal care in the long-term care system: European Overview Paper*. Athens/Vienna: Interlinks, 2010. https:// www.euro.centre.org/downloads/detail/768.

⁸⁹ Martínez-Buján, Raquel. "Los modelos territoriales de organización social del cuidado a personas mayores en los hogares." *Revista Española de Investigaciones Sociológicas*, n.º 145, 2014. http://dx.doi. org/10.5477/cis/reis.145.99.

⁹⁰ On this question, see: Barczyk, Daniel, and Matthias Kredler. "Long-Term Care Across Europe and the United States: The Role of Informal and Formal Care." *Fiscal Studies* 40, 2019. https://doi. org/10.1111/1475-5890.12200; and Oliva-Moreno, Juan, Luz María Peña-Longobardo, and Cristina Vilaplana-Prieto. "An Estimation of the Value of Informal Care Provided to Dependent People in Spain." *Applied Health Economics and Health Policy* 13, 2015. https://doi.org/10.1007/ s40258-015-0161-x.

⁹¹ Mixed care includes cases where formal home-based care is complemented by 20-80% informal care. For further details, see: Barczyk, Daniel, and Matthias Kredler. "Long-Term Care Across Europe and the United States: The Role of Informal and Formal Care." *Fiscal Studies* 40, 2019. https://doi.org/10.1111/1475-5890.12200.

⁹² Surveys in Spain suggest that, in the case of needing help, most people choose to stay at home as the most desirable residential option, despite the increase in preference for different care alternatives over the last decades. For further details, see: Costa-Font, Joan, David Elvira, and Oscar Mascarilla-Miró. "`Ageing in Place'? Exploring Elderly People's Housing Preferences in Spain." Urban Studies 46, n.º 2, 2009. https:// doi.org/10.1177/0042098008099356; Del Barrio, Elena, and Mayte Sancho. Primero las personas: cuidar como nos gustaría ser cuidados/ as. Resultados de la Encuesta sobre cuidados. Barcelona: Obra Social "la Caixa", 2016; Fernández-Carro, Celia. "¿Hacia la «desfamiliarización» del cuidado predilecto? Un análisis del contexto español (1997-2009)." Revista Española de Investigaciones Sociológicas 164, 2018. http:// dx.doi.org/10.5477/cis/reis.164.57; and Moreno-Colom, Sara, et al. "Significados e imaginarios de los cuidados de larga duración en España. Una aproximación cualitativa desde el discurso de las cuidadoras." Papeles del CEIC International Journal on Collective Identity Research 2016/1, n.º 145, 2016. http://dx.doi.org/10.1387/pceic.15195.

⁹³ See: Barczyk, Daniel, and Matthias Kredler. "Long-Term Care Across Europe and the United States: The Role of Informal and Formal Care." *Fiscal Studies* 40, 2019. https://doi.org/10.1111/1475-5890.12200; Durán Heras, María Ángeles. "La otra economía española." In Cristóbal Torres Albero (ed.). *Spain 2015 Situación Social*. Centro de Investigaciones Sociológicas, 2015. 472-86; and Tobío, Constanza, *et al. El cuidado de las personas. Un reto para el siglo XXI*. Barcelona: Obra Social Fundación "la Caixa", Colección Estudios Sociales, n.º 28, 2010.

⁹⁴ On this question, see, among others: Blanco, Agustín, Antonio Chueca, and José Antonio López-Ruiz (coord. and eds.). *Informe España 2017*. Madrid: Universidad Pontificia Comillas, Cátedra J.M. Martín Patino, 2017. https://digital.csic.es/bitstream/10261/159550/1/2017-FEncuentro.pdf; and García-Mochón, Leticia, *et al.* "Determinants of Burden and Satisfaction in Informal Caregivers: Two Sides of the Same Coin? The CUIDAR-SE Study." *International Journal of Environmental Research and Public Health* 16, n.º 4378, 2019. https://doi.org/10.3390/

ijerph16224378.

⁹⁵ For further details, see: Blanco, Agustín, Antonio Chueca, and José Antonio López-Ruiz (coord. and eds.). *Informe España 2017*. Madrid: Universidad Pontificia Comillas, Cátedra J.M. Martín Patino, 2017. https://digital.csic.es/bitstream/10261/159550/1/2017-FEncuentro. pdf; and Del Barrio, Elena, and Mayte Sancho. *Primero las personas: cuidar como nos gustaría ser cuidados/as. Resultados de la Encuesta sobre cuidados*. Barcelona: Obra Social "la Caixa", 2016.

⁹⁶ Carrasco, Cristina, Cristina Borderías, and Teresa Torns. "Introducción. El trabajo de cuidados: antecedentes históricos y debates actuales." In Cristina Carrasco, Cristina Borderías, and Teresa Torns (eds.). *El trabajo de cuidados: Historia, teoría y políticas*. Madrid: Los libros de La Catarata/ Fuhem Ecosocial, 2011. 13-95.

⁹⁷ Eurostat. *Inactive population due to caring responsibilities by sex* [sdg_05_40]. https://ec.europa.eu/eurostat/data/database.

⁹⁸ Refer to: Elizalde-San Miguel, Begoña. "¿Femenino e informal? El modelo tradicional de cuidados a examen desde una perspectiva demográfica." *Revista Prisma Social*, n.º21, 2018. https:// revistaprismasocial.es/article/view/2466/2652; Fernández-Carro, Celia, Rosa Gómez-Redondo, and Noelia Cámara-Izquierdo. "The availability of carers for older disabled people in Spain: demographic insights and policy implications." *International Journal of Care and Caring* 3, n.º 3, 2019. https://doi.org/10.1332/239788219X15488381886380; and Gómez Redondo, Rosa, Celia Fernández Carro, and Noelia Cámara Izquierdo. ¿Quién cuida a quién? La disponibilidad de cuidadores informales para personas mayores en España. Una aproximación demográfica basada en datos de encuesta. Madrid: Informes Envejecimiento en red, n.º 20, 2018. http://envejecimiento.csic.es/ documentos/documentos/enred-info20-quiencuida.pdf.

^{9°}See: Abellán, Antonio, *et al.* "Partner care, gender equality, and ageing in Spain and Sweden." *International Journal of Ageing and Later Life* 11, n.º 1, 2017. https://doi.org/10.3384/ijal.1652-8670.16-305; and Zueras, Pilar, Jeroen Spijker, and Amand Blanes. "Evolución del perfil de los cuidadores de personas de 65 y más años con discapacidad en la persistencia de un modelo de cuidado familiar." *Revista Española de Geriatría y Gerontología* 53, n.º 2, 2018. https://doi.org/10.1016/j. regg.2017.07.004.

¹⁰⁰ International migrant women have been key in the provision of care services to older people. Refer to: Blanco, Agustín, Antonio Chueca, and José Antonio López-Ruiz (coord. and eds.). *Informe España 2017*. Madrid: Universidad Pontificia Comillas, Cátedra J.M. Martín Patino, 2017. https://digital.csic.es/bitstream/10261/159550/1/2017-FEncuentro.pdf; and Díaz Gorfinkiel, Magdalena, and Raquel Martínez-Buján. "Mujeres migrantes y trabajos de cuidados: transformaciones del sector doméstico en España." In Elisa Chuliá Rodrigo, and María Miyar Busto (coords.). *Gender gap*, Madrid: Funcas, *Panorama Social*, n.º 27, 2018. 105-18. https://www.funcas.es/revista/brechas-de-generojulio-2018/.

¹⁰¹ For further details, see: OECD. *Who Cares? Attracting and Retaining Care Workers for the Elderly.* OECD Health Policy Studies. Paris: OECD Publishing, 2020. https://doi.org/10.1787/92c0ef68-en; and Vara, María-Jesús. "Long-Term Care for Elder Women in Spain: Advances and Limitations." *Journal of Aging & Social Policy* 26, n.º 4, 2014. https://doi.org/10.1080/08959420.2014.939894.

¹⁰² Costa-Font, Joan, Christophe Courbage, and Katherine Swartz. "Financing Long-Term Care: Ex Ante, Ex Post or Both?" *Health Economics* 24, 2015. https://doi.org/10.1002/hec.3152.

¹⁰³ Barczyk, Daniel, and Matthias Kredler. "Long-Term Care Across Europe and the United States: The Role of Informal and Formal Care." *Fiscal Studies* 40, 2019. https://doi.org/10.1111/1475-5890.12200.

¹⁰⁴ Public spending on long-term care includes health and social care components. Social assistance expenditure data are not available for all countries. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Eurostat. *Expenditure for selected health care functions by health care financing schemes [HLTH_SHA11_HCHF]*. https://ec.europa.eu/eurostat/data/ database.

¹⁰⁵ Official State Gazette. *Ley 39/2006, de 14 de diciembre, de Promoción de la Autonomía Personal y Atención a las personas en situación de dependencia.* Madrid, 2006. https://www.boe.es/eli/ es/l/2006/12/14/39/con.

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¹⁰⁷ Data from the System for Autonomy and Care for Dependency as of 30 November 2020. For further details, see: INE. *Cifras de población. Población residente por fecha, sexo y edad.* https://www.ine.es/dyngs/ INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176951& menu=resultados&idp=1254735572981; and Instituto de Mayores y Servicios Sociales. *Estadísticas. Sistema para la Autonomía y Atención a la Dependencia. Histórico. Informes publicados.* https://www.imserso. es/imserso_01/documentacion/estadisticas/info_d/estadisticas/est_inf/ inf_gp/2020/index.htm.

¹⁰⁸ Costa-Font, Joan. "Caring for Carers? Long Term Care Subsidization and Caregivers Wellbeing." In *Elderly Care in France and in Europe*. Paris: Paris School of Economics, 2019.

¹⁰⁹ Costa-Font, Joan, Sergi Jiménez-Martin, and Cristina Vilaplana. "Does long-term care subsidization reduce hospital admissions and utilization?" *Journal of Health Economics* 58, 2018. https://doi. org/10.1016/j.jhealeco.2018.01.002.

¹¹⁰For further details, see: Jiménez, Sergi, and Analia Viola. "Observatorio de la Dependencia: Tercer informe, Noviembre 2019." FEDEA, *Estudios sobre la Economía Española*, n.º 2019/42, 2019. https://ideas.repec. org/p/fda/fdaeee/eee2019-42.html; and Rodríguez Cabrero, Gregorio, *et al. ESPN Thematic Report on Challenges in Long-term Care: Spain.* Brussels: European Commission, 2018. https://ec.europa.eu/social/Bl obServlet?docId=19869&langId=en.

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¹¹⁴ Costa-Font, Joan, and Cristina Vilaplana-Prieto. "Does the Expansion of Public Long-Term Care Funding Affect Saving Behaviour?" *Fiscal Studies* 38, n.º 3, 2017. https://doi.org/10.1111 /j.1475-5890.2017.12139.

¹¹⁵ Symptoms in older people can be very varied (gastrointestinal disorders or loss of appetite; tiredness; reduced mobility; bleeding, increased confusion, delirium...), which underlines the difficulty of early detection by mere symptomatology. In this regard, see: Department of Social Rights and Agenda 2030. *Informe del grupo de trabajo covid-19 y residencias*. Madrid, 2020. https://www.mscbs.gob.es/ssi/imserso/docs/GTCOVID_19_ RESIDENCIAS.pdf.

¹¹⁶ See: Grupo de Trabajo Multidisciplinar. *Informe del GTM sobre el impacto de la COVID-19 en las personas mayores, con especial énfasis en las que viven en residencias.* 2020. https://www.ciencia.gob.es/ stfls/MICINN/Ministerio/FICHEROS/Informe_residencias_GDT_ MinisterioCyI.pdf; and Jiménez-Martín, Sergi, and Analía Viola. "La asistencia residencial en España y COVID-19." *FEDEA, Estudios sobre la Economía Española*, n.º 2020/20, 2020. https://documentos.fedea. net/pubs/eee/eee2020-20.pdf.

¹¹⁷ Department for Health. *Información científica-técnica. Enfermedad por coronavirus, COVID-19*. Madrid, 2020. https://www.mscbs.gob.es/profesionales/saludPublica/ccayes/alertasActual/nCov-China/documentos/ITCoronavirus.pdf.

¹¹⁸ According to the INE, by 0.9 years for men and 0.8 years for women. INE. *Nota de prensa: Proyecciones de Población 2020-2070*. Madrid: Nota de prensa, 2020. https://www.ine.es/prensa/pp_2020_2070.pdf. Other related preliminary studies include: Abellán García, Antonio, and Rogelio Pujos Rodríguez. "COVID-19 y efecto en la esperanza de vida." Envejecimiento en red, http://envejecimientoenred.es/covid-19-yperdida-de-esperanza-de-vida/; and Trias-Llimos, Sergi, Tim Riffe, and Usama Bilal. "Monitoring life expectancy levels during the COVID-19 pandemic: Example of the unequal impact in Spanish regions." *MedRxiv*, 2020. https://doi.org/10.1101/2020.06.03.20120972.

¹¹⁹ There were 20.4% fewer births in December 2020 than in the same month in 2019 (the lowest for a month since 1941). In this regard, see: INE. *Estadística experimental – Estimación Mensual de Nacimientos*. Madrid: Nota de prensa, 2021. https://www.ine.es/prensa/experimental_emn.pdf.

¹²⁰ INE. *Nota de prensa: Proyecciones de Población 2020-2070*. Madrid: Nota de prensa, 2020. https://www.ine.es/prensa/pp_2020_2070.pdf.

¹²¹ Although there were 20.4% fewer births in December 2020 than in the same month in 2019 (the lowest for a month since 1941), it is still too early to predict a lasting effect. In this regard, see: INE. *Estadística experimental – Estimación Mensual de Nacimientos*. Madrid: Nota de prensa, 2021. https://www.ine.es/prensa/experimental_emn.pdf.

¹²² See: Castro-Martín, Teresa, Teresa Martín-García, Antonio Abellán, Rogelio Pujol, and Dolores Puga. "Tras las huellas de la crisis económica en la demografía española." In Pau Marí-Klose (coord.). *Un balance social de la crisis.* Madrid: Funcas, Panorama Social, n.º 22, 2015. 43-60. https://www.funcas.es/wp-content/uploads/Migracion/Articulos/ FUNCAS_PS/022art04.pdf; and INE. *Tasa Global de Fecundidad según nacionalidad (española/extranjera) de la madre.* https://www.ine.es/ dynt3/inebase/index.htm?padre=1149&capsel=1149.

¹²³ Department of Health, Consumer Affairs and Social Welfare. *Crisis económica y salud en España*. Madrid, 2018. https://www.mscbs.gob. es/estadEstudios/estadisticas/docs/CRISIS_ECONOMICA_Y_SALUD. pdf.

¹²⁴ The demographic projections of the Eurostat baseline scenario are considered. Refer to: Eurostat. *Assumptions for life expectancy at birth by sex and type of projection [proj_19nalexpy0]*. https://ec.europa.eu/ eurostat/data/database.

¹²⁵ Eurostat. *Population on 1st January by age and type of projection* [*proj_19naasfr*]. https://ec.europa.eu/eurostat/data/database.

¹²⁶ In fact, none of the demographic projections or forecasts made by other organisations for Spain (Eurostat in the favourable fertility scenario, INE, AIReF, or the United Nations) envisage an increase in the fertility rate sufficient to reach the population replacement level (traditionally 2.1 children per woman). These fertility rates, moreover, are based on the absence of mortality in these generations of women. In this regard, see: AIReF. *Datos. Cifras de población.* https://www.airef.es/ es/cifras-de-poblacion/; Eurostat. *Assumptions for fertility rates by age and type of projection [proj_19naasfr]*. https://ec.europa.eu/eurostat/ data/database; Eurostat. "Archive: Estadísticas de población a nivel regional." Eurostat, https://ec.europa.eu/eurostat/statistics-explained/ index.php/Archive:Estad%C3%ADsticas_de_poblaci%C3%B3n_a_ nivel_regional; INE. *Indicadores de fecundidad*. Https://ec.europa.eu/ eurostat/data/database;; and United Nations. *Total Fertility*. https:// population.un.org/wpp/Download/Standard/Fertility/.

¹²⁷ The absolute number of women of reproductive age (considering women aged 18-49) will progressively decrease. In 2050, according to Eurostat's baseline scenario, there will be at least one million fewer women of childbearing age than there are today. In this regard, see: Eurostat. *Population on 1st January by age, sex and type of projection* [*proj_19np*]. https://ec.europa.eu/eurostat/web/products-datasets/-/ tps00002.

¹²⁸ 20% of the total number of women surveyed cited either work and work-life balance or economic reasons for not having had children. The figure for the sum of these reasons drops to 12% among surveyed women These reasons, however, are more important in explaining the delay in childbearing: 35% of all the women surveyed said these were the main reasons for delaying childbearing. See: INE. *Encuesta de fecundidad 2018*. https://www.ine.es/dynt3/inebase/es/index. htm?padre=5497.

¹²⁹ Considering women aged 50 and over. For further details, see: INE. *Encuesta de fecundidad 2018*. https://www.ine.es/dynt3/inebase/es/index.htm?padre=5497.

¹³⁰ In 2019, around 40% of women arriving in our country are over 50 or

under 19. In this regard, see: INE. *Migraciones exteriores*. https://www. ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=12547 36177000&menu=ultiDatos&idp=1254735573002.

¹³¹Taking into account the average ages at childbearing in the countries of origin, and the average age of the women who migrate to Spain, it is very likely that some of them have already had the desired children in their country of origin.

¹³² In the period from 2002 to 2019, foreign women showed a decrease in their fertility rate from 1.86 to 1.59 children. See: INE. *Indicadores de fecundidad*. https://www.ine.es/jaxiT3/Datos.htm?t=1407.

¹³³For further details on the elaboration of the graph, see the*Methodology note* number III

¹³⁴ Eurostat. Assumptions for net migration by age, sex and type of projection [proj_19nanmig]; Emigration by age and sex [migr_emi2]; and Immigration by age and sex [migr_imm8]. https://ec.europa.eu/ eurostat/data/database.

¹³⁵ For further details, see: Collier, Paul. *Exodus: How Migration is Changing Our World*. Oxford: Oxford University Press, 2013; and Economic and Social Council. *Informe 02/2019. La inmigración en España: efectos y oportunidades*. Madrid, 2019. http://www.ces.es/documents/10180/5209150/Inf0219.pdf.

¹³⁶Eurostat. *Population on 1st January by age, sex and type of projection* [*proj_19np*]. https://ec.europa.eu/eurostat/data/database.

¹³⁷On this question, see: Aksoy, Yunus, *et al.* "Demographic Structure and Macroeconomic Trends." *American Economic Journal: Macroeconomics*, 11, n.º 1, 2019. https://doi.org/10.1257/mac.20170114; and Guillemette, Yvan, and David Turner. "The Long View: Scenarios for the World Economy to 2060." *OECD Economic Policy Papers*, n.º 22, París: OECD Publishing, 2018. https://doi.org/10.1787/b4f4e03e-en.

¹³⁸ Among the long-term unemployed who have been unemployed for two years or more, 24% are aged 55-64 in 2019. For further details, see: INE. *Encuesta de Población Activa*. *Paris nivel de formación alcanzado, sexo y grupo de edad*. https://www.ine.es/dyngs/INEbase/operacion. htm?c=Estadistica_C&cid=1254736176918&menu=resultados&sec c=1254736195129&idp=1254735976595#ltabs-1254736195129.

¹³⁹ OECD. Working Better with Age, Ageing and Employment Policies. Paris: OECD Publishing, 2019. https://doi.org/10.1787/c4d4f66a-en.

¹⁴⁰ It is essential to bear in mind that these developments will not be the same for all citizens due to the existence of many inequalities determined by factors such as level of education or place of residence. In addition, there will be bottlenecks that will require major scientific efforts to overcome, such as neurodegenerative diseases (e.g. dementias, Alzheimer's) or mental health problems (e.g. depression, anxiety). On these questions, see: OMS. The Epidemiology and Impact of Dementia. Current State and Future Trends. 2015. https://www.who.int/mental_ health/neurology/dementia/dementia_thematicbrief_epidemiology.pdf; and WHO. "Mental Disorders." WHO, https://www.who.int/news-room/ fact-sheets/detail/mental-disorders; Pujol Rodríguez, Rogelio, Antonio Abellán, and María Puga. "Evolución y diferencias territoriales de la Esperanza de Vida Libre de Discapacidad a los 65 años en España." In XIV Congreso Nacional de la Población. Seville: AGE, 2014; and Solé-Auró, Aïda, Unai Martín, and Antía Domínguez Rodríguez. "Educational Inequalities in Life and Healthy Life Expectancies among the 50-Plus in Spain." International Journal of Environmental Research and Public Health 17, n.º 3558, 2020. https://doi.org/10.3390/ijerph17103558.

¹⁴¹Guillemette, Yvan, and David Turner. "The Long View: Scenarios for the World Economy to 2060." *OECD Economic Policy Papers*, n.º 22, Paris: OECD Publishing, 2018. https://doi.org/10.1787/b4f4e03e-en.

¹⁴² However, the possibility of retirement at the age of 65 is maintained for those who have contributed for at least 38 years and six months.

¹⁴³ European Commission. *The 2021 Ageing Report: Underlying Assumptions & Projection Methodologies*. Luxembourg: Publications Office of the European Union, n.º 142, 2020. https://ec.europa.eu/info/ sites/info/files/economy-finance/ip142_en.pdf.

¹⁴⁴ To solve this situation, a country like Portugal, similar to Spain in the level and composition of its replacement rate, has opted to implement a dynamic and progressive increase in the retirement age, raising it by a proportion equivalent to two-thirds of future increases in life expectancy. See: Ventura Bravo, Jorge Miguel, and José Antonio Herce. *Las pensiones en España y Portugal. Descripción de los esquemas y evolución reciente comparada*. Madrid: Instituto BBVA de Pensiones, Documento de Trabajo, n.º 2/2014, 2014. https://www. jubilaciondefuturo.es/recursos/doc/pensiones/20131003/posts/2015-2-las-pensiones-en-espana-y-portugal-final-esp.pdf.

¹⁴⁵This estimate is based on the evolution of the population in each age cohort according to Eurostat's demographic projections. In the baseline scenario, the active population is estimated assuming that labour force participation rates are held constant at 2019 values for all age groups. In the alternative scenarios, a progressive convergence of the Spanish participation rates in the 55-74 age cohorts is assumed until reaching, in 2050, the participation rates for these same cohorts of each benchmark country in 2019.

¹⁴⁶Es relevante tener en cuenta que los países referentes probablemente también aumentarán sus tasas de actividad en la población de edad avanzada hasta 2050, ya que experimentarán cambios demográficos similares. At present, Japan, a world leader in longevity and ageing, with a population aged 65 and over accounting for 28% of its total population in 2018, has substantially higher activity rates in cohorts aged 55 and over. If Spain were to aim for the same, it would gain 3.5 million assets (compared to a scenario where activity rates in these cohorts remain stable at 2019 values). For further details, see: OECD. *Historical population data*. https://stats.oecd.org/.

¹⁴⁷ See: Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]*. https://ec.europa.eu/eurostat/data/database; and OCDE. *LFS by sex and age – indicators*. https://stats.oecd.org/.

¹⁴⁸ OECD. Working Better with Age, Ageing and Employment Policies. Paris: OECD Publishing, 2019. https://doi.org/10.1787/c4d4f66a-en.

¹⁴⁹ Anghel, Brindusa, and Aitor Lacuesta. "Envejecimiento, productividad y situación laboral." *Banco de España, Artículos Analíticos, Boletín Económico*, n.º 1/2020, 2020. https://www.bde. es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/ ArticulosAnaliticos/20/T1/descargar/Fich/be2001-art2.pdf.

¹⁵⁰ Economic and Social Council. *El futuro del trabajo*. Madrid, 2018. http://www.ces.es/documents/10180/5182488/Inf0318. pdf/79443c12-b15b-850d-afbc-8ac0336193d1.

¹⁵¹ OECD. Working Better with Age, Ageing and Employment Policies.

Paris: OECD Publishing, 2019. https://doi.org/10.1787/c4d4f66a-en.

¹⁵² Hudomiet, Péter, *et al.* "The effects of job characteristics on retirement." *Journal of Pension Economics and Finance*, 2020. https:// doi.org/10.1017/S147474220000025.

¹⁵³ UNECE. *Active Ageing Index 2018*. https://statswiki.unece.org/ display/AAI/II.+Results.

¹⁵⁴ Dependency ratio measured as the population aged 65 and over out of the population aged 15-64. For further details, see: Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]*. https://ec.europa.eu/eurostat/data/database.

¹⁵⁵ Official State Gazette. *Ley 23/2013, de 23 de diciembre, reguladora del Factor de Sostenibilidad y del Índice de Revalorización del Sistema de Pensiones de la Seguridad Social.* Madrid, 2013. https://www.boe. es/eli/es/l/2013/12/23/23.

¹⁵⁶ These estimates do not incorporate the effects of the 2013 reform, so that pensions are updated with the CPI and the sustainability factor is not introduced. The increase to 15.2% of GDP corresponds to AIReF's estimate for 2050, which incorporates the 2011 reform. Under these assumptions, De la Fuente, García Díaz and Sánchez estimate that pension expenditure, under a baseline demographic scenario, would rise to 16.9% of GDP in 2052. For further details, see: AIRef. Actualización de previsiones demográficas y de gasto en pensiones. Documento Técnico, n.º 1/20. 2020. https://www.airef.es/wp-content/ uploads/2020/09/PREVIS-DEMOGRAFICAS/200928-Documento-T%C3%A9cnico-previsiones-demogr%C3%A1ficas-y-gasto-enpensiones.pdf; and De la Fuente, Ángel, Miguel Ángel García Díaz, and Alfonso R. Sánchez. "¿Hacia una contrarreforma de pensiones? Notas para el Pacto de Toledo." Hacienda Pública Española / Review of Public Economics 232, n.º 1, IEF, 2020 https://ideas.repec.org/a/hpe/journl/ y2020v232i1p113-144.html

¹⁵⁷ For a comparison of existing methodologies to simulate pension expenditure see: Jimeno, Juan F., Juan A. Rojas, and Sergio Puente. "Modelling the impact of aging on social security expenditures." *Economic Modelling* 25, n.º 2, 2008. https://doi.org/10.1016/j. econmod.2007.04.015.

¹⁵⁸ Public expenditure on contributory pensions is simulated by incorporating the minimum pension supplement. With regard to the determinants of their future development, it is worth noting: 1) the demographic factor is the proportion of people of legal retirement age or older in the working-age population; 2) the replacement rate is defined for these calculations as the ratio between the average pension and the average wage (the latter from the National Accounts); 3) the employment rate is constructed as the ratio of full-time employed (National Accounts) to the working-age population; 4) the share of wages in GDP and the pension coverage rate (number of contributory pensions among the population at the legal retirement age) are kept constant at the 2019 values (41.4% and 1.06, respectively). Refer to: Eurostat. Population on 1st January by age, sex and type of projection [proj 19np]. https://ec.europa.eu/eurostat/data/database; INE. Cifras de población. Población residente por fecha, sexo y edad. https://www. ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica C&cid=1254 736176951&menu=resultados&idp=1254735572981; Contabilidad Nacional Anual de España: principales agregados. PIB a precios de mercado y Remuneración y empleo por ramas de actividad. https://

www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid =1254736177057&menu=resultados&idp=1254735576581; and Department for Inclusion, Social Security and Migration. *eSTADISS: Estadísticas de pensiones*. https://bit.ly/3j27PBN. For further details on the methodology used, see: Hernández de Cos, Pablo, Juan Francisco Jimeno, and Roberto Ramos. "El sistema público de pensiones en España: Situación actual, retos y alternativas de reforma." *Banco de España, Documentos Ocasionales*, n.º 1701, 2017. https://www.bde. es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/ DocumentosOcasionales/17/Fich/do1701.pdf.

¹⁵⁹ The replacement rate (AIReF) or the system's level of generosity (De la Fuente *et al.*) is expected to fall progressively in the future even if no additional measures to those already in place are taken. For further details, see: AIReF. *Actualización de previsiones demográficas y de gasto en pensiones*. Documento Técnico, n.º 1/20, 2020. https://www.airef. es/wp-content/uploads/2020/09/PREVIS-DEMOGRAFICAS/200928-Documento-T%C3%A9cnico-previsiones-demogr%C3%A1ficas-ygasto-en-pensiones.pdf; and De la Fuente, Ángel, Miguel Ángel García Díaz, and Alfonso R. Sánchez. "¿Hacia una contrarreforma de pensiones? Notas para el Pacto de Toledo." *Hacienda Pública Española / Review of Public Economics* 232, n.º 1, IEF, 2020. https://ideas.repec.org/a/hpe/ journl/y2020v232i1p113-144.html.

¹⁶⁰ It is assumed that the employment rate considered here (full-time employed persons over the working-age population) grows in the same proportion as the total employed persons over the workingage population in a baseline scenario in which its future evolution is projected from the historical average from 1995 to 2019[see Chapter 7].

¹⁶¹Variation estimated on the basis of the effects of the 2011 reform and those that would be generated by the incorporation of a sustainability factor similar to that envisaged in the 2013 reform. For further details, see AIReF. Actualización de previsiones demográficas y de gasto en pensiones. Documento Técnico, n.º 1/20, 2020. https://www.airef.es/ wp-content/uploads/2020/09/PREVIS-DEMOGRAFICAS/200928-Documento-T%C3%A9cnico-previsiones-demogr%C3%A1ficas-ygasto-en-pensiones.pdf.

¹⁶² Rouzet, Dorothée, *et al.* "Fiscal challenges and inclusive growth in ageing societies." *OECD Economic* Policy Papers, n.º 27, Paris: OECD Publishing, 2019. https://doi.org/10.1787/c553d8d2-en.

¹⁶³ Official Gazette of the Spanish Parliament. *Informe de evaluación y reforma del Pacto de Toledo*. Madrid, 2020. https://www.congreso.es/public_oficiales/L14/CONG/BOCG/D/BOCG-14-D-187.PDF.

¹⁶⁴ The experience of the *National Employment Savings Trust* (NEST) in the UK is a good reference in this field. Refer to: Nest Pensions, https:// www.nestpensions.org.uk/schemeweb/nest.html.

¹⁶⁵ The recent Toledo Pact establishes: "the comprehensive reform of widowhood involves adapting the configuration of the pension to the new social and family realities, as well as to socio-economic circumstances, in order to improve the protection of pensioners without other resources, and to adapt the protection of less vulnerable groups". For further details, refer to: Official Gazette of the Spanish Parliament. *Informe de evaluación y reforma del Pacto de Toledo*. Madrid, 2020. https://www.congreso.es/public_oficiales/L14/CONG/ BOCG/D/BOCG-14-D-187.PDF; and Fuster, Luisa. "Pensiones y género. Brecha de Género en las pensiones contributivas en España." In Instituto Santalucía (ed.). *Pensiones del futuro*. Madrid: Instituto Santalucía. https://institutosantalucia.es/pensiones-del-futuro/. A recent study concludes that without widowhood pensions the gender gap in contributory pensions would be 60% instead of the current 30%. Moreover, without this pension, 50% of female pensioners would not receive a contributory pension. For further details, see: Fuster, Luisa. "Las pensiones de viudedad en España." *FEDEA, Estudios sobre la Economía Española*, n.º 2021/06, 2021. https://documentos.fedea. net/pubs/eee/eee2021-06.pdf.

¹⁶⁶ Social Protection Committee, and European Commission. *The* 2018 Pension Adequacy Report Vol. II: Country Profiles. Luxembourg: Publications Office of the European Union, 2018. https://doi. org/10.2767/653851.

¹⁶⁷ Official State Gazette. Real Decreto-ley 3/2021, de 2 de febrero, por el que se adoptan medidas para la reducción de la brecha de género y otras materias en los ámbitos de la Seguridad Social y económico. Madrid, 2021. https://www.boe.es/diario_boe/txt.php?id=BOE-A-2021-1529.

¹⁶⁸ In the 2018 Ageing Report population projections published by Eurostat in 2017 are taken. Furthermore, the macroeconomic scenario assumes that real GDP growth will gradually increase to 1.8% per year in 2050. For this reason, the estimated increase in health expenditure as a share of GDP does not fully correspond to that which would occur in a baseline scenario where GDP growth is obtained by extrapolating past trends in its determinants into the future [see chapter 1]. For further details, see: European Commission. *The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070).* Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2765/615631.

¹⁶⁹ In the most favourable scenario, where future increases in life expectancy are in good health, the increase in public health care expenditure would not amount to more than 0.6 percentage points of GDP. For further details, see: European Commission. *The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States* (2016-2070). Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2765/615631.

¹⁷⁰ More information in: Hammond, Rey. *The world in 2040: Future Health, Care and Wellbeing*. Allianz Care, 2019. https://image.health. allianzcare-emails.com/lib/fe9b12747766047874/m/1/30a0836e-6ce7-4b9c-8b47-99a206299502.pdf; and Center for the Governance of Change. *Innovation, sustainability and the future of Healthcare*. Madrid: IE University, 2020. https://www.ie.edu/cgc/research/innovation-sustainability-future-healthcare/.

¹⁷¹ Official State Gazette. *Ley Orgánica 3/2021, de 24 de marzo, de regulación de la eutanasia*.Madrid, 2021. https://www.boe.es/eli/es/lo/2021/03/24/3.

¹⁷²Official State Gazette. *Real Decreto Legislativo 1/2015, de 24 de julio, por el que se aprueba el texto refundido de la Ley de garantías y uso racional de los medicamentos y productos sanitarios.* Madrid, 2015. https://www.boe.es/eli/es/rdlg/2015/07/24/1/con.

¹⁷³ Department of Health, Social Services and Equality. *Estrategia para el Abordaje de la Cronicidad en el Sistema Nacional de Salud*. Madrid,
 2012. https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/pdf/ESTRATEGIA_ABORDAJE_CRONICIDAD.pdf.

¹⁷⁴ On this question, see, among others: Department of Health,

Consumer Affairs and Social Welfare. *Crisis económica y salud en España*. Madrid, 2018. https://www.mscbs.gob.es/estadEstudios/ estadisticas/docs/CRISIS_ECONOMICA_Y_SALUD.pdf; and WHO. *Health in All Policies: Framework for Country Action*. 2014. https://www.who. int/healthpromotion/frameworkforcountryaction/en/.

¹⁷⁵ Zunzunegui, María Victoria , and François Béland. "Políticas intersectoriales para abordar el reto del envejecimiento activo. Informe SESPAS 2010." *Gaceta Sanitaria* 24, 2010. https://doi.org/10.1016/j. gaceta.2010.08.004.

¹⁷⁶ See, among others: Costa-Font, Joan, Christophe Courbage, and Katherine Swartz. "Financing Long-Term Care: Ex Ante, Ex Post or Both?"*Health Economics* 24, 2015. https://doi.org/10.1002/hec.3152; Spijker, Jeroen, Daniel Devolder, and Pilar Zueras. "The impact of demographic change in the balance between formal and informal old-age care in Spain. Results from a mixed microsimulation–agentbased model." *Ageing & Society*, 2020. https://doi.org/10.1017/ S0144686X20001026; and Zimmerman, Mary Kaye, Jacquelyn S. Litt, and Christine Bose. *Global Dimensions of Gender and Carework*. Stanford: Stanford University Press, 2006.

¹⁷⁷ See: Martínez Rodríguez, Teresa, *et al. Modelo de atención centrada en la persona. Presentación de los Cuadernos prácticos.* Madrid: Informes Envejecimiento en red, n.º 12, 2015. http://envejecimiento.csic.es/ documentos/documentos/enred-modeloatencioncuadernosmatia.pdf; and WHO. *WHO global strategy on people-centred and integrated health services.* Geneva, 2015. https://www.who.int/servicedeliverysafety/ areas/people-centred-care/global-strategy/en/.

¹⁷⁸ See: Del Barrio, Elena, and Mayte Sancho. *Primero las personas: cuidar como nos gustaría ser cuidados/as. Resultados de la Encuesta sobre cuidados*. Barcelona: Obra Social "la Caixa", 2016; and Elizalde-San Miguel, Begoña. "¿Femenino e informal? El modelo tradicional de cuidados a examen desde una perspectiva demográfica." *Revista Prisma Social*, n.º 21, 2018. https://revistaprismasocial.es/article/ view/2466/2652.

¹⁷⁹ López Villanueva, Cristina, and Isabel Pujades Rubies. "Vivir solo en España. Evolución y características de los hogares unipersonales en la vejez." In Julio Pérez Díaz (coord.). *Envejecimiento de la población, familia y calidad de vida en la vejez*. Madrid: Funcas, Panorama Social, n.º 28, 2018. 93-115. https://www.funcas.es/revista/envejecimientode-la-poblacion-familia-y-calidad-de-vida-en-la-vejez-enero-2019/.

¹⁸⁰ Martínez Rodríguez, Teresa, *et al. Modelo de atención centrada en la persona. Presentación de los Cuadernos prácticos.* Madrid: Informes Envejecimiento en red, n.º 12, 2015. http://envejecimiento.csic.es/documentos/documentos/enred-modeloatencioncuadernosmatia.pdf.

¹⁸¹ These self-managed collaborative housing projects aim to preserve the autonomy of their residents, while reinforcing mutual support mechanisms and integrating long-term care as an indispensable part of living together. For further details see: López Gómez, Daniel, and Mariona Estrada Canal. "¿Cómo avanzan las dinámicas de senior cohousing en España?" In Sandra Ezquerra, *et al.* (eds.). *Edades en transición, envejecer en el siglo XXI.* Madrid: Ariel, 2016. 227-237.

¹⁸² Community care initiatives can be particularly beneficial for older people living alone (23% of those aged 65+ in 2019), where the risk of unwanted loneliness is highest. For further details, see: INE. *Encuesta Continua de Hogares. Población residente según sexo, edad* y tamaño del hogar al que pertenece. https://www.ine.es/dyngs/ INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176952 &menu=resultados&idp=1254735572981#!tabs-1254736195199; Vega-Solís, Cristina, and Raquel Martínez-Buján. "Explorando el lugar de lo comunitario en los estudios de género sobre sostenibilidad, reproducción y cuidados." *Quaderns-e Institut Català d'Antropologia*, n.º 22, 2017. https://www.antropologia.cat/estatic/files/5_Vega_Martinez. pdf; and Velarde-Mayol, C., S. Fragua-Gil, and J.M. García-de-Cecilia. "Validación de la escala de soledad de UCLA y perfil social en la población anciana que vive sola." SEMERGEN – *Medicina de Familia* 42, n.º 3, 2016. https://doi.org/10.1016/j.semerg.2015.05.017.

¹⁸³On this question, see, among others: Abellán, Antonio, *et al.* "Partner care, gender equality, and ageing in Spain and Sweden." *International Journal of Ageing and Later Life* 11, n.º 1, 2017. https://doi.org/10.3384/ ijal.1652-8670.16-305; and Zueras, Pilar, Jeroen Spijker, and Amand Blanes. "Evolución del perfil de los cuidadores de personas de 65 y más años con discapacidad en la persistencia de un modelo de cuidado familiar." *Revista Española de Geriatría y Gerontología* 53, n.º 2, 2018. https://doi.org/10.1016/j.regg.2017.07.004.

¹⁸⁴ For further details, refer to: Badenes Plá, Nuria, and M. T. López López. "Doble dependencia: abuelos que cuidan nietos en España." *Zerbitzuan: Gizarte zerbitzuetarako aldizkaria= Revista de servicios sociales*, n.º 49, 2011. https://doi.org/10.5569/1134-7147.49.09; and Del Barrio, Elena, Olga Mayoral, and Mayte Sancho (Matia Instituto Gerontológico). *Estudio sobre las condiciones de vida de las personas de 55 y más años en Euskadi*. Vitoria-Gasteiz: Servicio Central de Publicaciones del Gobierno Vasco, Documentos de Bienestar Social, n.º 77, 2015. https://www.matiainstituto.net/es/publicaciones/estudiosobre-las-condiciones-de-vida-de-las-personas-de-55-y-mas-anosen-euskadi.

¹⁸⁵ In the 2018 *Ageing Report* population projections published by Eurostat in 2017 are taken. Furthermore, the macroeconomic scenario assumes that real GDP growth will gradually increase to 1.8% per year in 2050. For this reason, the estimated increase in long-term care expenditure as a share of GDP does not fully correspond to that which would occur in a baseline scenario where GDP growth is obtained by extrapolating past trends in its determinants into the future [see chapter 1]. For further details, see: European Commission. *The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States* (2016-2070). Luxembourg: Publications Office of the European Union, 2018. https://doi.org/10.2765/615631.

¹⁸⁶ In order to project the number of potential beneficiaries of longterm care benefits, we take as a reference the age brackets of 65 and over in 2050 based on Eurostat's demographic projections, and assume that the proportion of beneficiaries with benefits from the System for Autonomy and Care for Dependency in these age cohorts remains constant with respect to 2020. Data from the System for Autonomy and Care for Dependency as of 31 December 2020. See: Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]*. https://ec.europa.eu/eurostat/data/database; INE. *Cifras de población. Población residente por fecha, sexo y edad.* https://www.ine.es/dyngs/ INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176951& menu=resultados&idp=1254735572981; and Instituto de Mayores y Servicios Sociales. *Estadísticas. Sistema para la Autonomía y Atención a la Dependencia. Histórico. Informes publicados.* https://www.imserso. es/imserso_01/documentacion/estadisticas/info_d/estadisticas/est_inf/

inf_gp/2020/index.htm.

¹⁸⁷ For further details, see: Fernández Pérez, José Luis, and José Antonio Herce San Miguel (dirs.). *Los retos socio-económicos del envejecimiento en España*. Madrid: Consultores de las Administraciones Públicas, 2009; and Sosvilla Rivero, Simón, and Ignacio Moral Arce. "Estimación de los beneficiarios de prestaciones de dependencia en España y del gasto asociado a su atención para 2007-2045." *Gaceta Sanitaria* 25, 2011. https://doi.org/10.1016/j.gaceta.2011.09.022 .

¹⁸⁸ U.S. News & World Report. "Best Countries for a Comfortable Retirement." U.S. News & World Report, https://www.usnews.com/ news/best-countries/best-comfortable-retirement.

¹⁸⁹International Labour Organization. *Care work and care jobs for the future of decent work*. Geneve, 2018. https://www.ilo.org/wcmsp5/ groups/public/---dgreports/---dcomm/---publ/documents/publication/ wcms_633135.pdf.

¹⁹⁰ The activity rate is defined as the ratio between the active population in each of the represented age cohorts and the population in that age group. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The observed figure is from 2019. For further details, see: OECD. *LFS by sex and age – indicators*. https://stats. oecd.org/.The activity rate is defined as the ratio between the active population in each of the represented age cohorts and the population in that age group. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The observed figure is from 2019. For further details, see: OECD. *LFS* by sex and age – indicators. https://stats.oecd.org/.

¹⁹¹The health expenditure reported here does not include long-term care services. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. Data for the EU-8 and Spain are from the OECD and data for the EU-27, from Eurostat. The observed figure is the average from 2015 to 2018. For further details, see: Eurostat. *Expenditure for selected health care functions by health care financing schemes [HLTH_SHA11_HCHF]*. https://ec.europa.eu/eurostat/data/database; and OECD. *Health expenditure and financing. Government/compulsory schemes. Long-term care (health) and long-term care (social)*. https://stats.oecd.org/Index.aspx?DataSetCode=SHA.

¹⁹² Public expenditure on long-term care includes health and social care components. Social assistance expenditure data are not available for all countries. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. Data for the EU-8 and Spain are from the OECD and data for the EU-27, from Eurostat. The observed figure is the average from 2015 to 2018. For further details, see: Eurostat. Expenditure for selected health care functions by health care financing schemes [HLTH_SHA11_HCHF]. https://ec.europa.eu/ eurostat/data/database; and OECD. Health expenditure and financing. Government/compulsory schemes. Current expenditure on health (all functions) and long-term care (health).https://stats.oecd.org/Index. aspx?DataSetCode=SHA. Public expenditure on long-term care includes health and social care components. Social assistance expenditure data are not available for all countries. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. Data for the EU-8 and Spain are from the OECD and data for the EU-27, from Eurostat. The observed figure is the average from 2015 to 2018. For further details, see: Eurostat. Expenditure for selected health care functions by health care financing schemes [HLTH_SHA11_

HCHF. https://ec.europa.eu/eurostat/data/database; OECD]. Health expenditure and financing. Government/compulsory schemes. Current expenditure on health (all functions) and long-term care (health). https://stats.oecd.org/Index.aspx?DataSetCode=SHA.

¹⁹³ The numerator includes the beneficiaries of the System for Autonomy and Care for Dependency (SAAD) who, although they have the right to a benefit, are not receiving it. The denominator includes all the beneficiaries of the Sistema para la Autonomía y Atención a la Dependencia who have been recognised as entitled to a benefit. The data observed is the situation as of December 2020. For further details, see: Instituto de Mayores y Servicios Sociales. Estadísticas. Sistema para la Autonomía y Atención a la Dependencia. Histórico. Informes publicados. https://www.imserso.es/imserso 01/documentacion/estadisticas/ info_d/estadisticas/est_inf/inf_gp/2020/index.htm.The numerator includes the beneficiaries of the System for Autonomy and Care for Dependency (SAAD) who, although they have the right to a benefit, are not receiving it. The denominator includes all the beneficiaries of the Sistema para la Autonomía y Atención a la Dependencia who have been recognised as entitled to a benefit. The data observed is the situation as of December 2020. For further details, see: Instituto de Mayores y Servicios Sociales. Estadísticas. Sistema para la Autonomía y Atención a la Dependencia. Histórico. Informes publicados. https://www.imserso. es/imserso_01/documentacion/estadisticas/info_d/estadisticas/est_inf/ inf_gp/2020/index.htm.

¹⁹⁴ The Basque Government's Health in All Policies (SeTP, Salud en todas las políticas) initiative is an interesting example of an ambitious and comprehensive initiative. For further details on the initiative, see: Department of Health of the Basque Government. "Salud en todas las políticas." Department of Health of the Basque Government, https:// www.euskadi.eus/gobierno-vasco/salud-todas-las-politicas/inicio/.

¹⁹⁵ The draft of the "Recovery, Transformation and Resilience Plan" includes in its component 18 "Renewal and expansion of the capacities of the National Health System" more than 1 billion euros to, among other things, develop a plan to invest in high-tech equipment in the National Health System, reinforce prevention and health promotion and increase the capacity to respond to health crises. See: Government of Spain. *Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

¹⁹⁶For a detailed analysis of possible proposals for action in this field, refer to: Asociación de Economía de la Salud. "Capítulo IV. Buen gobierno de la sanidad." In *Sistema Nacional de Salud: diagnóstico y propuestas de avance*. 2014. http://www.aes.es/Publicaciones/SNS_ version_completa.pdf.

¹⁹⁷ Department of Health, Social Services and Equality. *Estrategia para el Abordaje de la Cronicidad en el Sistema Nacional de Salud*. Madrid, 2012. https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/pdf/ESTRATEGIA_ABORDAJE_CRONICIDAD.pdf.

¹⁹⁸ It refers to interventions that are routinely applied in healthcare practice but (1) are performed outside the approved or clinically relevant indication; (2) are effective and safe, but there are other firstline alternatives with better cost-effectiveness and safety outcomes; and (3) there is no solid scientific evidence on their appropriateness and therapeutic utility. See: Department of Health, Social Services and Equality. "Compromiso por la calidad de las sociedades científicas en España." Department of Health, Social Services and Equality, https:// www.mscbs.gob.es/organizacion/sns/planCalidadSNS/cal_sscc.htm.

¹⁹⁹ For further details on the international comparison of pension and work reconciliation arrangements, the current situation in Spain and the debate on future directions for improvement, see: Jiménez Martín, Sergi. "Jubilación Activa." *FEDEA, Documentos de trabajo*, n.º 2021/02, 2021. https://documentos.fedea.net/pubs/dt/2021/dt2021-02.pdf; and Sánchez Martín, Alfonso R., and Sergi Jiménez Martín. "La compatibilidad del trabajo y el cobro de pensión en España: análisis institucional en el contexto europeo."*FEDEA, Estudios sobre la Economía Española*, n.º 2021/10, 2021. https://documentos.fedea.net/pubs/eee/ eee2021-11.pdf.

²⁰⁰ Konle-Seidl, Regina. "Retention and re-integration of older workers into the labour market: What works?" *IAB Discussion Paper*, n.º 17, 2017. https://www.econstor.eu/handle/10419/172881.

²⁰¹Herce, José Antonio. "Trans-formación." *Empresa Global*, n.º 95, 2010. http://www.empresaglobal.es/EGAFI/descargas/1051548/1633772/ trans-formacion.pdf.

²⁰² On this question, see: Halabisky, D. "Entrepreneurial Activities in Europe - Senior Entrepreneurship." *OECD Economic Policy Papers*, n.º 2, Paris: OECD Publishing, 2012. https://doi.org/10.1787/5jxrcml7lhxqen; and Liang, James, Hui Wang, and Edward P. Lazear. "Demographics and Entrepreneurship." *Journal of Political Economy* 126, n.º S1, 2018. https://doi.org/10.1086/698750.

²⁰³ Official Gazette of the Spanish Parliament.*Informe de evaluación y reforma del Pacto de Toledo*. Madrid, 2020. https://www.congreso.es/public_oficiales/L14/CONG/BOCG/D/BOCG-14-D-187.PDF.

²⁰⁴ Since 2011, the General Social Security Act has already stipulated that the Social Security Administration must inform each worker of his or her future entitlement to ordinary retirement, by means of the socalled "orange letter or envelope". An example of good practice in this regard is the orange envelope in Sweden. See: Boada-Penas, María del Carmen. "Reformas del sistema de pensiones: La Experiencia Sueca." *FEDEA, Documento de Trabajo*, n.º 2021/03, 2021. https://documentos. fedea.net/pubs/dt/2021/dt2021-03.pdf; and Official State Gazette. *Ley 27/2011, de 1 de agosto, sobre actualización, adecuación y modernización del sistema de Seguridad Social.* Madrid, 2011. https:// www.boe.es/buscar/doc.php?id=BOE-A-2011-13242.

²⁰⁵ Department of Social Rights and Agenda 2030. *On this, it is worth noting the path opened by the recently approved Shock Plan for the Autonomy and Dependent Care System*. Madrid, 2020. https://www.montepio.es/wp-content/uploads/2020/05/Plan-de-Choque-Dependencia_resumen-de-propuestas_02-10-2020.pdf.

²⁰⁶ In this respect, it is also worth noting the boost that European recovery funds can provide. The draft of the "Recovery, Transformation and Resilience Plan" in its component 22 "Shock plan for the care economy and reinforcement of inclusion policies" provides for more than 3.5 billion euros for, among other things, the strengthening of care for dependent persons and the promotion of the change of model in long-term care. See: Government of Spain. *Recovery, Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2021/130421-%20Plan%20 de%20recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf. ²⁰⁷ See: Martínez Rodríguez, Teresa, *et al. Modelo de atención centrada en la persona. Presentación de los Cuadernos prácticos.* Madrid: Informes envejecimiento en red, n.º 12, 2015. http://envejecimiento.csic.es/ documentos/documentos/enred-modeloatencioncuadernosmatia.pdf; and WHO. *WHO global strategy on people-centred and integrated health services.* Geneva, 2015. https://www.who.int/servicedeliverysafety/ areas/people-centred-care/global-strategy/en/.

²⁰⁸ 21% of women aged 18-55 have had fewer children than desired. 42% of women in Spain aged between 18 and 55 have had their first child later than they considered ideal. For more information, see: INE. *Encuesta de fecundidad 2018*. https://www.ine.es/dynt3/inebase/es/ index.htm?padre=5497.

²⁰⁹ Considering women aged 18 and over. For further details, see: INE. *Encuesta de fecundidad 2018*. https://www.ine.es/dynt3/inebase/es/ index.htm?padre=5497.

²¹⁰ INE. *Indicador coyuntural de fecundidad, 2019*. https://www.ine.es/ dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736177 003&menu=ultiDatos&idp=1254735573002.

²¹¹ In addition to the policies proposed below, in Chapter 8 of this *Strategy* two policies that may have an effect on the birth rate are proposed: an improvement in the child benefit for each child under 18 years and a reform of family benefits in personal income tax. In the long run, the effectiveness of family policies based on direct monetary incentives may be compromised. In Spain, the introduction of an allowance of 2,500 euros per child increased fertility by 3% between 2007 and 2010, but its elimination decreased it by 6%, See: González, Libertad, and Sofia Trommlerová. "Cash Transfers and Fertility: How the Introduction and Cancellation of a Child Benefit Affected Births and Abortions." *Journal of Human Resources*, 2021. https://www.barcelonagse.eu/file/8108/download?token=j4sLFbkf.

²¹² Borràs, Vicent, Marc Ajenjo, and Sara Moreno-Colom. "More time parenting in Spain: a possible change towards gender equality?" *Journal*

of Family Studies 27, 2021. https://doi.org/10.1080/13229400.2018 .1440618.

²¹³ For further details, see: Eurostat. *Pupils in early childhood and primary education by education level and age - as % of corresponding age population [educ_uoe_enrp07]*. https://ec.europa.eu/eurostat/data/database; and Department of Education and Vocational Training. *Escolarización y entorno educativo. Tasas de escolarización en las edades teóricas de los niveles no obligatorios. Educación infantil.* Madrid, 2020. https://www.educacionyfp.gob.es/inee/indicadores/sistema-estatal/mapa-indicadores.html.

²¹⁴ See: Gandasegui Díaz, Vicente, Begoña Elizalde-San Miguel, and Maria T. Sanz. "Back to the Future: a Sensitivity Analysis to Predict Future Fertility Rates Considering the Influence of Family Policies— The Cases of Spain and Norway." *Social Indicators Research*, 2020. https://doi.org/10.1007/s11205-020-02566-7; and Sanz, Maria T., Vicente Díaz Gandasegui, and Begoña Elizalde-San Miguel. "Sense and sensibility: using a model to examine the relationship between public pre-school places and fertility." *The Journal of Mathematical Sociology* 43, n.º 4, 2019. https://doi.org/10.1080/0022250X.2019.1583226.

²¹⁵ The Renta Valenciana de Inclusión now includes canteen and school expenses grants. For further details: Generalitat Valenciana. "Renta Valenciana de Inclusión." Generalitat Valenciana, http://inclusio.gva. es/es/web/integracion-inclusionsocial-cooperacion/renta-valencianade-inclusion-rvi.

Dependency ratio measured as the population aged 65 and over out of the population aged 15-64. The forward projection corresponds to the Eurostat baseline scenario. For further details, see: Eurostat. Demographic balances and indicators by type of projection [proj_19ndbi]; and Old-age-dependency ratio [tps00198]. https://ec.europa.eu/ eurostat/data/database.

CHALLENGE 6: PROMOTING BALANCED, FAIR AND SUSTAINABLE TERRITORIAL DEVELOPMENT

¹ World Bank. "Urban development". World Bank. https://www. bancomundial.org/es/topic/urbandevelopment/overview.

² INE. *Censo de 1900*. https://www.ine.es/dynt3/inebase/es/index. htm?padre=580&dh=1.

³ United Nations. World Urbanization Prospects 2018. Percentage of population in urban and rural areas. https://population.un.org/wup/Country-Profiles/.

⁴ Due to data availability and international comparability, the urbanisation rate since 1950 is represented. The EU-27 average is a simple average of the individual countries. In this regard, see: *Ibid*.

⁵ On this question, see, among others: Archondo, Ignacio, *et al.* Tendencias en la urbanización: Riesgos y oportunidades. BBVA Research, 2018. https://www.bbvaresearch.com/wp-content/ uploads/2018/11/Observatorio-Futuro-de-las-Ciudades.pdf; European Commission and UN-Habitat. The State of European Cities 2016. Cities leading the way to a better future. Luxembourg: Publications Office of the European Union, 2016. http://www.oecd.org/officialdocuments/pu blicdisplaydocumentpdf/?cote=EDU/WKP(2019)4&docLanguage=En; and Goerlich Gisbert, Francisco, and Ernest Reig Martínez (dirs.). Las Áreas urbanas funcionales en España: Economía y Calidad de Vida. Bilbao: Fundación BBVA, 2020. https://www.fbbva.es/wp-content/ uploads/2020/06/DE2020_areas-urbanas-funcionales_ivie_web. pdf; Gutiérrez, Eduardo, Enrique Moral-Benito, and Roberto Ramos. "Tendencias recientes de la población en las áreas rurales y urbanas de España." Documentos Ocasionales Banco de España, n. º 2027, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Fich/do2027.pdf; and OECD. The Metropolitan Century. Understanding urbanization and its consequences. Policy Highlights. Paris: OECD Publishing, 2015. http:// www.oecd.org/regional/regional-policy/The-Metropolitan-Century-Policy-Highlights%20.pdf.

⁶Spain is the third safest country in Europe and one of the safest in the world. In our country, more than 80% of people say they feel safe walking alone at night, above the OECD average of 68%. This safety is not only subjective, different safety records also place Spain among the safest countries in the European Union. In this regard, refer to: Eurostat. *Recorded offences by offence category - police data [crim_off_cat]*. https://ec.europa.eu/eurostat/data/database; and OCDE. *How 's life?* 2015. Measuring well-being. Paris: OECD Publishing, 2015. https:// dx.doi.org/10.1787/how_life-2015-en" \t "_blank" \o "How's Life? 2015.

⁷ 274 Spanish municipalities have been recognised as child-friendly cities by Unicef. Spain is a world leader in this field. For further details, see: Unicef. *Ciudades Amigas de la Infancia 2018-2022*. https://ciudadesamigas.org/ciudades-infancia-2018/ciudades-amigas-2018/.

⁸Spain is the country with the most municipalities in the world that have joined the network of age-friendly cities and communities. In 2020, 191 municipalities, in which 32.4% of the over-60 population reside, hold this title. In this regard, see: WHO "About the Global Network for Age-friendly Cities and Communities." WHO, https://extranet.who.int/

agefriendlyworld/who-network/.

⁹ Even at the peak of migratory flows and at the lowest point of employment, Spain has shown a more open attitude towards immigration than the average of the European countries, as well as a greater appreciation of its contribution in all spheres, and fluid intercultural relations. In this regard, see: Spanish Economic and Social Council. *La inmigración en España: efectos y oportunidades*. Madrid, 2019. http://www.ces.es/informes; and González Enríquez, Carmen. *Luces y sombras en la integración de los migrantes en España*. Madrid: Real Instituto Elcano, 2016. http://www.realinstitutoelcano. org/wps/portal/rielcano_es/contenido?WCM_GLOBAL_CONTEXT=/ elcano/elcano_es/zonas_es/demografia+y+poblacion/ari38-2016gonzalezenriquez-luces-sombras-integracion-migrantes-espana.

¹⁰72% of those who live in Spanish cities trust the rest of the inhabitants of their urban area, a high percentage and much higher than the average for southern European countries. In this regard, refer to: European Commission, Directorate-General for Regional and Urban Policy. *Report on the Quality Of Life In European Cities, 2020*. Luxembourg: Publications Office of the European Union, 2020. https://ec.europa.eu/ regional_policy/en/information/maps/quality_of_life.

¹¹ Eurostat. European Union Statistics on Income and Living Conditions. Distribution of population by tenure status, type of household and income group- EU-SILC survey [ILC_LVHO02]. https://ec.europa.eu/eurostat/ data/database.

¹² For further details, see: INE. *Censo de Población y Viviendas 1991*. https://www.ine.es/censo91/es/inicio.jsp; INE. *Censo de Población y Viviendas 2011*. https://www.ine.es/censos2011_datos/cen11_datos_ resultados.htm#; and Department of Public Works, Transport and Environment. *Informe Nacional de España Hábitat II*. Madrid, 1997. http://habitat.aq.upm.es/in/.

¹³ This improvement is due to a decrease in household size (fewer children, fewer intergenerational households and an increase in singleperson households) and an increase in the floor area of dwellings built. Thus, in 1970, the usable floor area per person was 18.3 m2², rising to 37.37 m² in 2011 (latest available census). For further details, see: INE. *Censo de Población y Viviendas 1991*. https://www.ine.es/censo91/es/ inicio.jsp; INE. *Censo de Población y Viviendas 2011*. https://www.ine.es/ censos2011_datos/cen11_datos_resultados.htm#; and Department of Public Works, Transport and Environment. *Informe Nacional de España Hábitat II.* Madrid, 1997. http://habitat.aq.upm.es/in/.

¹⁴ Percentage of disposable income used to pay for housing (rent and mortgage, as well as mortgage interest). Disposable income measures the net income of households (net of taxes and social contributions and accounting for net interest and dividends received). Data for the EU-27 and EU-8 are simple averages of the individual countries. See: OECD. *Housing costs over income [HCI.2]*. http://www.oecd.org/housing/data/ affordable-housing-database/housing-conditions.htm.

¹⁵ Porcentaje de población que vive en hogares en los que el gasto en vivienda representa al menos el 40% de la renta disponible total del hogar. Data for the EU-27 and EU-8 are simple averages of the individual countries. Refer to: Eurostat. *European Union Statistics on* Income and Living Conditions. Housing cost overburden rate by tenure status - EU-SILC survey [ilc_lvho07c]. https://ec.europa.eu/eurostat/data/database.

¹⁶ For further details on the construction of the EU-8, see the*Apunte metodológico* número I.

¹⁷ Mingorance Jiménez, Alfredo. *Sociedad y empleo en Vallecas*. Madrid: Universidad Complutense de Madrid, Servicio de Publicaciones, 1993. https://eprints.ucm.es/2411/1/AH0024001.pdf; and Valenzuela Rubio, Manuel. "La pervivencia del chabolismo en Madrid". *Temas de Madrid*, nº 1. *Departamento de Geografía*. Universidad Autónoma de Madrid, 1975. 35-43.

¹⁸ These official data do not take into account the situation of Cañada Real (divided among four municipalities and where shanty towns alternate with housing built on undeveloped land, but which would not be considered substandard housing due to its characteristics). With regard to the notable decrease in the number of people living in horizontal substandard housing, UN Habitat highlighted as a good practice the "Neighbourhood Reshaping" initiated in 1979 in Madrid. In this regard, see: Agencia de vivienda social. *Informe de gestión y actividades*. Madrid: Comunidad de Madrid, 2018. https:// www.comunidad.madrid/sites/default/files/doc/vivienda/informe_ gestion_2018.pdf; and Castro, Prisciliano, José Molina, and Belén Bada. "Un ejemplo de participación y renovación urbana: la remodelación de barrios en Madrid (España)." *Ciudades para un Futuro más Sostenible*, 1996. http://habitat.aq.upm.es/bpes/onu/bp258.html.

¹⁹ It is defined as the percentage of the population suffering from overcrowding in addition to at least one of the measures of housing deprivation (leaking roof, no bath/shower, no indoor toilet, too dark). The at-risk-of-poverty threshold is 60% of the national median of the equivalent disposable income. EU-27 and EU-8 data are simple averages for the individual countries. See: Eurostat. *European Union Statistics on Income and Living Conditions. Severe housing deprivation rate by age, sex and poverty status - EU-SILC survey [ilc_mdho06a].*. https://ec.europa.eu/eurostat/data/database.

²⁰The indicator measures the proportion of people living in overcrowded conditions (overcrowded dwellings). This overcrowding rate is calculated by taking into account the ratio between the number of rooms in the dwelling and the number of household members. Eurostat considers as minimums: one common living room for the household; one bedroom per couple; one bedroom for each single person aged 18 and over; one bedroom for each single same-sex couple aged 12 to 17; one bedroom for each single person aged 12 to 17, not included in the previous category; one room for each couple of children under the age of 12. The at-risk-of-poverty threshold is 60% of the national median of the equivalent disposable income. EU-27 and EU-8 data are simple averages for the individual countries. In this regard, see: Eurostat. *European Union Statistics on Income and Living Conditions. Overcrowding rate by poverty status - EU-SILC survey [TESSI172]*. https://ec.europa.eu/eurostat/data/database.

²¹Some relevant examples are Agenda 21 local, Estrategia española de sostenibilidad urbana y local for 2011, Agenda Urbana Española for 2019, and initiatives such as the Pacto de los Alcaldes para el Clima y la Energía Europa (Global Covenant of Mayors), Red C40, or Red Española de Ciudades por el Clima. In this regard, see: Aguado, Itziar, et al. "La Agenda 21 Local en España." Ekonomiaz: Revista vasca de economía 64, 2007. https://dialnet.unirioja.es/servlet/articulo?codigo=2350127; Eurostat. *Population covered by the Covenant of Mayors for Climate* & Energy signatories [SDG_13_60]. https://ec.europa.eu/eurostat/ data/database; Department for Environment. *Estrategia Española de* Sostenibilidad urbana y local, 2011. Madrid, 2011. https://www.miteco. gob.es/es/calidad-y-evaluacion-ambiental/temas/medio-ambienteurbano/EESUL-290311-web_tcm30-181850.pdf; Department of Transport, Mobility and Urban Agenda. *Agenda Urbana Española*. Madrid, 2019. www.aue.gob.es; Olazabal, Marta, *et al.* "How are Italian and Spanish Cities tackling climate change? A local comparative study." *BC3 Working paper series, n.º 2014-03*, 2014. https://ideas.repec.org/p/ bcc/wpaper/2014-03.html; and Reckien, Diana, *et al.* "How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28." *Journal of Family Studies* 191, 2018. https://doi.org/10.1016/j.jclepro.2018.03.220 .

²² The percentage of the population reporting noise problems has also halved from 24.9% in 2004 to 14.1% in 2019. For further details, see: Eurostat. *Noise from neighbors or from the street - EU-SILC survey [ILC_ MDDW01]*. https://ec.europa.eu/eurostat/data/database.

²³ The data series in the figure have been constructed from the reports of the European Environment Agency, taking into account the percentage of the population exposed to annual average concentrations of particulate matter (PM10) above 20 micrograms per cubic metre (WHO recommended limit). See: European Environment Agency. "ECT/ATNI reports." *European Topic Centre or Air Pollution, transport, noise and industrial pollution,* https://www.eionet.europa.eu/etcs/etcatni/products/etc-atni-reports; and WHO. *Air quality guidelines for particulate matters, ozone, nitrogen dioxide and sulphur dioxide. Global update 2005.* Geneva, 2005. http://www.who.int/phe/health_topics/ outdoorair/outdoorair_aqg/en/index.html .

²⁴EU-27 and EU-8 data are simple averages for the individual countries. See: Eurostat. *Pollution, grime or other environmental problems - EU-SILC survey [ILC_MDDW02].* https://ec.europa.eu/eurostat/data/database.

²⁵See: Centro de Innovación del Sector Público de PwC and IE Business School. *Smart Cities: La ciudad como plataforma de transformación digital.* 2015. https://docplayer.es/12056595-Centro-de-innovaciondel-sector-publico-de-pwc-e-ie-business-school-smart-citiesla-transformacion-digital-de-las-ciudades-en-colaboracion-con. html; and the Spanish Network of Smart Cities (RECI). https:// reddeciudadesinteligentes.es/mapa-de-ciudades/.

²⁶93,1 hab./km² and 108,8 hab./km², respectively in 2018. The average density in Spain in 1990 was 77 inhabitants/km². For further details, see: Eurostat. *Population Density [TPS00003]*. https://ec.europa.eu/ eurostat/data/database; INE. *Cifras de población. Principales cifras desde 1971*. https://www.ine.es/jaxiT3/Tabla.htm?t=31304; and INE. *Anuario estadístico de España, 1996. Superficie y altimetría*. https:// www.ine.es/inebaseweb/pdfDispacher.do?td=145936&ext=.pdf.

²⁷ INE. Cifras de población. Principales cifras desde 1971. https://www. ine.es/jaxiT3/Tabla.htm?t=31304; and INE. Anuario estadístico de España, 1996. Superficie y altimetría. https://www.ine.es/inebaseweb/ pdfDispacher.do?td=145936&ext=.pdf.

²⁸ Ayuda, María Isabel, Fernando Collantes, and Vicente Pinilla. "From locational fundamentals to increasing returns: the spatial concentration

of population in Spain, 1787–2000." *Journal of Educational studies*, 12. 2010. https://doi.org/10.1007/s10109-009-0092-x.

²⁹ There are different definitions of medium-sized cities, although most studies tend to consider those cities with between 50,000 and 300,000 inhabitants. Provincial capitals should be added to these, even if they have a smaller population, and cities that, despite having between 50,000 and 300,000 inhabitants, are integrated into the metropolitan areas of cities of a higher rank or form metropolitan areas of their own that are larger than 400,000 inhabitants. On this question, see, among others: Ganau, Joan, and Joan Vilagrasa. "Ciudades medias en España: posición en la red urbana y procesos urbanos recientes." Colección Mediterráneo Económico: "Ciudades, Arquitectura y Espacio Urbano, n.º 3, 2020. https://www.publicacionescajamar.es/publicacionescajamar/ public/pdf/publicaciones-periodicas/mediterraneo-economico/3/3-20. pdf; Martínez Navarro, José María, Juan Antonio García González, and Luis Alfonso Escudero. "Las ciudades medias de España y sus coronas en el siglo XXI (2000-2017): dinámica demográfica y desarrollo inmobiliario." Urbe Revista Brasileira de Gestão Urbana 12, 2020. https://doi.org/10.1590/2175-3369.012.e20190202.

³⁰ De la Roca Cladera, Josep, Blanca Arellano Ramos, and Montserrat Moix Bergadà. "Estructura urbana, policentrismo y sprawl: los ejemplos de Madrid y Barcelona." *Ciudad y territorio, estudios territoriales*, 43, n.º 168, 2011. https://upcommons.upc. edu/bitstream/handle/2117/13579/04_CyTET_168web.pdf; and Department of Development; DG for Architecture, Housing and Land; SG for Land, Information and Evaluation. *Áreas urbanas en España 2018. Constitución. Cuarenta años de las ciudades españolas.* Madrid, 2018. https://apps.fomento.gob.es/CVP/handlers/pdfhandler. ashx?idpub=BAW058.

³¹ Ganau, Joan, and Joan Vilagrasa. "Ciudades medias en España: posición en la red urbana y procesos urbanos recientes." *Colección Mediterráneo Económico: "Ciudades, Arquitectura y Espacio Urbano",* n.º 3, 2020. https://www.publicacionescajamar.es/publicacionescajamar/ public/pdf/publicaciones-periodicas/mediterraneo-economico/3/3-20. pdf.

³² Ibid.

³³ See, among others: Pérez, Francisco and Ernest Reig (dirs.). *Madrid: capitalidad, economía del conocimiento y competencia fiscal*. Valencia: Generalitat Valenciana, 2020. https://www.ivie.es/es_ES/ptproyecto/ ivielab-madrid-capitalidad-economia-del-conocimiento-competenciafiscal/; and Sánchez, Joan-Eugeni. "Pautas de localización de las sedes de las grandes empresas y entornos metropolitanos." *EURE (Santiago)*. 2007. http://dx.doi.org/10.4067/S0250-71612007000300005.

³⁴ Ganau, Joan, and Joan Vilagrasa. "Ciudades medias en España: posición en la red urbana y procesos urbanos recientes." *Colección Mediterráneo Económico: "Ciudades, Arquitectura y Espacio Urbano",* n.º 3, 2020. https://www.publicacionescajamar.es/publicacionescajamar/ public/pdf/publicaciones-periodicas/mediterraneo-economico/3/3-20. pdf.

³⁵ The size of the bubbles represents the percentage of decrease (grey) or increase (blue) in population in each of the Spanish provincial capitals between 2010 and 2019. For further details, see: INE. *Cifras oficiales de población resultantes de la revisión del Padrón municipal a 1 de enero. Resumen por capitales de provincia. Población por capitales de provincia*

y sexo. https://www.ine.es/jaxiT3/Tabla.htm?t=2911&L=0.

³⁶On this question, see, among others: Collantes, Fernando, and Vicente Pinilla. ¿Lugares que no importan? La despoblación de la España rural desde 1900 hasta el presente. Zaragoza: Sociedad Española de Historia Agraria, 2019. https://puz.unizar.es/2156-lugares-que-no-importanla-despoblacion-de-la-espana-rural-desde-1900-hasta-el-presente. html; and Pinilla, Vicente, and Luis Antonio Sáez. La despoblación rural en España: génesis de un problema y políticas innovadoras. Zaragoza: Informes Centro de Estudios sobre la Despoblación y Desarrollo de Áreas Rurales, 2017. http://sspa-network.eu/wp-content/uploads/ Informe-CEDDAR-def-logo.pdf.

³⁷ Collantes, Fernando, and Vicente Pinilla. ¿Lugares que no importan? La despoblación de la España rural desde 1900 hasta el presente. Zaragoza: Sociedad Española de Historia Agraria, 2019. https://puz. unizar.es/2156-lugares-que-no-importan-la-despoblacion-de-laespana-rural-desde-1900-hasta-el-presente.html.

³⁸ Pinilla, Vicente, and Luis Antonio Sáez. *La despoblación rural en España: génesis de un problema y políticas innovadoras*. Zaragoza: Informes Centro de Estudios sobre la Despoblación y Desarrollo de Áreas Rurales, 2017. http://sspa-network.eu/wp-content/uploads/ Informe-CEDDAR-def-logo.pdf.

³⁹ Camarero, Luis, and Rosario Sampedro. "La inmigración dinamiza la España rural." *Observatorio Social. Fundación La Caixa*, 2020. https://observatoriosociallacaixa.org/es/-/la-inmigracion-dinamizala-espana-rural?utm_source=newsletter&utm_medium=email&utm_ campaign=3951_OBS_Email%20&utm_content=ES&utm_ term=Ciencias-Sociales&crm_i=CIESOC_2_GEN.

⁴⁰ The EU classifies municipalities with a population density of less than 12.5 inhabitants per km2 as "at risk of depopulation". In January 2020, 5,007 Spanish municipalities had fewer than 1,000 inhabitants. However, this situation is not unique to Spain, but affects all European countries to a greater or lesser extent, and the fight against depopulation is one of the main priorities of the Vice-Presidency for Democracy and Demography of the European Commission. For further details, refer to: Čipin, Ivan, et al. "A Long-Term Vision for the Development of Rural Areas in Europe." Population and Policy Compact 27. Berlin: Max Planck Society/Population Europe, 2020. https://population-europe.eu/policybrief/long-term-vision-development-rural-areas-europe; Comisionado del Gobierno frente al Reto Demográfico. Diagnóstico estrategia nacional frente al reto demográfico. Eje despoblación. Department of Territorial Policy and Public Function, 2020. https://www.mptfp.gob.es/ dam/es/portal/reto_demografico/Indicadores_cartografia/Diagnostico_ Despoblacion.pdf.pdf; and INE. España municipal 2020. https://www. ine.es/infografias/infografia_padron.pdf.

⁴¹ Despite the fact that the Spanish population has increased by 16% between 2000 and 2019, the rural population residing in municipalities of less than 5,000 inhabitants has been reduced by 8%. Over the same period, an estimated 5,110 municipalities have lost population. In half of them, the number of inhabitants has fallen by more than 25% in the last two years, a phenomenon that has affected practically all of the country's autonomous communities. On this question, see: INE. *Estadística del Padrón Continuo. Datos de municipios por tramos.* https://www.ine.es/dynt3/inebase/index.htm?type=pcaxis&path=/t20/e245/p04/provi&file=pcaxis&dh=0&capsel=0; and General Secretariat for Demographic Challenge. *El reto demográfico y la despoblación en cifras.*

Department for Ecological Transition and Demographic Challenge, 2020. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2020/280220-despoblacion-en-cifras.pdf.

⁴²Economic and Social Council. "El medio rural y su vertebración social y territorial." *Colección informes*, n.º1. Madrid: Economic and Social Council, 2018. http://www.ces.es/documents/10180/5182488/ Inf0118.pdf/6d616668-0cb8-f58c-075b-2251f05dad9f.

⁴³Data for 1981 and 1991 are from the Population and Housing Census. The rest comes from the municipal census. For further details, see: INE. *Censo de Población y Viviendas 1981 1991. Tamaño del municipio de residencia.* https://www.ine.es/censos2011_datos/cen11_datos_ resultados1.htm; and *Cifras oficiales de población resultantes de la revisión del Padrón municipal a 1 de enero. Población por comunidades y ciudades autónomas y tamaño de los municipios.* https://www.ine.es/ jaxiT3/Tabla.htm?t=2915.

⁴⁴ General Secretariat for Demographic Challenge. *El reto demográfico y la despoblación en cifras*. Department for Ecological Transition and Demographic Challenge, 2020. https://www.lamoncloa.gob.es/ presidente/actividades/Documents/2020/280220-despoblacion-encifras.pdf.

⁴⁵ Ayala García, Alba, and Antonio Abellán García. "La España rural se vacía." Envejecimiento en red, http://envejecimientoenred.es/laespana-rural-se-vacia/.

⁴⁶ Fundación BBVA and Ivie. *Despoblación de las provincias españolas*. Fundación BBVA, Esenciales n.º 37, 2019. https://www.fbbva.es/wpcontent/uploads/2019/07/FBBVA_Esenciales_37_Despoblacion.pdf.

⁴⁷ Economic and Social Council. "El medio rural y su vertebración social y territorial." *Colección informes*, n.º1. Madrid: Economic and Social Council, 2018. http://www.ces.es/documents/10180/5182488/ Inf0118.pdf/6d616668-0cb8-f58c-075b-2251f05dad9f.

⁴⁸INE. *Estadística del Padrón Continuo. Datos de municipios por tramos.* https://www.ine.es/dynt3/inebase/es/index.htm?type=pcaxis&file=pca xis&path=%2Ft20%2Fe245%2Fp05%2F%2Fa2019.

⁴⁹ It should be recalled that Spain is one of the EU countries with the lowest fertility rate. For further details, refer to: Eurostat. *Total Fertility Rate, 1960- 2018 (live births per woman) [demo_frate].* https:// ec.europa.eu/eurostat/data/database.

⁵⁰ Pinilla, Vicente, and Luis Antonio Sáez. "La despoblación rural en España: génesis de un problema y políticas innovadoras." *Informes CEDDAR* 2, 2017. http://sspa-network.eu/wp-content/uploads/Informe-CEDDAR-def-logo.pdf.

⁵¹INE. Estadística del Padrón Continuo. Datos de municipios por tramos. https://www.ine.es/dynt3/inebase/index.htm?type=pcaxis&path=/t20/ e245/p04/provi&file=pcaxis&dh=0&capsel=0.

⁵² Noguera Tur, Joan, and Adrián Ferrandis Martínez. "Accesibilidad y provisión de Servicios de Interés General en las áreas rurales de la Unión Europea: un análisis a partir del Eurobarómetro." *Boletín de la Asociación de Geógrafos Españoles*, n.º 64, 2014. https://doi. org/10.21138/bage.1703.

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⁶²Nieuwenhuijsen, Mark J. "Urban and transport planning pathways to carbon neutral, liveable and healthy cities; A review of the current evidence." *Environment International*, 140, 2020. https://doi. org/10.1016/j.envint.2020.105661.

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⁶⁵ In order to understand the evolution of the concept of *urban sprawl* the measures that approximate it and the debate on its positive and negative effects, see, among others: Frenkel, Amnon, and Maya Ashkenazi. "Measuring Urban Sprawl: How can we deal with it?" *Environment and Planning B: Urban Analytics and City Science* 35, 2008. https://doi.org/10.1068/b32155; and Harvey, Robert O., and W. A. V. Clark. "The Nature and Economics of Urban Sprawl." *Land Economics* 41, n. ° 1, 1965. https://www.jstor.org/stable/3144884.

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⁶⁸ Medium-sized cities and their areas of influence experienced the highest relative growth, well above that observed in large cities. In this regard, see: Bellet, Carme and Eduardo Olazábal "Las ciudades intermedias en España: dinámicas y procesos de urbanización recientes". In: Maturana, Francisco, *et al.* (eds.). *Sistemas urbanos y ciudades medias en Iberoamérica.* Santiago de Chile: GEOlibros, 2017. 146-85; and Vázquez Varela, Carmen, and José María Martínez Navarro. "Capítulo III. Ciudades medias de interior y desarrollo territorial: entre la vertebración de nuevas estructuras urbano-territoriales y el despoblamiento de sus entornos provinciales." In: In: Cebrián Abellán, Francisco (coord.). *Dinámicas de urbanización en ciudades medias interiores: ¿hacia un urbanismo más urbano?* Valencia: Tirant Humanidades, 2020. 95-146.

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⁷⁰ Non-residential uses (industrial, office, logistics and commercial) increased from 27% of the artificial surface of the territory to 42% in the period 1987-2011. On this question, see: Olazabal Salgado, Eduardo, and Carme Bellet Sanfeliu. "Procesos de urbanización y artificialización del suelo en las aglomeraciones urbanas españolas (1987-2011)." *Cuadernos geográficos de la Universidad de Granada* 57.2, 2018. http://dx.doi.org/10.30827/cuadgeo.v57i2.5920.

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⁷⁴14.6% of the total number of dwellings in our residential stock are for second homes and 13.6% are vacant, according to the INE's 2011 figures. 48% of these second homes are located in inland regions or in the north of Spain. In this regard, see: INE. *Censo de Población y Viviendas 2011*. https://www.ine.es/censos2011_datos/cen11_datos_ resultados.htm#.

⁷⁵ This percentage is extracted by dividing the number of nonmainstream homes by the total number of dwellings, in 2019. While it is true that a proportion of secondary homes in some areas of Spain are owned by foreigners, Spain's housing per capita ratio is one of the highest in the OECD, only behind Portugal and Bulgaria. In this regard, see: OECD. *Affordable Housing Database. Housing market. Housing stock and construction.* http://www.oecd.org/housing/data/affordablehousing-database/; and Department of Transport, Mobility and Urban Agenda. *Estimated housing stock Viviendas principales y no principales por comunidades autónomas y provincias.* https://www.mitma.gob.es/ el-ministerio/informacion-estadistica/vivienda-y-actuaciones-urbanas/ estadisticas/estimacion-del-parque-de-viviendas.

⁷⁶ In this regard, see: Agrawal, David R., Dirk Foremny, and Clara Martínez-Toledano. "Paraísos Fiscales, Wealth Taxation, and Mobility." SSRN, 2020. http://dx.doi.org/10.2139/ssrn.3676031; López Laborda, Julio and Fernando Rodrigo Sauco. "Movilidad de los contribuyentes de rentas altas en respuesta a las diferencias regionales en los impuestos personales." *FEDEA, Studies on the Spanish Economy*. 2017. https://ideas.repec.org/p/fda/fdaeee/eee2017-28.html; Martínez Sánchez, César. "El principio de solidaridad interterritorial: desafíos actuales". In Vega Borrego, Félix A., Juan Arrieta Martínez de Pisón, and Juan Zorzona Pérez. *La distribución del poder financiero en España: Homenaje al profesor Juan Ramallo Massanet*. Madrid: Marcial Pons, 2014. 93-113; and Pérez, Francisco, and Ernest Reig (dirs.). *Madrid: capitalidad, economía del conocimiento y competencia fiscal*. Valencia: Generalitat Valenciana, 2020. https://www.ivie.es/es_ES/ptproyecto/ ivielab-madrid-capitalidad-economia-del-conocimiento-competencia-
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⁷⁷ Another factor that was decisive in this increase in urbanisation was the change in land regulation and a strong increase in its artificialisation. In this regard, see: Department of Transport, Mobility and Urban Agenda. *Agenda Urbana Española*. *Diagnóstico y Síntesis Territorial*. Madrid, 2019. https://www.aue.gob.es/recursos_aue/02_00doc._diagnostico.pdf; and Olazabal Salgado, Eduardo, and Carme Bellet Sanfeliu. "Procesos de urbanización y artificialización del suelo en las aglomeraciones urbanas españolas (1987-2011)." *Cuadernos geográficos de la Universidad de Granada* 57.2, 2018. http://dx.doi. org/10.30827/cuadgeo.v57i2.5920.

⁷⁸ Legislative plurality (Spain has 19 different legislators, with their respective legal frameworks for urban planning and development) would have limited the creation of synergies in the distribution of infrastructures and resources, thus affecting the distribution of the population in the territory. In this regard, see: Santiago Rodríguez, Eduardo, and Isabel González García. "El estado del planeamiento urbanístico municipal en España: análisis de los instrumentos vigentes y de los municipios sin planeamiento." *Cuadernos de Investigación Urbanística, n.º 127,* 2019. https://dialnet.unirioja.es/servlet/articulo?codigo=7349960; and Department of Development. *Estrategia Española de Sostenibilidad Urbana y Local (EESUL).* Madrid, Department of Development, 2011. http://www.fomento.gob.es/NR/rdonlyres/1668CD1E-0B11-4C9E-84E2-E664DD3464C1/111503/EESULWEB2011.pdf.

⁷⁹Department of Transport, Mobility and Urban Agenda. *Agenda Urbana Española. Diagnóstico y Síntesis Territorial.* Madrid, 2019. https://www. aue.gob.es/recursos_aue/02_00-doc._diagnostico.pdf.

⁸⁰ Municipalities without a General Plan (18.5% of Spanish municipalities do not have their own urban planning and another 15% only have an Urban Land Delimitation Project (PDSU)) are concentrated in unpopulated Spain. For further details, refer to: Santiago Rodríguez, Eduardo, and Isabel González García. "El estado del planeamiento urbanístico municipal en España: análisis de los instrumentos vigentes y de los municipios sin planeamiento." *Cuadernos de Investigación Urbanística, n.º 127*, 2019. https://dialnet.unirioja.es/servlet/ articulo?codigo=7349960.

⁸¹Department of Transport, Mobility and Urban Agenda. *Agenda Urbana Española. Diagnóstico y Síntesis Territorial.* Madrid, 2019. https://www. aue.gob.es/recursos_aue/02_00-doc._diagnostico.pdf.

⁸² These figures were higher in 2007, when they accounted for 80.6% and 48.6%, respectively. For further details, see: Eurostat. *European Union Statistics on Income and Living Conditions. Distribution of population by tenure status, type of household and income group-- EU-SILC survey [ILC_LVH002].* https://ec.europa.eu/eurostat/data/database.

⁸³ Blanco, Roberto (coord.). "El mercado de la vivienda en España entre 2014 y 2019." *Documentos Ocasionales Banco de España n.º 2013*, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Fich/do2013.pdf.

⁸⁴ Over-indebtedness is defined as spending more than 40% of household income on mortgage payments. See: Eurostat. *Glossary: Housing cost overburden rate*. https://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Housing_cost_overburden_rate.

⁸⁵ Eurostat. European Union Statistics on Income and Living Conditions.

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⁸⁶ Blanco, Roberto (coord.). "El mercado de la vivienda en España entre 2014 y 2019." *Documentos Ocasionales Banco de España n.º 2013*, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Fich/do2013.pdf.

⁸⁷ The percentage of loans granted with a LTV (loan-to-dwelling value ratio) of more than 80% was above 15% before the 2008 crisis, and has fallen to 9% in 2019. In this regard, see: Banco de España. *Indicadores del mercado de la vivienda*. Madrid, 2020. https://www.bde.es/webbde/es/estadis/infoest/si_1_5.pdf.

⁸⁸ At the national level, average annual house price growth in Spain, in the period from 2014 to 2019, was around 5% nominal. The autonomous communities with the highest increases were the Community of Madrid and Catalonia, with 8.4% and 7.1%, respectively. See: INE. *Índice de Precios de Vivienda*, 2014-2019. https://www.ine.es/prensa/ipv_prensa. htm.

⁸⁹ Blanco, Roberto (coord.). "El mercado de la vivienda en España entre 2014 y 2019." *Documentos Ocasionales Banco de España n.º 2013*, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Fich/do2013.pdf.

⁹⁰ In fact, a recent study for our country shows the importance of having a savings buffer when deciding between buying and renting a house. While approximately 50% of renters in Spain have a sufficient level of income to buy a home, only 13% of them also have the necessary savings to do so. For further details, refer to: Montoriol-Garriga, Judit. "¿Comprar o alquilar? Una cuestión de ingresos, pero sobre todo de capacidad de ahorro." *Caixabank Research*, 2020. https://www. caixabankresearch.com/es/analisis-sectorial/inmobiliario/comprar-oalquilar-cuestion-ingresos-sobre-todo-capacidad-ahorro.

⁹¹ The same process has also occurred in other European cities in recent years. See: European Commission. *Report on the quality of life in European cities*. Luxembourg: Publications Office of the European Union, 2020. https://ec.europa.eu/regional_policy/sources/docgener/work/qol2020/qol_presentation.pdf.

⁹²Reduced-price dwellings are those dwellings whose price is voluntarily set by the owner below the market rental price. This figure includes the figure considered as "transfer". The EU-27 figure is a simple average of the EU-27 countries. See: Eurostat. European Union Statistics on Income and Living Conditions. *Distribution of population by tenure status, type of household and income group-- EU-SILC survey [ilc_ lvho02]*. https://ec.europa.eu/eurostat/data/database.

⁹³ International Monetary Fund. *Spain selected issues. IMF Country Report No. 20/299.* Washington: IMF, 2020. https://www.imf.org/en/Publications/CR/Issues/2020/11/12/Spain-Selected-Issues-49884.

⁹⁴Department of Transport, Mobility and Urban Agenda. *Sistema Estatal de Índices de precios de Alquiler de Vivienda*. Mitma, 2019. https://www.mitma.gob.es/recursos_mfom/comodin/recursos/2020-07-01_sintesis-resultado_indice-alquiler.pdf.

⁹⁵ It includes all housing subject to some type of public protection (social housing and public housing, among others) and different tenure regimes. However, the figure offered by the Observatorio de Vivienda y Suelo refers to publicly owned housing, destined for social renting or limited renting, using terminology similar to that used in the context of the European Union. In this regard, see: Department of Transport, Mobility and Urban Agenda. *Observatorio de Vivienda y Suelo. Boletín especial Vivienda Social 2020*. Madrid, 2020. https://apps.fomento.gob. es/CVP/detallepublicacion.aspx?idpub=BAW072.

⁹⁶ Similarly, Spain's public spending on housing accounts for barely 0.2% of total social spending, while the EU average is 2.6%. See: Bosch, Jordi, and Carme Trilla. "Sistema de vivienda y estado del bienestar. El caso español en el marco europeo." *Observatorio Social de la Caixa*, 2019. https://observatoriosociallacaixa.org/-/sistema-de-vivienda-y-estado-del-bienestar-el-caso-espanol-en-el-marco-europeo; Department of Transport, Mobility and Urban Agenda. *Observatorio de Vivienda y Suelo. Boletín especial Vivienda Social 2020.* Madrid, 2020. https://apps.fomento.gob.es/CVP/detallepublicacion.aspx?idpub=BAW072.

⁹⁷ Percentage of population living in households where expenditure on housing represents at least 40% of total household disposable income. According to Eurostat, reduced or free rent would include: rent from social housing; reduced rent from an employer; rent set by law; and accommodation provided free of charge (the latter does not involve the payment of rent as it is part of employment remuneration or provided by a private source, among other options). Data for the EU-27 and EU-8 are simple averages of the individual countries. For further details, refer to: Eurostat. *European Union Statistics on Income and Living Conditions*. *Housing cost overburden rate by tenure status. EU-SILC survey [ilc_ lvho07c]*. https://ec.europa.eu/eurostat/data/database; Eurostat. *Methodological guidelines and description of EU-SILC target variables*. 2017. https://ec.europa.eu/eurostat/documents/1012329/8658951/ Household+data+-+housing.pdf/6c5216f2-b40b-49d6-a0aa-9c2c4bb32348.

⁹⁸The delay in the age of leaving the nest would be mainly determined by economic and employment-related issues and job insecurity. However, factors such as the lengthening of the formative stage or others of a cultural nature may also be playing a key role. For further details, refer to: Ballesteros, Juan Carlos, and Anna Sanmartín. "Emancipación en tiempos de crisis." *Revista de Estudios de Juventud*, n.º 116, 2017. http://www.injuve.es/sites/default/files/2018/06/publicaciones/ revista116_documentos10.pdf.

⁹⁹ Both weighted and simple average of the EU-27 See: Eurostat. European Union Statistics on Income and Living Conditions. Share of young adults aged 18-34 living with their parents by age and sex -EU-SILC survey [ilc_lvps08]. https://ec.europa.eu/eurostat/data/database.

¹⁰⁰ The first data in the series for Spain is 2004. See: *Ibid.*

¹⁰¹Gentile, Alessandro. "Emancipación juvenil en tiempos de crisis: Un diagnóstico para impulsar la inserción laboral y la transición residencial." *Fundación Alternativas*, 2013. https://www.fundacionalternativas.org/public/storage/estudios_documentos_archivos/1770908f64699996 1c5b8bf208fdbbb0.pdf.

¹⁰² Persons whose income is below 60% of the equivalent annual median income of the country.

¹⁰³ In the case of the Spanish population as a whole, the percentages of overcrowding and severe housing deprivation are reduced to 6% and 2%, respectively. Refer to: Eurostat. *European Union Statistics on Income and Living Conditions. Overcrowding rate by age, sex and poverty* status-EU-SILC survey [tessi172]. https://ec.europa.eu/eurostat/data/ database; Eurostat. European Union Statistics on Income and Living Conditions. Severe housing deprivation rate by age, sex and poverty status- EU-SILC survey [lc_mdho06a]. https://ec.europa.eu/eurostat/ data/database.

¹⁰⁴ Ubrich, Thomas. *Cuando la casa nos enferma: la vivienda como cuestión de salud pública.* Madrid: Provivienda, 2018. https://www.provivienda.org/wp-content/uploads/INFORME-CUANDO-LA-CASA-NOS-ENFERMA-1.pdf.

¹⁰⁵The European Observatory on Fuel Poverty identifies as proofs of fuel poverty the inability to maintain an adequate temperature in the home, late payment of bills, excessively low energy expenditure or expenditure on energy supplies that is disproportionate to the level of income. For further details, see: Department for Ecological Transition and Demographic Challenge *Actualización de indicadores de la Estrategia Nacional contra la Pobreza Energética*. Madrid, 2020. https://www. miteco.gob.es/es/prensa/20201106_actualizaciondeindicadores2020_ final__tcm30-516466.pdf.

¹⁰⁶ Fuel poverty particularly affects female-headed single-parent households and households of people over 65 years of age, also more markedly among women. In this regard, see: Tirado Herrero, Sergio, *et al. Pobreza energética en España. Hacia un sistema de indicadores y una estrategia de actuación estatales*. Madrid: Asociación de Ciencias Ambientales, 2018. https://niunhogarsinenergia.org/panel/uploads/ documentos/informe%20pobreza%20energ%C3%A9tica%202018. pdf.

¹⁰⁷ Data for 2019. Percentage of households whose energy expenditure over income is more than twice the national median. In 2015, the latest year for which a European comparison is available, the proportion of households suffering from energy bill overburdening was slightly lower in Spain (14.1%) than in the EU-27 (16.2%) and the EU-8 (18%). For further details, see: Department for Ecological Transition and Demographic Challenge *Actualización de indicadores de la Estrategia Nacional contra la Pobreza Energética*. Madrid, 2020. https://www. miteco.gob.es/es/prensa/20201106_actualizaciondeindicadores2020_ final__tcm30-516466.pdf; and EU Energy Poverty Observatory. *High share of energy expenditure in income (2M)*. https://www.energypoverty. eu/indicator?primaryId=1460&type=bar&from=2015&to=2015&count ries=EU,AT,BE,BG,CH,CY,CZ,DE,DK,EE,EL,ES,FI,FR,HU,HR,IE,IS,TT,LT,LU ,LV,MT,NL,NO,PL,PT,RO,RS,SE,SI,SK,UK&disaggregation=none.

¹⁰⁸ Data for 2019. Data for the EU-27 and EU-8 are simple averages of the individual countries. In this regard, refer to: Eurostat. *Inability to keep home adequately warm - EU-SILC survey [ILC_MDES01]*. https:// ec.europa.eu/eurostat/data/database.

¹⁰⁹ These architectural barriers to accessibility mean that 100,000 people can never leave their homes due to mobility problems. For further details see: INE. *Censo de Población y Viviendas 2011*. https:// www.ine.es/censos2011_datos/cen11_datos_resultados.htm#; Fundación Mutua de Propietarios. *Nuevo estudio sobre La accesibilidad de la nueva vivienda en España*. Fundación Mutua de Propietarios, 2020. https://www.fundacionmdp.org/notice/nuevo-estudio-sobrela-accesibilidad-de-la-nueva-vivenda-en-espana/; and Nasarre-Aznar, Sergio, and Héctor Simón-Moreno. "Housing not for all: The lack of universal accessibility to housing in multi-unit buildings in Spain,

Sweden and Germany." *Journal of Property, Planning and Environmental Law* 12, 2019. https://doi.org/10.1108/JPPEL-05-2019-0028.

¹¹⁰ The solution will require rethinking the current technical and regulatory impediments (minimum building requirements for the installation of lifts, those relating to heritage protection or other urban planning and technical feasibility limitations). In this regard, see: Lebrusán, Irene. *La vivienda en la vejez. Problemas y estrategias para envejecer en sociedad*. Madrid: Politeya: estudios de política y sociedad, Consejo Superior de Investigaciones Científicas, 2019.

¹¹¹Department of Transport, Mobility and Urban Agenda. *Agenda Urbana Española*. Madrid, 2019. www.aue.gob.es; and Monzón, Andrés, *et al.* "Observatorio de la Movilidad Metropolitana. Informe OMM-2017." *Centro de Investigación del Transporte Universidad Politécnica de Madrid*, 2019. http://www.observatoriomovilidad.es/images/stories/05_ informes/Informe_OMM2017_web.pdf.

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¹¹³ Instituto por la Diversificación y Ahorro de la Energía. *La Movilidad al Trabajo: Un Reto Pendiente.* Dirección General de Tráfico, Instituto para la Diversificación y Ahorro de Energía, 2019. https://www.idae.es/ sites/default/files/la_movilidad_al_trabajo_un_reto_pendiente_dgt_ idae_junio_2019.pdf.

¹¹⁴ Almost all municipalities with over 50,000 inhabitants have a public and non-motorised mobility plan. See: Department of Transport, Mobility and Urban Agenda. *Agenda Urbana Española*. Madrid, 2019. www.aue.gob.es.

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¹¹⁶ Ecologistas en Acción. *La calidad del aire en el Estado español durante 2019*. 2020. https://www.ecologistasenaccion.org/wp-content/uploads/2019/06/informe-calidad-aire-2018.pdf.

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¹¹⁹ Eurostat. *People at risk of poverty or social exclusion by degree of urbanization [ilc_peps13]*. https://ec.europa.eu/eurostat/data/database.

¹²⁰ The EU-27 is calculated as the simple average of its individual countries. See: Eurostat. *People at risk of poverty or social exclusion by age and sex [ilc_peps13]*. https://ec.europa.eu/eurostat/data/database.

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¹²⁵ Leal, Jesús. "Segregación social y mercados de vivienda en las grandes ciudades." *Revista Española de Sociología*, n.º 2, 2008. https://recyt.fecyt.es/index.php/res/article/view/64866.

¹²⁶ Gentrification involves the replacement of the users of a neighbourhood by those of a higher socio-economic status. It is often accompanied by heavy investment in housing and the environment. For further details, refer to: Clark, Erik. "The order and simplicity of gentrification: a political challenge." *Lund University Publications*, 2015. https://lup.lub.lu.se/search/publication/620935.

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¹²⁸ Fresnillo, Iolanda. "La Transformación del Comercio de Proximidad en los Barrios." *UAB: Gentrificació i Dret a la ciutat*, 2018. https://ddd. uab.cat/pub/prmb/prmb_a2018m6n60/prmb_a2018m6n60p27iSPA. pdf.

¹²⁹Social segregation in urban areas tends to be greater where inequality is also greater. To the extent that inequality constrains a country's longterm economic growth, reducing urban segregation is a key factor in improving future economic and social development. Refer to: Musterd, Sako, *et al.* "Socioeconomic segregation in European capital cities. Increasing separation between poor and rich." *Urban Geography* 38, n. ° 7, 2017. https://doi.org/10.1080/02723638.2016.1228371; and OECD. In it together: Why less inequality benefits all. Paris: OECD Publishing, 2015. https://doi.org/10.1787/9789264235120-en.

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¹³⁸ On this question, see, among others: Afán de Ribera Ibarra, Miguel." Análisis teórico. Consecuencias ambientales de la despoblación rural II." CONAMA, 2006. https://www.agegeografia.es/site/wp-content/uploads/2017/10/Consecuenciasambientales-de-la-despoblaci%C3%B3n-rural-Ponencia-de-Miguel-Af%C3%A1n.pdf; Greenpeace Spain. *Proteger el medio rural es protegernos del fuego*. Greenpeace, 2020. https://storage. googleapis.com/gpes-static/protege-el-bosque/PROTEGE-EL-BOSQUE-v5.pdf; and WWF. *Fuego a las puertas: Cómo los incendios afectan cada vez más a la población en España*. Madrid: WWF/ Adena, 2017. http://awsassets.wwf.es/downloads/Fuego_a_las_ puertas_20171.pdf?_ga=2.227547101.1154487364.1534832701-308208004.1534832701.

¹³⁹ Fundación BBVA and Ivie. "Despoblación de las provincias españolas". *Esenciales n.º* 37, 2019. https://www.fbbva.es/wp-content/uploads/2019/07/FBBVA_Esenciales_37_Despoblacion.pdf.

¹⁴⁰ In this regard, see: Llull Peñalba, Josué. "Evolución del concepto y de la significación social del patrimonio cultural." Arte, Individuo y Sociedad 17, 2005. https://revistas.ucm.es/index.php/ARIS/article/ view/ARIS0505110177A; Moreno Arriba, Jesús. "Despoblación rural y tradiciones populares: los ramos cantados en Valdebecedas (Ávila, España)." Opción 31. 2015. https://www.redalyc.org/ pdf/310/31043005027.pdf; and UNESCO. Convention for the safeguarding of the intangible cultural heritage. Paris, 2003. https:// unesdoc.unesco.org/ark:/48223/pf0000132540.

¹⁴¹On this question, see, among others: Marí-Dell'Olmo, Marc *et al.* "Socioeconomic Inequalities in COVID-19 in a European Urban Area: Two Waves, Two Patterns". *International Journal of Environmental Research and Public Health* 18, 2021. https://doi.org/10.3390/ ijerph18031256; and Ruiz Azarola, Ainhoa, *et al.* "Repercusiones del coronavirus en poblaciones en situación de vulnerabilidad social: personas migrantes y minorías étnicas." *Escuela Andaluza de Salud Pública*, 2020. https://www.easp.es/web/coronavirusysaludpublica/ repercusiones-del-coronavirus-en-poblaciones-en-situacion-devulnerabilidad-social-personas-migrantes-y-minorias-etnicas/.

¹⁴² UN Habitat. Cities and Pandemics: Towards a More Just, Green and Healthy Future. Kenia: United Nations Human Settlements Programme, 2021. https://unhabitat.org/sites/default/files/2021/03/cities_and_ pandemics-towards_a_more_just_green_and_healthy_future_unhabitat_2021.pdf.

¹⁴³ Subdirección General de Aire Limpio y Sostenibilidad Industrial. Informe de indicadores de calidad del aire durante el estado de alarma debido al COVID-19. Madrid: Department for Ecological Transition and Demographic Challenge, 2020. https://www.miteco.gob.es/es/ calidad-y-evaluacion-ambiental/temas/atmosfera-y-calidad-del-aire/ indicadores_covid_tcm30-510603.pdf.

¹⁴⁴ In this chapter, the INE's demographic projections are considered as they provide a provincial level breakdown and forecasts for the evolution of the number of households (see methodological note). Si bien los datos pronosticados de población total para el rango de años entre 2021 y 2050 difiere de la ofrecida por Eurostat en su escenario base, la población proyectada para 2050 y el ritmo de crecimiento respecto a 2021 son relativamente similares. For further details, see: INE. *Proyecciones de población de España. Serie 2020 - 2070*. https:// www.ine.es/dynt3/inebase/index.htm?padre=6671&capsel=6672. ¹⁴⁵ In 2035, the over-65s will account for 26.5% of the population compared to the loss in other age groups: the under-15s will be 1.5 million fewer than in 2020 (a 20.5% loss), and there will be 2.7 million fewer people (almost 20%) aged 30-49 by the same period. For further details see: INE. *Proyecciones de población de España. Serie 2020 - 2070.* https://www.ine.es/dynt3/inebase/index. htm?padre=6671&capsel=6672.

¹⁴⁶ INE. *Proyecciones de población de España. Serie 2020 - 2070*.https:// www.ine.es/dynt3/inebase/index.htm?padre=6671&capsel=6672.

¹⁴⁷ Latest year for which projections disaggregated by Autonomous Community are available.

¹⁴⁸ The largest relative losses will be in Asturias (-10.0%), Castille and León (-10.0%) and Extremadura (-8.3%). Respecto a la pérdida total de población del país, Castilla y León y Galicia acumularán el 31,5% y el 23,5%, respectivamente. For further details, see: INE. *Proyecciones de población de España. Serie 2020 - 2035*. https://www.ine.es/dynt3/ inebase/index.htm?padre=6671&capsel=6672.

¹⁴⁹ Among the communities that will register a positive balance, the Community of Madrid and Catalonia will account for more than 60% of total population growth until 2035. For further details, see: INE. *Proyecciones de población de España. Serie 2020 - 2035.* https://www. ine.es/dynt3/inebase/index.htm?padre=6671&capsel=6672.

¹⁵⁰ The Canary Islands, the Balearic Islands, Catalonia and the Community of Madrid will have a higher migration balance abroad (projections per thousand inhabitants) than the rest of the communities, and the Balearic Islands will register the highest inter-Autonomous Community migration balance. For further details, see: INE. *Nota de prensa: Proyecciones de Población 2020-2070*, 2020. https://www. ine.es/prensa/pp_2020_2070.pdf.

¹⁵¹INE. Proyecciones de población de España. Serie 2020 - 2035. https:// www.ine.es/dynt3/inebase/index.htm?padre=6671&capsel=6672.

¹⁵² Comisionado del Gobierno frente al Reto Demográfico. *Diagnóstico estrategia nacional frente al reto demográfico. Eje despoblación.* Department of Territorial Policy and Public Function, 2020. https:// www.mptfp.gob.es/dam/es/portal/reto_demografico/Indicadores_ cartografia/Diagnostico_Despoblacion.pdf.pdf.

¹⁵³ United Nations. World Urbanization Prospects 2018. Percentage of population in urban and rural areas. https://population.un.org/wup/Country-Profiles/.

¹⁵⁴ The EU-27 is calculated as the simple average of its individual countries. In this regard: United Nations. *World Urbanization Prospects* 2018. Percentage of population in urban and rural areas. https:// population.un.org/wup/Country-Profiles/.

¹⁵⁵ The municipality of Madrid, with nearly 7 million inhabitants, could potentially absorb nearby cities such as Guadalajara or Toledo.

¹⁵⁶ Vandecasteele Ine, *et al. The Future of Cities – Opportunities, challenges and the way forward.* Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/jrc/en/publication/eurscientific-and-technical-research-reports/future-cities.

¹⁵⁷ These processes will also be influenced by a continuity in the relocation of companies to municipalities with sufficient land available and lower prices. For further details, refer to: United Nations. *Urban* Agglomerations, 1950-2035. WUP2018-F15-Percentage_Urban_in_ Cities. https://population.un.org/wup/Download/.

¹⁵⁸ On this question, see, among others: Ganau, Joan, and Joan Vilagrasa. "Ciudades medias en España: posición en la red urbana y procesos urbanos recientes." *Colección Mediterráneo Económico:* "*Ciudades, Arquitectura y Espacio Urbano*", n.º 3, 2020. https:// www.publicacionescajamar.es/publicacionescajamar/public/ pdf/publicaciones-periodicas/mediterraneo-economico/3/3-20. pdf; y Pasciaroni, Carolina. "Ciudades medias: Aproximación Metodológica, Funcionalidades y Estructura Productiva." Revista de Ciencias Económicas, 30, 2012. https://dialnet.unirioja.es/servlet/ articulo?codigo=4040664.

¹⁵⁹ United Nations. World Urbanization Prospects 2018. Percentage of population in urban and rural areas. Annual Urban Population at Mid-Year by Region, Subregion, Country and Area, 1950-2050 (thousands); and Annual Rural Population at Mid-Year by Region, Subregion, Country and Area, 1950-2050 (thousands). https://population.un.org/wup/ Country-Profiles/.

¹⁶⁰ Their classification as rural could even change if they exceed 10,000 inhabitants, the threshold above which it would be considered an urban nucleus.

¹⁶¹ In this respect, there could be a differentiated behaviour among the 23 provinces that make up depopulated Spain, according to the current trends verified by Bandrés and Azón: a group of provinces characterised by depopulation, ageing above the national average and a rate of economic growth below the country's average ("Depopulated Spain that is decreasing": Ávila, Cuenca, León, Zamora, Salamanca, Lugo, Ourense, Segovia, Palencia, Soria and Teruel); a second group made up of provinces with a younger demographic pyramid, with considerable importance of agriculture and reduced industrial weight, high unemployment rates and per capita income well below the Spanish average ("Depopulated Spain that is stagnating": Albacete, Ciudad Real, Badajoz, Cáceres, Córdoba and Jaén); and a final group of provinces with a high share of industry, low unemployment rates and acceptable economic growth, thanks to the presence of dynamic capitals that have a positive influence on the demographic recovery of the surrounding area ("Depopulated Spain that is going up again": Guadalajara, Burgos, Huesca, La Rioja, Valladolid y Zaragoza). In this regard, see: Bandrés, Eduardo, and Azón, Vanessa. La despoblación de la España interior. Madrid: Funcas, 2020. https://www.funcas.es/publicaciones/ documentos-de-trabajo-y-notas-tecnicas/; and Collantes, Fernando, and Vicente Pinilla. ¿Lugares que no importan? La despoblación de la España rural desde 1900 hasta el presente. Zaragoza: Sociedad Española de Historia Agraria, 2019. https://puz.unizar.es/2156-lugaresque-no-importan-la-despoblacion-de-la-espana-rural-desde-1900hasta-el-presente.html.

¹⁶² The existence of permanent rain-fed crops in areas with difficult topography helps to prevent erosion, maintain the landscape and biodiversity. It is therefore necessary to maintain these crops and promote conservation agriculture in order to prevent fires and the loss of vegetation cover, as well as the degradation of landscapes and the destruction of agricultural environments. For further details, refer to: Afán de Ribera Ibarra, Miguel. "Análisis teórico. Consecuencias ambientales de la despoblación rural II." CONAMA, 2006. https://www. age-geografia.es/site/wp-content/uploads/2017/10/Consecuenciasambientales-de-la-despoblaci%C3%B3n-rural-Ponencia-de-Miguel-

Af%C3%A1n.pdf.

¹⁶³ On this question, see, among others: Beard, John., and Charles Petitot. "Ageing and Urbanization: Can cities be designed to foster Active Ageing?" *Public Health Reviews 32*, n.º 2, 2010. https://doi.org/10.1007/ BF03391610; WHO. *La Red Mundial de Ciudades y Comunidades Adaptadas a las Personas Mayores: Revisar el último decenio y mirar con optimismo hacia el siguiente*. Geneva: World Health Organisation, 2018. https://apps.who.int/iris/bitstream/handle/10665/278981/WHO-FWC-ALC-18.4-spa.pdf?ua=1; and Vandecasteele Ine, *et al. The Future of Cities – Opportunities, challenges and the way forward*. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa. eu/jrc/en/publication/eur-scientific-and-technical-research-reports/ future-cities.

¹⁶⁴ Olazabal, Marta, and María Ruiz de Gopegui. "¿Para qué impactos climáticos se preparan las ciudades españolas?". *Ekonomiaz* n.º 97, 2020. https://dialnet.unirioja.es/servlet/articulo?codigo=7536543.

¹⁶⁵ They are estimated to be directly responsible for 21% of total greenhouse gas emissions and for almost 70% when the production of all the goods and services they produce is incorporated. For further details, refer to: Deloitte Monitor. *Ciudades energéticamente sostenibles: la transición energética urbana a 2030*. Deloitte, 2019. https://perspectivas.deloitte.com/hubfs/Deloitte/Campaigns/ Descarbonizaci%C3%B3n/Descarbonizacion-2019/Deloitte-ESciudades-energeticamente-sostenibles.pdf?hsCtaTracking=1ea0cfbe-140c-4eaf-932c-5bd030c89f82%7C3af97a08-eed1-4758-af17-155e9c47304a.

¹⁶⁶ On this question, see, among others: PWC Spain. *Bots, Machine Learning, Servicios Cognitivos. Realidad y perspectivas de la Inteligencia Artificial en España.* PWC Publications, 2018. https://www.pwc.es/es/publicaciones/tecnologia/assets/pwc-ia-en-espana-2018.pdf; and Vandecasteele Ine, *et al. The Future of Cities – Opportunities, challenges and the way forward.* Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/future-cities.

¹⁶⁷ Innovation districts have an innovation intensity of 30% or higher, geographically concentrated in urban areas, and produce 3.5 times more innovation per employee and 20 times more wealth per capita than the national average, further demonstrating the capacity of these actions to attract talent and generate stable, quality employment. The most successful worldwide such as Kendall Square, the Microsoft Software Cluster in Redmond, North Carolina Research Triangle Park, or the Pittsburgh Innovation District have reached 70-90% innovation intensity. On this question, see, among others: Burke, Jeremy, and Ramón Gras. Atlas of Innovation Districts. ARETIAN Urban Analytics and Design, 2019. https://www.aretian.com/atlas; Burke, Jeremy, and Ramón Gras. "Hacia una nueva ciencia para entender y diseñar mejor las ciudades." MIT Technology Review, 2019. https://www.technologyreview. es/s/11355/hacia-una-nueva-ciencia-para-entender-y-disenar-mejorlas-ciudades; and Florida, Richard. "Maps Reveal Where the Creative Class Is Growing." Bloomberg CityLab, 2019. https://www.bloomberg. com/news/articles/2019-04-18/small-city-tech-hubs-gain-on-siliconvalley. In Spain, the experience of Barcelona, with the creation of 22@ in Poblenou, is worth mentioning. As Burke and Gras (2019) point out, between 2004 and 2019, the neighbourhood grew from 36,000 employees to 90,000, 60% of whom worked in knowledge-intensive activities. On this question, see: Burke, Jeremy, and Ramón Gras.

Innovation districts and industrial clusters in the Barcelona metropolitan region. ARETIAN Urban Analytics and Design, 2019. https://pemb.cat/public/docs/102_iw_barcelona_metropolitan_region__final_report.pdf.

¹⁶⁸ This has already happened in the US. . Strengthening synergies among companies, universities and related research centres will be key to the success of these districts. See: Florida, Richard. "Maps Reveal Where the Creative Class Is Growing." *Bloomberg CityLab*, 2019. https:// www.bloomberg.com/news/articles/2019-04-18/small-city-tech-hubsgain-on-silicon-valley.

¹⁶⁹ As the European Commission points out, a smart city is a place where traditional networks and services are made more efficient through the use of digital and telecommunications technologies for the benefit of its inhabitants and businesses. For further details, refer to: European Commission. "Smart Cities." https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en.

¹⁷⁰ Mashariki, Amen Ra, and Nicolas Diaz. *The Analytics Playbook for Cities. A Navigational Tool for Understanding Data Analytics in Local Government, Confronting Trade-Offs, and Implementing Effectively.* Ash Center for Democratic Governance and Innovation, 2020. https://datasmart.ash.harvard.edu/news/article/analytics-playbook-cities-0.

¹⁷¹On this question, see, among others: McKinsey Global Institute. *Smart cities: digital solutions for a more livable future*. McKinsey&Company, 2018. https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/smart-cities-digital-solutions-for-a-more-livable-future; and World Economic Forum. *Industrial Internet of Things Unleashing the Potential of Connected Products and Services*, 2015. http://reports.weforum.org/industrial-internet-of-things/.

¹⁷² This could lead, among other things, to the emergence of new administrative entities, broader and more functional than the current municipal demarcations, defined by productive activity or ecological processes, such as functional urban areas or bio-regions. On this question, see, among others: Alonso Morán, Nerea. "Planificar la biorregión, hacia un modelo enraizado en el territorio." In Prats, Fernando, Yayo Herrero, and Alicia Torrego (coords.). La gran encrucijada: sobre la crisis ecosocial y el cambio de ciclo histórico. Madrid: Libros en Acción, 2017. 257-265. https://www.fuhem.es/Landing_LaGranEncrucijada/ lan_LaGranEncrucijada.html; Eurostat. "Functional urban area." Eurostat. Statistics Explained, https://ec.europa.eu/eurostat/statisticsexplained/index.php/Glossary:Functional urban area; and Monnet, Jérôme. "La urbanización contemporánea: los desafíos de un mundo fluido y difuso." Papeles de relaciones ecosociales y cambio global, 106, 2009. https://www.fuhem.es/papeles_articulo/la-urbanizacioncontemporanea-los-desafios-de-un-mundo-fluido-y-difuso/.

¹⁷³ This has implications for the availability of public space, urban health and quality of life. For further details see: Nieuwenhuijsen, Mark J., and Haneen Khreis. "Car free cities: Pathway to healthy urban living." *Environment International*, 94, 2016. https://doi.org/10.1016/j. envint.2016.05.032.

¹⁷⁴ Hudomiet, Péter, *et al.* "How can we spot future areas of gentrification?" *World Economic Forum*. https://www.weforum.org/agenda/2019/02/gentrification-and-businesses/.

¹⁷⁵ Mansilla López, José A. "Vecinos en peligro de extinción. Turismo urbano, movimientos sociales y exclusión socioespacial en Barcelona." *Revista de Turismo y Patrimonio Cultural*, 2018. https://doi.org/10.25145/j.pasos.2018.16.020.

¹⁷⁶ En el periodo 2013-2019, la formación neta de hogares fue de alrededor de 68.000 al año. For further details, refer to: INE. *Encuesta continua de hogares. Series desde 2013.* https://www.ine.es/dyngs/ INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736176952 &menu=resultados&idp=1254735572981#!tabs-1254736195199; and INE. *Proyección de hogares. Serie 2020 -2035.* https://www.ine. es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736 176954&menu=ultiDatos&idp=1254735572981.

¹⁷⁷ The average size is projected to be 2.41 in 2035 compared to 2.51 in 2020 For further details, refer to: INE. *Proyección de hogares. Serie 2020-2035.* https://www.ine.es/jaxi/Tabla.htm?path=/t20/p276/2020-2035/l0/&file=01001.px&L=0.

¹⁷⁸ Ibid.

¹⁷⁹ Ibid.

¹⁸⁰ Ibid.

¹⁸¹ Whereas in 2008, 54% of households whose reference person was a young person aged 16-29 lived in a home they owned, in 2017 almost 49% lived in rented accommodation. For further details, refer to: Muñoz Fernández, Guzmán Antonio. "¿Por qué los jóvenes no pueden acceder a una vivienda en propiedad?" *Observatorio Social de La Caixa*, 2019. https://observatoriosociallacaixa.org/-/por-que-los-jovenes-nopueden-acceder-a-una-vivienda-en-propiedad.

¹⁸² This form of tenure has been implemented in Catalonia, which establishes the same rights and obligations as an owner, but for a limited period of time. For further details, refer to: Official State Gazette. *Ley 19/2015, de 29 de julio, de incorporación de la propiedad temporal y de la propiedad compartida al libro quinto del Código civil de Cataluña*. Madrid, 2015. https://www.boe.es/diario_boe/txt. php?id=BOE-A-2015-9678.

¹⁸³ Joint ownership confers on one of the two owners, called the material owner, a share of the ownership, possession, use and exclusive enjoyment of the property (e.g. he lives in it, he can rent it out) and the right to acquire, gradually, the remaining share from the other owner, called a formal owner. An example would be the English *sharedownership*. It has also been applied in Catalonia. For further details, refer to: Government of the United Kingdom. "Shared Ownership." Government of the United Kingdom. https://www.helptobuy.gov.uk/ shared-ownership/; and *Ley 5/2006, de 10 de mayo, del libro quinto del Código Civil de Cataluña, relativo a los derechos reales*. Madrid, 2006. https://www.boe.es/buscar/act.php?id=BOE-A-2006-11130.

¹⁸⁴ It is important to note that the actual number of public and social housing units currently existing in Spain is unknown. 1.5 million is an estimate of the number of social housing units needed in our country, according to some studies. For further details, see: OECD. *Social housing: A key part of past and future housing policy. Employment, Labour and Social Affairs Policy Briefs.* Paris: OECD publishing, 2020. http://oe.cd/social-housing-2020; and Trilla, Carme, and Jordi Bosch. *El parque público y protegido de viviendas en España: Un análisis desde el contexto europeo.* Madrid: Fundación Alternativas, 2018. https://www.fundacionalternativas.org/laboratorio/documentos/ documentos-de-trabajo/el-parque-publico-y-protegido-de-viviendasen-espana-un-analisis-desde-el-contexto-europeo.

¹⁸⁵ Nasarre Aznar, Sergio. *Los Años de la Crisis de la Vivienda*. Tirant lo Blanc, 2020. https://editorial.tirant.com/es/libro/los-anos-de-la-crisisde-la-vivienda-sergio-nasarre-aznar-9788413364827.

¹⁸⁶ On this question, see, among others: Johansson, Christer, *et al.* "Impacts on air pollution and health by changing commuting from car to bicycle." *Science of the total environment* 584, 2017. https:// doi.org/10.1016/j.scitotenv.2017.01.145; Department of Transport, Mobility and Urban Agenda. *Agenda Urbana Española*. 2019. www.aue. gob.es; OECD. *Rethinking Urban Sprawl: Moving Towards Sustainable Cities. Policy highlights.* Paris: OECD Publishing, 2018. https://www. oecd.org/environment/tools-evaluation/Policy-Highlights-Rethinking-Urban-Sprawl.pdf; and Office for National Statistics. *Commuting and personal wellbeing.* United Kingdom, 2014. http://www.ons.gov.uk/ons/ dcp171766_351954.pdf.

¹⁸⁷ Liu, Jenny H., and Wei Shi. "Understanding Economic and Business Impacts of Street Improvements for Bicycle and Pedestrian Mobility – A Multicity Multiapproach Exploration." *Transportation Research and Education Center (TREC)* 2020. https://ppms.trec.pdx.edu/media/ project_files/1031-1161_Project_Brief_-_Economic_Impacts_of_ Bike_Ped_Street_Improvements_K9JeQSd.pdf.

¹⁸⁸ Mueller, Natalie, *et al.* "Changing the urban design of cities for health: The Superblock model." *Environment International*, 134, 2019. https:// doi.org/10.1016/j.envint.2019.105132.

¹⁸⁹ In line with the "Safe, Sustainable and Connected Mobility Strategy 2030". See: Department of Transport, Mobility and Urban Agenda.
"Estrategia de movilidad." Department of Transport, Mobility and Urban Agenda, 2020 https://esmovilidad.mitma.es/ejes-estrategicos.

¹⁹⁰ Alonso Raposo, Maria, and Biagio Ciuffo. *The future of road transport - Implications of automated, connected, low-carbon and shared mobility. Executive summary*. Luxembourg: Publications Office of the European Union, 2019. https://publications.jrc.ec.europa.eu/repository/bitstream/JRC116644/fort_exec-summary_online.pdf.

¹⁹¹The so-called sharing economy, with "shared mobility" in particular represented, will grow from USD 15 billion in 2015 to USD 335 billion in 2025, at a global level. To be effective, mobility planning and transport demand management will be necessary to prevent carpooling from resulting in lower occupancy trips and a shift away from public transport. For further details, refer to: Beltrán, Albert. *Plataformas de economía colaborativa: una mirada global.* The Ostela School of Tourism & Hospitality, 2018. http://www.aept.org/archivos/documentos/ostelea_ informe_economia_colaborativa.pdf.

¹⁹² In European cities such as Copenhagen, Helsinki or Vienna, more than 40% of journeys are already made on foot or by bike For further details, refer to: Vandecasteele Ine, *et al.* "The Future of Cities – Opportunities, challenges and the way forward." Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/jrc/en/publication/eurscientific-and-technical-research-reports/future-cities.

¹⁹³ A recent example of intelligent transport systems is the *Smart Bus*pilot project in Madrid. For further details, see: López de Benito, Javier. "Madrid estrena Smart Bus Madrid, el nuevo servicio de bus a demanda." Movilidad Eléctrica, https://movilidadelectrica.com/smart-bus-madrid-bus-a-demanda/.

¹⁹⁴World Economic Forum. *The future of the last-mile ecosystem*. World Economic Forum, 2020. http://www3.weforum.org/docs/WEF_Future_of_the_last_mile_ecosystem.pdf.

¹⁹⁵ According to the 2011 Population and Housing Census (INE), more than 55% of primary dwellings were built before 1980. 0% of the total residential stock was built before the 1940s. For further details, refer to: INE. *Censo de Población y Viviendas 2011. Tablas predefinidas. Viviendas según tipo y año de tenencia.* https://www.ine. es/censos2011_datos/cen11_datos_resultados.htm.

¹⁹⁶ By the end of 2018, around 3.6 million buildings had an energy certificate. Of these, the majority were classified with the least efficient categories. For further details, refer to: Instituto para la Diversificación y Ahorro de la Energía. *Estado de la Certificación Energética de los Edificio*. Department for Ecological Transition, 2018. https://energia.gob.es/ desarrollo/EficienciaEnergetica/CertificacionEnergetica/Documentos/ Documentos%20informativos/informe-seguimiento-certificacionenergetica.pdf.

¹⁹⁷ Average of the years between 2015 and 2019. For further details, refer to: Department of Transport, Mobility and Urban Agenda. *Número de visados en reforma o restauración de edificios*. Datos anuales de 2015 a 2019. https://www.fomento.gob.es/BE/?nivel=2&orden=09000000.

¹⁹⁸ For further details on methodology, comparability and data, see: Zebra2020. *Data Tool. Energy efficiency trends in buildings*. https:// zebra-monitoring.enerdata.net/overall-building-activities/share-ofnew-dwellings-in-residential-stock.html#equivalent-major-renovationrate.html.

¹⁹⁹ Almost 60% of Spanish dwellings (some 13.8 million, of which 9.8 million are primary and another 4 million are secondary and vacant) were built before the first Spanish regulations requiring minimum energy efficiency standards. The volume of dwellings over 50 years old will reach 6.7 million in the decade 2020-2030; almost 8.4 million in 2030-2040; 10.4 million in 2040-2050 and 12.4 million between 2050 and 2060. For further details, see: Department of Transport, Mobility and Urban Agenda. *Long-Term Strategy for energy renovations in the building sector in Spain*. Madrid, 2020. https://ec.europa.eu/energy/sites/ener/files/documents/es_ltrs_2020.pdf.

²⁰⁰ Department for Ecological Transition and Demographic Challenge Integrated National Energy and Climate Plan (PNIEC) 2021-2030. Madrid, 2020. https://www.miteco.gob.es/images/es/pnieccompleto_ tcm30-508410.pdf.

²⁰¹ This is relevant, as energy efficiency measures have sometimes been to the detriment of proper ventilation, resulting in poor indoor air quality. On this question, see: Kephalopoulos, S., *et al. Promoting healthy and energy efficient buildings in the European Union: National implementation of related requirements of the Energy Performance Buildings Directive (2010/31/EU).* Luxembourg: Publications Office of the European Union, 2017. https://doi:10.2760/73595.

²⁰²The installed capacity of photovoltaic self-consumption in our country has increased from 22MW in 2014 to 460MW in 2019. For further details, refer to: Unión Española Fotovoltaica. *El Sector Fotovoltaico. Hacia una nueva era. Informe Anual 2020.* 2020. https://unef.es/ informacion-sectorial/informe-anual-unef/.

²⁰³ Department for Ecological Transition and Demographic Challenge

Estrategia de almacenamiento energético. Madrid, 2021. https:// www.miteco.gob.es/es/prensa/estrategiadealmacenamientoenergeti co_tcm30-522655.pdf.

²⁰⁴ Department for Ecological Transition and Demographic Challenge Integrated National Energy and Climate Plan (PNIEC) 2021-2030. Madrid, 2020. https://www.miteco.gob.es/images/es/pnieccompleto_ tcm30-508410.pdf.

²⁰⁵Our cities have fewer km2 of green space than many European cities. In this regard, see: Fuller, Richard A, and Kevin J Gaston. "The scaling of green space coverage in European cities." *Biology letters* 5, n.º 3, 2009. https://doi:10.1098/rsbl.2009.0010.

²⁰⁶ These infrastructures improve the insulation and efficiency of buildings, contribute to the improvement of air quality, reduce noise and lower the ambient temperature. On this question, see, among others: Briz Escribano, Julian, Manfred Köhler, and Isabel de Felipe. *Multifunctional urban green infrastructure*. Salzweg, Germany: Waging and Pronatur, 2019; Olivieiri, Francesca, Lorenzo Olivieiri and Javier Neila. "Experimental study of the thermal-energy performance of an insulated vegetal façade under summer conditions in a continental Mediterranean climate." *Building and Environment* 77, 2014. https://doi.org/10.1016/j. buildenv.2014.03.019.

²⁰⁷ There are currently more than 15,000 urban gardens in Spain, spread over 300 municipalities. In this regard, see: Urbano, Beatriz. "Huertos urbanos, la despensa sostenible de las ciudades." *The Conversation*, 2019. https://theconversation.com/huertos-urbanos-la-despensasostenible-de-las-ciudades-126371.

²⁰⁸ It refers to the methods used to cultivate plantsusing mineral solutions or aerial environments instead of soil. See: Vandecasteele, Ine, *et al.* (eds.). *The Future of Cities – Opportunities, challenges and the way forward.* Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/future-cities.

²⁰⁹ Rising temperatures and heat waves will have a greater impact on cities due to the urban heat island effect. The concentration of heatemitting elements (air conditioning and vehicles, among others) and the presence of materials such as concrete or asphalt mean that urban centres are hotter than the surrounding areas, especially at night. For further details, refer to: Revi, Aromar, and David Satterthwaite (coords.). "Urban areas." In: Field, Christopher B., *et al.* (eds.). *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge and Nueva York: Cambridge University Press, 2014. https:// www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap8_FINAL. pdf.

²¹⁰ The potential discrimination suffered by the population of migrant origin in access to housing, especially rental housing, has an impact on the perpetuation of unequal residential conditions, with access to poorer quality housing in urban parks and their concentration in neighbourhoods with high levels of vulnerability. On residential discrimination, see: Asociación Provivienda. ¿Se alquila? Racismo y xenofobia en el mercado del alquiler. 2020. https://www.provivienda. org/wp-content/uploads/Se-alquila.-Racismo-y-xenofobia-en-elmercado-del-alquiler.pdf. ²¹² According to the WHO, the term digital health includes telemedicine (remote medical services supported by technology, from simple phone calls with health professionals to complex surgical operations with remotely controlled robots), telecare (the use of technology to treat patients remotely not only from a medical but also from a socio-health point of view, with a preventive and follow-up perspective), electronic health management (*eHealth*) or via mobile phones (*mHealth*), the advanced use of computer science for the management of massive volumes of health data (*Big Data*), the application of genomics, the application of robotics through internet connectivity between devices (IoT) and the application of artificial intelligence (AI) in medicine. On this question, see: Bigorra, Joan, and Laura Sampietro. "Salud digital: una oportunidad y un imperativo ético." *Revista DIECISIETE* n.º 4. 2021. Madrid. https://doi.org/10.36852/2695-4427_2021_04.13.

²¹³ Pinilla, Vicente, and Luis - Antonio Sáez. "Searching for a Depopulation Dividend in the 21st Century: Perspectives from Japan, Spain and New Zealand." *Journal of the Japanese Institute of Landscape Architecture* 83, 2019. https://www.jila-zouen.org/wp-content/uploads/2019/05/ Matanle-Saez-Perez-EN.pdf.

²¹⁴ The European Commission has proposed the strategy "A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives", with the Goal of at least doubling the annual rate of energy renovation of both residential and non-residential buildings by 2030. As a result, 35 million buildings in the EU could be renovated over the next decade, creating up to 160,000 associated jobs. From 2030 to 2050, the aim is to further strengthen energy rehabilitation. In Spain, we have a longterm strategy for energy rehabilitation in the building sector in Spain, which provides a strategic vision and targets for 2030, 2040 and 2050. A boost from European recovery funds can also be key. Component 2 of the "Recovery, Transformation and Resilience Plan" project, named the "Housing Rehabilitation and Urban Regeneration Plan", which amounts to 6 billion euros, focuses on energy-efficient housing rehabilitation. For further details, refer to: European Commission. A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives. Brussels: European Commission, 2020. https://static.construible.es/ media/2020/10/20201014-estrategia-europea-renovation-wave.pdf; Government of Spain. Recovery, Transformation and Resilience Plan. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf; and Department of Transport, Mobility and Urban Agenda. Long-Term Strategy for energy renovations in the building sector in Spain. Madrid, 2020. https://ec.europa.eu/energy/ sites/ener/files/documents/es_ltrs_2020.pdf.

²¹⁵ Spain still takes over 50% of waste to landfill, compared to 0% in countries such as Switzerland. For further details, refer to: European Environment Agency. *Municipal waste landfill rates in Europe by country 2017*. 2019. https://www.eea.europa.eu/data-and-maps/indicators/ diversion-from-landfill/assessment; and Department for Ecological Transition and Demographic Challenge. *Memoria anual de generación y gestión de residuos. Residuos de competencia municipal 2018*. Madrid, 2018. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/ publicaciones/memoriaresiduosmunicipales2018_tcm30-521965.pdf.

²¹⁶ European Commission. *Proposal for a directive of the European Parliament and of the Council amending Directive 1999/31/EC on* the landfill of waste. Brussels, 2015. https://eur-lex.europa.eu/legalcontent/EN/TXT/?gid=1452152827375&uri=CELEX:52015PC0594.

²¹⁷ For further details, see: Comité Europeo de las Regiones. *Dictamen: Multilevel governance and cross-sectoral cooperation to fight energy poverty*. Brussels: European Commission, 2019. https://cor.europa.eu/ ES/our-work/Pages/OpinionTimeline.aspx?opId=CDR-5877-2018.

²¹⁸ It is defined as the percentage of population living in households where expenditure on housing represents at least 40% of total household disposable income. Data for the EU-27 and EU-8 are simple averages of the individual countries. Refer to: Eurostat. *European Union Statistics on Income and Living Conditions. Housing cost overburden rate by tenure status - EU-SILC survey [ilc_lvho07c]*. https://ec.europa. eu/eurostat/data/database.

²¹⁹ Today, several European countries such as Ireland, Finland, Slovenia or Estonia have similar levels. Assuming a halving of the proportion of the population experiencing rent overburden, recent values of overburden in the case of home ownership and a progressive change in tenure status (greater importance of renting as opposed to owning), the aggregate overburden target of 4.5% of the population for 2050 is feasible.. Today, several European countries such as Ireland, Finland, Slovenia or Estonia have similar levels. Assuming a halving of the proportion of the population experiencing rent overburden, recent values of overburden in the case of home ownership and a progressive change in tenure status (greater importance of renting as opposed to owning), the aggregate overburden target of 4.5% of the population for 2050 is feasible.

²²⁰ The proportion of dwellings refurbished per year is estimated by dividing the number of building management permits for the refurbishment and/or restoration of dwellings (Building management permits of the Technical Architects' Associations. Building work in progress) (average 2015-2019), by the total number of dwellings from the estimated housing stock (average 2015-2019). See: Department of Transport, Mobility and Urban Agenda. Estimated housing stock Total de viviendas por comunidades autónomas y provincias. https:// apps.fomento.gob.es/BoletinOnline2/?nivel=2&orden=33000000; and Department of Transport, Mobility and Urban Agenda. Building management permits Obra nueva, ampliación y/o reforma de viviendas. Número de viviendas a reformar y/o restaurar. https://www.fomento. gob.es/BE/?nivel=2&orden=09000000. The proportion of dwellings refurbished per year is estimated by dividing the number of building management permits for the refurbishment and/or restoration of dwellings (Building management permits of the Technical Architects' Associations. Building work in progress) (average 2015-2019), by the total number of dwellings from the estimated housing stock (average 2015-2019). See: Department of Transport, Mobility and Urban Agenda. Estimated housing stock Total de viviendas por comunidades autónomas y provincias. https://apps.fomento.gob. es/BoletinOnline2/?nivel=2&orden=33000000; and Department of Transport, Mobility and Urban Agenda. Building management permits Obra nueva, ampliación y/o reforma de viviendas. Número de viviendas a reformar y/o restaurar. https://www.fomento.gob.es/ BE/?nivel=2&orden=09000000.

²²¹The percentage of municipal waste sent to landfill has been calculated from the annual per capita kilograms of municipal waste sent to landfill and the annual per capita kilograms of municipal waste generated. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. *Municipal waste by waste management operations [ENV_WASMUN]*. Disposal - landfill and other (D1-D7, D12), Kilograms per capita. Waste generated, kilograms per capita. https://ec.europa.eu/eurostat/data/database.

²²² Target for 2035 according to the European Parliament and the Council of the European Union. See: European Parliament and the Council of the European Union. Directiva (UE) 2018/850 del Parlamento Europeo y del Consejo de 30 de mayo de 2018 por la que se modifica la Directiva 1999/31/CE relativa al vertido de residuos. Brussels, 2018. https:// eur-lex.europa.eu/legal-content/es/TXT/?uri=CELEX%3A32018L0850

²²³ Percentage of population exposed to an annual average concentration of particulate matter (PM2.5) above 10 micrograms per cubic metre (WHO recommended limit). The EU-27 and EU-8 are obtained as the simple average of the values of the individual countries. Data observed are from 2018. In this regard: European Environment Agency. "ECT/ ATNI reports." European Topic Centre or Air Pollution, transport, noise and industrial pollution, https://www.eionet.europa.eu/etcs/ etc-atni/products/etc-atni-reports; and WHO. Air quality guidelines for particulate matters, ozone, nitrogen dioxide and sulphur dioxide. Global update 2005. Geneve, 2005. http://www.who.int/phe/health_topics/ outdoorair/outdoorair_aqg/en/index.html

²²⁴ The Goals for years 20302050 are in line with the analyses included in the European Union's Second Clean Air Outlook , presented in 2021. See: European Commission. *Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*. The Second Clean Air Outlook. Brussels: European Commission, 2021. https://eur-lex.europa. eu/legal-content/EN/TXT/?uri=COM%3A2021%3A3%3AFIN

²²⁵ We establish this indicator to monitor fuel poverty although it is necessary to analyse the joint evolution of the four indicators established by the European Observatory on Fuel Poverty: 1) percentage of the population unable to maintain an adequate temperature at home; 2) percentage of the population in arrears with bill payments; 3) percentage of households whose energy expenditure is excessively low (hidden fuel poverty) and 4) percentage of households whose expenditure on energy supplies is disproportionate to the level of income. The EU-27 and EU-8 are obtained as the simple average of the values of the individual countries. See: Eurostat. Inability to keep home adequately warm - EU-SILC survey [ILC_MDES01]. Https://ec.europa.eu/ eurostat/data/database; and Department for Ecological Transition and Demographic Challenge Actualización de indicadores de la Estrategia Nacional contra la Pobreza Energética. Madrid, 2020. https://www. miteco.gob.es/es/prensa/20201106_actualizaciondeindicadores2020_ final__tcm30-516466.pdf

²²⁶ In line with the National Fuel Poverty Strategy, which aims to reduce to at least 6% the percentage of the population unable to keep their homes at an adequate temperature for 2025. For further details, see: Department for Ecological Transition and Demographic Challenge. *National Fuel Poverty Strategy* 2019-2024. Madrid, 2019. https://www. miteco.gob.es/es/prensa/estrategianacionalcontralapobrezaenergeti ca2019-2024_tcm30-496282.pdf

²²⁷ In line with the European Committee of the Regions proposal.For further details, see: Comité Europeo de las Regiones. Dictamen:

Multilevel governance and cross-sectoral cooperation to fight energy poverty. Brussels: European Commission, 2019. https://cor.europa.eu/ ES/our-work/Pages/OpinionTimeline.aspx?opId=CDR-5877-2018

²²⁸ Urban Agenda. Agenda Urbana Española. Mitma, 2019. www.aue. gob.es.

²²⁹ In this sense, there are already interesting initiatives in our country, both from the public sphere (e.g. the "Madrid Emprende" programme of the Madrid City Council) and from the private sphere (e.g. the social enterprise "El Hueco" in Soria). See: Ayuntamiento de Madrid - Madrid Emprende. "¿Qué son los viveros de empresas?" Madrid Emprende web portal. https://www.madridemprende.es/es/apoyo-integral-alemprendimiento/que-son-los-viveros-de-empresas; and El Hueco. https://www.elhueco.org/

²³⁰ Ley 45/2007, de 13 de diciembre, para el desarrollo sostenible del medio rural, https://www.boe.es/buscar/act. php?id=BOE-A-2007-21493

²³¹ Department of Agriculture, Fisheries and Food.. "Red Rural Nacional. LEADER." Department of Agriculture, Fisheries and Food, http://www. redruralnacional.es/leader1

²³² Department of Economic Affairs and Digital Transformation. *España Digital* 2025. 2020. https://www.mineco.gob.es/stfls/mineco/prensa/ ficheros/noticias/2018/Agenda_Digital_2025.pdf

²³³ Comisionado del Gobierno frente al Reto Demográfico. Diagnóstico estrategia nacional frente al reto demográfico. Eje despoblación. Department of Territorial Policy and Public Function, 2020. https:// www.mptfp.gob.es/dam/es/portal/reto_demografico/Indicadores_ cartografia/Diagnostico_Despoblacion.pdf.pdf

²³⁴ In 2016, through the "Cork Declaration 2.0. A Better Life for Rural Areas", this Europe-wide mechanism was proposed to ensure that rural communities are heard and their well-being is taken into account, both in the design of policies and budgets and in their implementation. Countries such as the UK have been successfully applying this mechanism for more than a decade, and in Northern Ireland they have a (Rural Needs Act). See: Government of the United Kingdom. A Guide to the Rural Needs Act (Northern Ireland) 2016 for Public Authorities (Revised). 2018. https://www.daera-ni.gov.uk/sites/default/ files/publications/daera/17.18.249%20Guide%20to%20Rural%20 Needs%20Act%20NI%20final%20v2.PDF; and Pinilla, Vicente, and Luis Sáez. "What do public policies teach us about rural depopulation: the case study of Spain." European Countryside 13, 2021; and European Union. Declaración de Cork 2.0. "Una vida mejor en el medio rural". Luxembourg: Publications Office of the European Union, 2016. https:// enrd.ec.europa.eu/sites/enrd/files/cork-declaration_es.pdf

²³⁵ ECPA Urban Planning. "Case Study: The Boston Waterfront Innovation District." Smart Cities Dive. https://www.smartcitiesdive. com/ex/sustainablecitiescollective/case-study-boston-waterfrontinnovation-district/27649/

²³⁶ Zegas, Sam. "Kendall Square, MA: How to analyze an innovation ecosystem." *ARETIAN Urban Analytics and Design*. https://www.aretian. com/post/how-to-analyze-an-innovation-ecosystem-kendall-squarema?lang=es

²³⁷ In this respect, priority could be given to the acquisition of auctioned homes resulting from foreclosures by the public administration. This

could also help to decrease socio-spatial segregation by increasing social mix. The draft of the "Recovery, Transformation and Resilience Plan" dedicates in its component 2 "Housing Rehabilitation and Urban Regeneration Plan" around 1 billion euros for social rental housing in energy efficient buildings. In this regard, see: Official State Gazette. *Decreto-Ley 1/2015 de 24 de marzo en Cataluña de medidas extraordinarias y urgentes para la movilización de las viviendas provenientes de procesos de ejecución hipotecaria*, Madrid, 2015. https://www.boe.es/buscar/doc.php?id=BOE-A-2015-6016; and Government of Spain. Recovery, Transformation and Resilience Plan. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf

²³⁸ An example of this is the Programa Alquila of the EMVS, a free municipal service that mediates between those in need of rental housing and landlords who wish to rent it. For further details, refer to: Empresa Municipal de Vivienda y Suelo. "Alquiler entre particulares." Empresa Municipal de Vivienda y Suelo, https://www.emvs.es/Alquiler/ Paginas/inicio.aspx

²³⁹ The rental park and its maintenance is managed by a non-profit organisation or a public agency. One example would be that carried out by the UK government. For further details, refer to: Government of the United Kingdom. "Housing Associations Homes." Government of the United Kingdom, https://www.gov.uk/housing-association-homes

²⁴⁰ Arnth Jensen, Ane. "Danish Mortgages explained – an Ecosystem of Transparency and Digitalisation." News European Covered Bond Council. https://hypo.org/ecbc/publication-news/danish-mortgagesexplained-ecosystem-transparency-digitalisation/

²⁴¹ Medvedev, Alexey, et al. "Waste Management as an IoT-Enabled Service in Smart Cities." In: Balandin Sergey, Sergey Andreev, and Yevgeni Koucheryavy (eds.). *Internet of Things, Smart Spaces, and Next Generation Networks and Systems*. Lecture Notes in Computer Science, 9247. 2015. 104-15. https://doi.org/10.1007/978-3-319-23126-6_10

²⁴² SENSA Networks. "5 Smart Cities That Are Leveraging IoT Technology for Efficient Waste Management." SENSA Networks. http://www. sensanetworks.com/blog/efficient-waste-management/

²⁴³ Department for Ecological Transition and Demographic Challenge. Guías de adaptación al riesgo de inundación: sistemas urbanos de drenaje sostenible. Madrid, 2019. https://www.miteco.gob.es/es/agua/ temas/gestion-de-los-riesgos-de-inundacion/guia-adaptacion-riesgoinundacion-sistemas-urbano-drenaje-sostenible_tcm30-503726.pdf

²⁴⁴ In the particular case of public buildings, the draft of the "Recovery, Transformation and Resilience Plan" dedicates in its component 2 "Housing Rehabilitation and Urban Regeneration Plan" around 1 billion euros for sustainable rehabilitation of public buildings. See: Government of Spain. Recovery, *Transformation and Resilience Plan*. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf

²⁴⁵Currently, around 10% of the solar photovoltaic energy generated in Spain comes from distributed generation systems. For further details, see: Unión Española Fotovoltaica. *El Sector Fotovoltaico. Hacia una nueva era. Informe Anual 2020.* 2020. https://unef.es/informacionsectorial/informe-anual-unef/ ²⁴⁶ Department of Transport, Mobility and Urban Agenda. Long-Term Strategy for energy renovations in the building sector in Spain. Madrid, 2020. https://ec.europa.eu/energy/sites/ener/files/documents/es_ ltrs_2020.pdf

²⁴⁷ In Spain, 8.1 million people are financially overburdened by energy costs; 5.1 million people suffer from hidden energy poverty; some 3.7 million people are cold in winter and 3.5 million people pay their bills late, with the consequent risk of having their supplies cut off. For further details, refer to: European Commission. *A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives*. Brussels: European Commission, 2020. https://static.construible.es/media/2020/10/20201014-estrategia-europea-renovation-wave.pdf; and Department for Ecological Transition and Demographic Challenge. National Fuel Poverty Strategy 2019-2024. Madrid, 2019. https://www.miteco.gob.es/es/prensa/estrategianacionalcontralapobrezaenergeti ca2019-2024_tcm30-496282.pdf.

²⁴⁸ In this line, the draft of the "National Plan for Recovery, Transformation and Resilience" dedicates, in its component 1 "Shock plan for sustainable, safe and connected mobility in urban and metropolitan environments", an amount of around 3,000 million euros. This item could help, through various incentives, to achieve this Goal. See: *Government of Spain. Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf

²⁴⁹ For further details, see: WHO "Calidad del aire y salud." World Health Organization, https://www.who.int/es/news-room/fact-sheets/detail/ ambient-(outdoor)-air-quality-and-health; and WHO. Environmental Noise Guidelines for the European Region. Copenhague: Publications World Health Organization Regional Office for Europe, 2018. https:// www.euro.who.int/__data/assets/pdf_file/0008/383921/noiseguidelines-eng.pdf

²⁵⁰ Vitoria Gasteiz City Council. *Plan de Movilidad Sostenible y Espacio Público. Plan Vigente.* https://www.vitoria-gasteiz.org/wb021/was/ contenidoAction.do?idioma=es&uid= _5e2b2877_120d224e518__7 fe7%E2%80%9D%20\t%20%E2%80%9C_blank.

²⁵¹ Madrid City Council. Proyecto MICOS. Entornos Escolares Saludables, 2016. http://madridsalud.es/wp-content/uploads/2016/04/MICOS-Regeneracion-urbana.pdf

²⁵² The creation of an Observatory of urban and territorial dynamics at a national level would facilitate research and knowledge of these realities and thus facilitate decision-making and the assessment of policies. Among the dynamics considered are those that go beyond local administrative spheres (such as mobility), as well as those that occur at the municipal level, be they social, environmental, economic or governance-related. In terms of its functioning, the methodological approach of the European Urban Agenda could be adopted, ensuring that harmonised information is available for all Spanish regions, as well as for EU member states.

²⁵³. WHO. Health as the pulse of the new urban agenda: United Nations conference on housing and sustainable urban development. 2016. https:// apps.who.int/iris/bitstream/handle/10665/250367/9789241511445-eng.pdf?sequence=1

²⁵⁴ "Global Covenant of Mayors for Climate Energy." https://www. globalcovenantofmayors.org/

²⁵⁵ "Eurocities." https://eurocities.eu/stories/home-sweet-home/

²⁵⁶ "Red de Ciudades Españolas por el Clima." http://www. redciudadesclima.es/

²⁵⁷ Emerging examples in this direction are the "Ciudades y Gobiernos Locales Unidos (CGLU)" or the "*Global Task Force of Local and Regional Governments*." For further details, see: Global Taskforce of Local and Regional Governments, https://www.global-taskforce.org/; and United Cities and Local Governments, https://www.uclg.org/es

CHALLENGE 7: ADDRESS THE SHORTCOMINGS OF OUR LABOUR MARKET AND ADAPT It to new social, economic and technological realities

¹ In 1980, 15% of the employed population in Spain worked in the agricultural sector, a proportion that today is only 4%. Meanwhile, employment in the service sector has increased by almost 30 percentage points to 80%. For further details, see: AMECO. *Employment, persons: agriculture, forestry and fishery products (National accounts) [NET1]; Employment, persons: industry excluding building and construction (National accounts) (NET2); Employment, persons: building and construction (National accounts) (NET2); and Employment, persons: services (National accounts) (NET5).* https://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm.

² The employment rate used here is the ratio of total employed population to population aged 15-64, to facilitate international comparisons and to provide historical data since 1980.

³Between 1980 and 2019, the employed population in Spain has grown by 7.9 million, of which 5.7 million were women (72%). The role of the foreign-born population in the Spanish labour market is also noteworthy. Between 1995 and 2019, the employed population of foreign origin has increased from 103,000 to 2.4 million, accounting for 32% of the net employment created during this period (7.2 million employed). For further details, see: Eurostat. *Employment by sex, age and citizenship* (1 000) [lfsa_egan]. https://ec.europa.eu/eurostat/data/database; and INE. *Encuesta de población activa. Ocupados por sexo y grupo de edad. Valores absolutos y porcentajes respecto del total de cada sexo.* https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_ C&cid=1254736176918&menu=resultados&idp=1254735976595# !tabs-1254736195129.

⁴The employment rate for women has risen from 28% in 1980 to 57% in 2019, while the male employment rate has fallen from 72% to 68% over the same period. For further details, see: OECD. *Historical population and Annual Labour Force Statistics summary tables*. https://stats.oecd. org/.

⁵ The EU-8 is constructed as the weighted average of the values of the individual countries, with working age population being the reference for the calculation of weights. The EU-28 is constructed from the aggregates reported by the OECD. For further details, see: OECD. *Historical population y Annual Labour Force Statistics summary tables.* https://stats.oecd.org/.

⁶ OECD. *Historical population and Annual Labour Force Statistics summary tables.* https://stats.oecd.org/.

⁷ In the private sector, the percentage of women on Boards of Directors has increased from 3% in 2003 to 26% today (EU-27: 28%). The percentage of female executives has increased to 16% of the total (EU-27: 18%). In the public sector, the percentage of women in Parliament has risen from 30% of the total in 2003 to over 40% in 2019, a much higher proportion than in the EU-27. For further details, see: Eurostat. *Positions held by women in senior management positions (source: EIGE) [sdg_05_60]; y Seats held by women in national parliaments and governments (source: EIGE) [sdg_05_50].* https://ec.europa.eu/eurostat/data/database.

⁸ Eurostat. Employed persons discriminated at work during the last 12

months by sex and age (source: Eurofound) [qoe_ewcs_1c3]. https://ec.europa.eu/eurostat/data/database.

⁹ The gender pay gap is defined as the difference between men's and women's average gross hourly earnings as a percentage of men's average gross hourly earnings. The indicator has been defined as "unadjusted" (by the socio-economic characteristics of the working population) because it provides an overall picture of gender pay inequality and measures a broader concept than "equal pay for equal work". Note that if the gap in gross annual wages is analysed, the figure for Spain in 2017 is 22% (compared to 12% for the hourly wage gap), which is mainly explained by the higher incidence of part-time work among women. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Gender pay gap in unadjusted form* [sdg_05_20]. https://ec.europa.eu/eurostat/data/database; and INE. Salario anual medio, mediano y modal. Salario por hora. Brecha salarial de género (no ajustada) en salarios por hora. https://www.ine.es/ss/ Satellite?L=es ES&c=INESeccion C&cid=125992 5408327&p=1254 735110672&pagename =ProductosYServicios%2FPYSLayout.

¹⁰ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Positions held by women in senior management positions (source: EIGE) [sdg_05_60]*. https://ec.europa.eu/eurostat/data/database.

¹¹ In this respect, the approval of the Workers' Statute in 1980 is noteworthy. For further details, see: Official State Gazette. *Ley 8/1980, de 10 de diciembre, del Impuesto sobre Sociedades*. Madrid, 1980. https://www.boe.es/eli/es/l/1980/03/10/8/dof/spa/pdf.

¹² In 1961, the first national unemployment insurance law was passed and remained in force until 1980. Esta ley arrancó con una cobertura del 75% del salario y una duración de la prestación por desempleo de seis meses. For further details, see: Official State Gazette. *Ley 62/1961, de 22 de julio, por la que se implanta el Seguro Nacional de Desempleo. Art. 8.* Madrid, 1961. https://www.boe.es/boe/dias/1961/07/24/pdfs/ A11006-11009.pdf.

¹³ In this respect, it is worth highlighting the reform of the Workers' Statute in 1994, which definitively repealed the labour ordinances of the pre-constitutional regime, promoted collective bargaining by allowing working conditions previously regulated by law to be subject to negotiation, introduced the obligation to include opt-out conditions in agreements at a higher level than the company, and added those based on economic reasons to the objective causes of fair dismissal. For further details, see: Ortega Masagué, Ana Carolina, and Juan Francisco Jimeno Serrano. "Veinticinco años de mercado de trabajo en España." *Economía Industrial*, n.º 349-350. 2003. https://www.mincotur.gob. es/Publicaciones/Publicacionesperiodicas/EconomiaIndustrial/

¹⁴ In this regard, Spain's commitment to the International Labour Organisation (ILO) should be highlighted. Spain is, together with Finland and Sweden, one of the EU-27 countries that has ratified the most ILO instruments. For further details, see: European Commission. Analysis – in the light of the European Union acquis – of the ILO up to date Conventions. Luxembourg: Publications Office of the European Union, 2013. https://op.europa.eu/en/publication-detail/-/publication/ ac9e4e2a-f158-4607-8149-9f11e66633b5.

¹⁵ It has risen from 1,751 in 1990 to 721 in 2019. For further details, see: Department of Labour and Social Economy. *Condiciones de trabajo y relaciones laborales. Accidentes de trabajo.* http://www.mites.gob.es/estadisticas/eat/welcome.htm.

¹⁶ En 2017, un 26% de la población ocupada española tenía un trabajo con una demanda física moderada o alta, frente al 42% de la UE-8 y el 41% de la UE-27. For further details, see: Eurostat. *Persons performing physical activity when working by type of activity, most frequent activity status, quantile and degree of urbanization [ilc_hch06].* https:// ec.europa.eu/eurostat/data/database.

¹⁷ Oesch, Daniel, and Giorgio Piccitto. "The polarization myth: Occupational Upgrading in Germany, Spain, Sweden and the UK, 1992-2015." *Work and Occupations*, n.º 46. 2019. https://people.unil.ch/ danieloesch/files/2019/09/Oesch_Piccitto_2019_Polarization_Myth. pdf.

¹⁸ Eurostat. Average number of usual weekly hours of work in main job, by sex, professional status, full-time/part-time and occupation (hours) [lfsa_ewhuis]. https://ec.europa.eu/eurostat/data/database.

¹⁹ In 2019, the EU-8 average was 7% and the EU-27 average was 8%. For further details, see: Eurostat. *Long working hours in main job by sex, age, professional status and occupation [lfsa_qoe_3a2].* https:// ec.europa.eu/eurostat/data/database.

²⁰ Over the last decades, maternity and paternity leave have been increased to equal 16 weeks in 2021, of which 6 weeks are mandatory for each parent. This places Spain at the EU-27 average for women, but above the European average for men. For further details, see: Official State Gazette. *Real Decreto-ley 6/2019, de 1 de marzo, de medidas urgentes para garantía de la igualdad de trato y de oportunidades entre mujeres y hombres en el empleo y la ocupación*. Madrid: 2019. https://www.boe.es/boe/dias/2019/03/07/pdfs/BOE-A-2019-3244. pdf ; and European Parliament. *Infographic: Maternity and paternity leave in the EU*. 2019. https://www.europarl.europa.eu/RegData/etudes/ ATAG/2019/635586/EPRS_ATA(2019)635586_EN.pdf.

²¹ In 1980, the real minimum wage (in 2019 dollars and adjusted for purchasing power differences) was \$5.4 per hour worked, while in 2019 it is \$8.6 per hour. For further details, see: OECD. *Real minimum wages*. https://stats.oecd.org/.

²² In 1980, the unemployment benefit was reformulated by Law 51/1980 and its maximum duration was extended to 18 months. For further details, see: Official State Gazette. *Ley 51/1980, de 8 de octubre, Básica de Empleo. Título II, Capitulo II, Art. 19 Duración de la prestación.* Madrid, 1980. https://www.boe.es/eli/es/l/1980/10/08/51.

²³ The numerator is the sum of accidents with sick leave during working hours and in *in itinere* (during the journey from home to the workplace or vice versa), and the denominator is the number of total employed persons. For further details, see: INE. *Encuesta de población activa*. *Ocupados por sexo y grupo de edad*. *Valores absolutos y porcentajes respecto del total de cada sexo*. https://www.ine.es/dyngs/INEbase/es/ operacion.htm?c=Estadistica_C&cid=1254736176918&menu=resulta dos&idp=1254735976595#!tabs-1254736195129; and Department of Work and Social Economy. *Condiciones de trabajo y relaciones laborales. Accidentes de trabajo.* http://www.mites.gob.es/estadisticas/ eat/welcome.htm.

²⁴ Data in 2019 dollars and adjusted for purchasing power differences. For further details, see: OECD. *Real minimum wages*. https://stats.oecd. org/.

²⁵ For further details on the construction of the EU-8, see the *Apunte metodológico* número I.

²⁶ For further details, see: International Labour Organization. Women and men in the informal economy: A statistical picture. Geneva, 2018. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/ documents/publication/wcms_626831.pdf; y Williams, Colin, et al. "An Evaluation of the Scale of Undeclared Work in the European Union and Its Structural Determinants: Estimates Using the Labour Input Method." European Commission, Luxembourg: Publications Office of the European Union, 2017. https://op.europa.eu/en/publication-detail/-/ publication/8c3086e9-04a7-11e8-b8f5-01aa75ed71a1.

²⁷ From the mid-1990s until the financial crisis of 2008, the Spanish economy recorded an average annual growth rate of 3.7%, 1.3 points higher than the EU-27. However, this growth was accompanied by the generation of strong imbalances, such as high external dependence (the current account deficit rose from 0.8% of GDP in 1996 to 9.6% in 2007) and high private sector indebtedness (the ratio of household and non-financial corporate debt to GDP rose from 79% in 1996 to 210% in 2007). For further details, see: Banco de España. "Deuda consolidada de las sociedades no financieras y de los hogares e ISFLSH." Banco de España, https://www.bde.es/webbde/es/estadis/infoest/temas/te_ cf.html; and Eurostat. *GDP and main components (output, expenditure and income) [nama_10_gdp]; y Current account balance - annual data [tipsbp20]. https://ec.europa.eu/eurostat/data/database.*

²⁸ The EU-8 is constructed as the weighted average of the values of the individual countries, with active population being the reference for the calculation of weights. The EU-28 is constructed from the aggregates reported by the OECD. For further details, see: OECD. *Annual Labour Force Statistics summary tables*. https://stats.oecd.org/.

²⁹ In Spain, the probability of finding a job for people experiencing longterm unemployment was 11% in 2018, while for the rest of unemployed people it was 30%. For further details, see: Eurostat. *Transition from unemployment to employment by sex, age and duration of unemployment - annual averages of quarterly transitions, estimated probabilities [lfsi_ long_e01]*. https://ec.europa.eu/eurostat/data/database.

³⁰ Gorjón, Lucía, Sara de la Rica, and Antonio Villar. "The social cost of unemployment in Spain: who are the losers?" *ISEAK Working Paper*, n.º 2019/2, 2019. https://iseak.eu/wp-content/uploads/2019/03/Thesocial-cost-of-unemployment-in-Spain-Who-are-the-losers.pdf.

³¹ For further details, see: INE. *Encuesta de población activa*. https:// www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1 254736176918&menu=ultiDatos&idp=1254735976595.

³² Inactive people who are not looking for work and whose main reason is that they do not believe that work is available accounted for 2.3 per cent of the inactive 15-74 year-olds in 2019, or 287,000 people. For further details, see: Eurostat. *Inactive population by sex, age and citizenship (1 000) [lfsa_igan]*; and *Inactive population not seeking employment by sex, age and main reason [lfsa_igar]*. https://ec.europa.eu/eurostat/data/database.

³³ The EU-8 is constructed as the simple average of the values for each of its countries and the EU-28 is constructed from the aggregates reported by the OECD. The simple average criterion has been used instead of a weighted average based on each country's active population in order to have a time series since 1987. For further details, see: OECD. Annual Labour Force Statistics summary tables. https://stats.oecd.org/.

³⁴ In 2018, 82% of young people aged 16-29 lived with their parents, compared to 52% in the EU-8 and 69% in the EU-27. For further details, see: Eurostat. *Share of young adults aged 18-34 living with their parents by age and sex - EU-SILC survey [ilc_lvps08]*. https://ec.europa.eu/eurostat/data/database.

³⁵ In 2018, the average age at which Spanish women had their first child was 31 years, compared to 29 years on average in the EU-8 and EU-27. For further details, see: Eurostat. *Fertility indicators [demo_find]*. https:// ec.europa.eu/eurostat/data/database.

³⁶ In 1975, the fertility rate in Spain was 2.8 children per woman, while in 2019 it had fallen to 1.2. For further details, see: INE. *Indicadores demográficos básicos. Indicador Coyuntural de Fecundidad según orden del nacimiento y nacionalidad (española/extranjera) de la madre.* https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C &cid=1254736177003&menu=resultados&idp=1254735573002#!ta bs-1254736195380.

³⁷ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Unemployment by sex and age – annual data [une_rt_a]*. https://ec.europa.eu/eurostat/data/database.

³⁸ By branch of activity, temporary employment is particularly high in agriculture (56% in 2019), construction (40%), recreational and other services (30%), and hotels, restaurants, trade and transport (26%). The public sector is also characterised by high temporary employment rates (27%), which have increased since 2013. For further details, see: Eurostat. *Employees by sex, age and economic activity (from 2008 onwards, NACE Rev. 2) - 1 000 [lfsa_eegan2]; and Temporary employees by sex, age and economic activity (from 2008 onwards, NACE Rev. 2) - 1 000 [lfsa_etgan2]. https://ec.europa.eu/eurostat/data/database.*

³⁹ The purpose of a temporary employment contract is to hire a worker for a specific period of time and for a very specific activity.

⁴⁰ Economic and Social Council. *La inmigración en España: efectos y oportunidades*. Madrid, 2019. http://www.ces.es/documents/10180/ 5209150/Inf0219.pdf.

⁴¹In Spain, 71% of young people have a temporary job, although the vast majority would like to have a permanent job. In the EU-8 this percentage is 47%. This fact, together with the aforementioned high unemployment rate and the high proportion of young people who neither study nor work (16% in 2018, compared to 9% in the EU-8), constitutes one of the great challenges ahead for the Spanish labour force. For further details, see: OECD. *Employment by permanency of the job*. https://stats.oecd. org/; and OCDE. Share of 18-24 year-olds population not in education

and unemployed or inactive (NEET). https://stats.oecd.org/.

⁴² An open-ended employment contract is characterised by the fact that there is no time limit for the provision of services. Puede ser a tiempo completo o a jornada parcial (de una duración inferior a la de los trabajadores a tiempo completo en situación comparable), y para la prestación de servicios de manera fija o discontinua

⁴³ The EU-8 is constructed as the simple average of the values for each of its countries and the EU-28 is constructed from the aggregates reported by the OECD. The simple average criterion has been used instead of a weighted average based on each country's active population in order to have a time series since 1987. For further details, see: OECD. *Employment by permanency of the job.* https://stats.oecd.org/.

⁴⁴ For further details, see: Eurostat. *Part-time employment as percentage* of the total employment, by sex, age and country of birth (%) [lfsa_ eppgacob]; Involuntary part-time employment as percentage of the total part-time employment, by sex and age (%) [lfsa_eppgai]; and Temporary employees as percentage of the total number of employees, by sex, age and country of birth (%) [lfsa_etpgacob]. https://ec.europa.eu/eurostat/ data/database.

⁴⁵ The rate of partiality among young people and those with a migrant background is very high [Fig. 11], suggesting that involuntary bias is also very high in these groups (no involuntary bias data are available for these groups).

⁴⁶ In 2019, the aggregate unemployment rate was 14.1%, while that of women was 16.0%. For further details, see: INE. *Encuesta de población activa. Tasas de paro por sexo y grupo de edad.* https://www.ine.es/dynt3/inebase/es/index.htm?padre=982&capsel=986.

⁴⁷ The EU-8 is constructed as the simple average of the values for the individual countries and the EU-28 is the aggregate indicator reported by the OECD. For further details, see: OECD. *Incidence of involuntary part time workers*. https://stats.oecd.org/.

⁴⁸ Comparisons of the duration of temporary contracts with the EU-8 and the EU-27 show that the increase in very short-term contracts (less than 1 month) has been a generalised trend in the rest of Europe, although the magnitude has been much higher in Spain. Moreover, in our country, the increase is also observed in contracts lasting between 1 and 3 months. For further details, see: Eurostat. *Temporary employees by sex, age and duration of the work contract* (1 000) [*lfsa_etgadc*]. https:// ec.europa.eu/eurostat/data/database. For further details for the case of Spain, see: Conde-Ruiz, J. Ignacio, *et al.* "Calendar effects in daily aggregate employment creation and destruction in Spain." *SERIEs* 10, 2019. https://doi.org/10.1007/s13209-019-0187-7; and Felgueroso, Florentino, *et al.* "Recent trends in the use of temporary contracts in Spain." *FEDEA, Estudios sobre la Economía Española*, n.º 2017/25, 2017. https://documentos.fedea.net/pubs/eee/eee2017-25.pdf .

⁴⁹ In recent years, there has been an increase in the number of permanent contracts signed that are necessary to create permanent employment that is maintained at the end of the year. For further details, see: Economic Cabinet of CCOO. *La falta de enmienda de la reforma laboral sigue precarizando la contratación indefinida*. Madrid, 2019. https://www.ccoo.es/11aacaa1507b3d2dedb16621fe6d872a000001. pdf.

⁵⁰ The broadest definition of platform workers includes those who have

earned income from providing services through online platforms, where both the transaction between provider and client and the payment are done digitally through the platform, whether the work is done digitally or physically. For example, riders, freelancers or workers doing microtasks. For further details, see: Amazon Mechanical Turk, https:// www.mturk.com/; and Urzi Brancati, Maria Cesira, Annarosa Pesole, and Enrique Fernández-Macías. "New evidence on platform workers in Europe. Results from the second COLLEEM survey." *European Commission* JRC, Luxembourg: Publications Office of the European Union, 2020. https://publications.jrc.ec.europa.eu/repository/bitstream/ JRC118570/jrc118570_jrc118570_final.pdf.

⁵¹ In 2018, Spain recorded a higher ratio of fatal and non-fatal occupational accidents per number of employees than the EU-27 average. For further details, see: Eurostat. *Fatal accidents at work by NACE Rev. 2 activity [hsw_n2_02]; and Non-fatal accidents at work by NACE Rev. 2 activity and sex [hsw_n2_01].* https://ec.europa.eu/eurostat/data/database.

⁵² This index takes into account 20 indicators from the *European Working Conditions Survey*subdivided into three sections: work intensity, autonomy and physical risk. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Piasna, Agnieszka. "`Bad jobs´ recovery? European Job Quality Index 2005-2015." *European Trade Union Institute Working Paper*, n.º 6, 2017. https://www.etui.org/sites/default/files/WP-2017.06-WEB.pdf.

⁵³ Fernández-Crehuet Santos, José María. *La conciliación de la vida profesional, familiar y personal España en el contexto europeo*. Ediciones Pirámide, 2016.

⁵⁴ Eurofound. Sexta Encuesta Europea sobre las Condiciones de Trabajo 2015. Intensidad en el trabajo. https://www.eurofound.europa.eu/es/ data/european-working-conditions-survey.

⁵⁵ Authors' own, based on microdata from the *European Skills and Jobs Survey* of CEDEFOP. For further details, see: CEDEFOP. *European Skills and Jobs Survey 2014*. https://www.cedefop.europa.eu/en/events-andprojects/projects/european-skills-and-jobs-survey-esjs/first-europeanskills-and-jobs-survey-esjs.

⁵⁶ For further details, see: European Agency for Safety and Health at Work "Los riesgos psicosociales y el estrés en el trabajo." European Agency for Safety and Health at Work, https://osha.europa.eu/es/ themes/psychosocial-risks-and-stress; Cinfa. *VII Estudio Cinfasalud: Percepción y hábitos de la población española en torno al estrés.* Madrid, 2017. http://www.infocoponline.es/pdf/ESTUDIO-ANSIEDAD. pdf; INE. *Nivel medio de estrés laboral según sexo y clase social basada en la ocupación de referencia. Media y desviación. Población de 15 y más años ocupada 2017.* https://www.ine.es/dynt3/inebase/es/index. htm?type=pcaxis&path=/t15/p419/a2017/p03/&file=pcaxis; and OECD. *Job quality. Job strain.* https://stats.oecd.org/.

⁵⁷ People do not only work for financial compensation. Work is one of the most important aspects of our daily lives and of our personal and social identity. One way to measure this non-financial component of work is through the so-called "job engagement index", which measures the extent to which a person would want to continue working if he or she did not need the money that work brings. If we look at this index, Spain appears as the country with the fourth lowest employment engagement index out of eighteen European countries, only ahead of the Czech Republic, Slovenia and Estonia. For further details, see: Van der Wel, Kjetil A., and Knut Halvorsen. "The bigger the worse? A comparative study of the welfare state and employment commitment." *Work, Employment and Society* 29, n.º 1, 2014. https://doi.org/10.1177/0950017014542499.

⁵⁸ The graph represents the proportion of people who rate their job satisfaction as medium or high. The EU-8 and EU-27 are constructed as the simple average of the values of the individual reported countries. For further details, see: Eurostat. *Percentage of the population rating their satisfaction as high, medium or low by domain, sex, age and educational attainment level [ilc_pw05]*. https://ec.europa.eu/eurostat/ data/database.

⁵⁹ The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of all EU-27 countries except Malta, Croatia, Romania, Bulgaria and Cyprus due to lack of data. For further details, see: OECD. *Job quality. Job strain.* https://stats.oecd.org/.

⁶⁰ For further details, see: Anghel, Brindusa, Sara de la Rica, and Aitor Lacuesta. "The impact of the great recession on employment polarization in Spain." *SERIEs* 5, 2014. https://doi.org/10.1007/s13209-014-0105-y; Sebastian, Raquel. "Explaining job polarisation in Spain from a task perspective." *SERIEs* 9, 2018. https://doi.org/10.1007/ s13209-018-0177-1; and Torrejón Pérez, Sergio. "Ciclo económico y empleo en España (1995-2014). La dinámica de los flujos y el cambio estructural." *Universidad Complutense de Madrid*, 2018. https://eprints. ucm.es/49465/.

⁶¹ For further details, see: Acemoglu, Daron "Technical change, inequality, and the labor market." *Journal of Economic Literature* 40, n.º 1, 2002. www.jstor.org/stable/2698593; Andrés, Javier, and Rafael Doménech. *La era de la disrupción digital*. Barcelona: Ediciones Deusto, 2020; Autor, David H., Lawrence F. Katz, and Alan B. Krueger. "Computing Inequality: Have Computers Changed the Labor Market?" *The Quarterly Journal of Economics* 113, 1998. https://doi. org/10.1162/003355398555874; Autor, David H., Frank Levy, and Richard J. Murnane. "The skill content of recent technological change: an empirical exploration." *The Quarterly Journal of Economics* 118, 2003. https://doi.org/10.1162/003355303322552801; and Goos, Maarten, Alan Manning, and Anna Salomons. "Job Polarization in Europe." *American Economic Review* 99, n.º 2, 2009. www.jstor.org/ stable/25592375.

⁶²Eurofound and Comisión Europea. *European Jobs Monitor 2019: Shifts in the employment structure at regional level*. Luxembourg: Publications Office of the European Union, 2019. https://www.eurofound.europa.eu/ sites/default/files/ef_publication/field_ef_document/ef19036en.pdf.

⁶³ High-skilled occupations include jobs classified in groups 1, 2 and 3 of the *International Standard Classification of Occupations (ISCO-88)*. Medium-skilled occupations include jobs classified in groups 4, 7 and 8; and low-skilled occupations include jobs classified in groups 5 and 9. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by the European Commission. For further details, see: European Commission. *Science, research and innovation performance of the EU 2020. A fair, green and digital Europe*. Luxembourg: Publications Office of the European Union, 2020. https://ec.europa.eu/info/sites/info/files/

srip/2020/ec_rtd_srip-2020-report.pdf.

⁶⁴ Much of the debate (academic and political) in recent years has been about trying to demonstrate the pre-eminence of one of these factors over the other. One position maintains that the dysfunctionality of our labour market can be explained *fundamentally* by the particularities of our productive system. The other one considers that this is *fundamentally* due to shortcomings in our regulatory framework. The very existence of the debate (and of valuable studies supporting both perspective) demonstrates that both factors are important and therefore both must be addressed in order to solve the problem.

⁶⁵ For further details, see: Cabrales, Antonio, Juan José Dolado, and Ricardo Mora. "Dual employment protection and (lack of) on-the-job training: PIAAC evidence for Spain and other European countries." *SERIEs* 8, 2017. https://doi.org/10.1007/s13209-017-0166-9; and Dolado, Juan José, Salvador Ortigueira, and Rodolfo Stucchi. "Does dual employment protection affect TFP? Evidence from Spanish manufacturing firms." *SERIEs* 7, 2016. https://doi.org/10.1007/ s13209-016-0150-9.

⁶⁶ Doménech, Rafael, Juan Ramón García, and Camilo Andrés Ulloa. "Hacia un mercado de trabajo más flexible y seguro." *Revista del Ministerio de Empleo y Seguridad Social*, 2018. https://www.uv.es/ rdomenec/DGU_Revista_MEYSS_134_2018.pdf.

⁶⁷ GDP per capita is expressed in 2015 euros adjusted for purchasing power differences. The EU-8 is constructed as the weighted average of the values of the individual countries, with active population being the reference for the calculation of weights. EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Active population by sex, age and citizenship (1 000) [lfsa_agan]; Employees by sex, age and educational attainment level (1 000) [lfsa_eegaed]; GDP and main components (output, expenditure and income) [nama_10_ gdp]; Population on 1 January by age and sex [demo_pjan]; Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]; Temporary employees by sex, age and educational attainment level (1 000) [lfsa_etgaed]; y Unemployment by sex and age – annual data [une_rt_a].* https://ec.europa.eu/eurostat/ data/database.

⁶⁸ Bentolila, Samuel, *et al.* "Two-tier labour markets in the great recession: France versus Spain." *The Economic Journal* 122, n.º 562, 2012. http://www.jstor.org/stable/23271737.

⁶⁹ Fraud in temporary contracts leads to unfair dismissal, the cost of which is 33 days' salary per year worked, which is the same as the cost of unfair dismissal in a permanent contract. This reduces incentives to choose open-ended over temporary contracts.

⁷⁰ This is due to the gap between employment protection for workers with permanent contracts (20 days' pay per year worked; 33 days if the dismissal is unfair) compared to temporary workers (12 days' pay per year worked for temporary contracts and contracts for work and services).

⁷¹ Specifically, it refers to the need to clarify in the law the causes of objective and collective dismissal, or dismissal for economic, technical, organisational and production reasons (which in labour law are called ETOP causes), in order to avoid an increase in legal uncertainty.

⁷² In this respect, the recent ruling of the Plenary of the Social Chamber

of the Supreme Court on the impossibility of linking the temporary contract for work or services to the existence of a contract is noteworthy. This judgement establishes the dissociation of the duration of contracts for works or services from commercial contracts between companies, unless such contracts do not represent the usual activity of the company and have sufficient autonomy and substance to justify their temporal delimitation. In practice, this means that workers who continuously carry out the same work on contracts are made permanent. For further details, see: Social Chamber of the Supreme Court. *Sentencia 1137/2020, de 29 de diciembre de 2020: imposibilidad de vincular el contrato temporal de obra o servicio a la existencia de una contrata.* Madrid, 2020. http://www.poderjudicial.es/search/openDocument/ c58363f2c4f87938.

⁷³ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The EU-27 does not include Germany due to lack of data. The EU-27 does not include Germany and Luxembourg in the variable "conversion rate from temporary to permanent employment" and Germany, Luxembourg, Malta and Romania in the variable "transition from temporary employment to unemployment" due to lack of data. For further details, see: Eurostat. *Transition from fixed term contracts to permanent contracts by sex and age - annual averages of quarterly transitions, estimated probabilities* [*lfsi_long_e05 and lfsi_long_e09*]. https://ec.europa.eu/eurostat/data/ database.

⁷⁴ OECD. Negotiating Our Way Up: Collective Bargaining in a Changing World of Work. Paris: OECD Publishing, 2019. https://doi. org/10.1787/1fd2da34-en.

⁷⁵ The fact that passive and active employment policies are not managed by the same administration may affect the incentives to design, implement and evaluate these policies, reducing their potential effectiveness.

⁷⁶ Passive policies mainly include unemployment benefits. The "other active policies" include spending by public employment services, subsidies and bonuses for job creation in the private sector, measures to improve the employability of people with disabilities and aid for unemployed people setting up new businesses. The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries. The EU-22 consists of all EU-27 countries except Malta, Croatia, Romania, Bulgaria and Cyprus due to lack of data. For further details, see: OECD. *Public expenditure and participant stocks on LMP*. https://stats.oecd.org/; and OCDE. *Coverage and classification of OECD data for public expenditure and participants in labour market programmes*. Paris: OECD Publishing, 2015. http://www.oecd.org/els/ emp/Coverage-and-classification-of-OECD-data-2015.pdf.

⁷⁷ Several studies show that hiring bonuses do not provide incentives for the creation of stable employment. In many cases, these subsidised contracts are used to fill positions that were already intended to be offered and which, when the period in which the company benefits from the subsidies ends, are terminated or converted back into temporary contracts. For further details, see: AIReF. *Estudio programa políticas activas de empleo. Evaluación del gasto público 2018*. Madrid, 2019. https://www.airef.es/wp-content/uploads/2019/06/Estudio3-PAE/protegido_Proyecto_03.pdf; Cebrián López, Inmaculada. "La contratación temporal en España y los efectos de la reforma de 1997." *Gaceta Sindical*, 2005. https://www.ccoo.es/c81d2e75c99cdea8587 15ae38932b279000001.pdf; and Toharia Cortés, Luis (dir.). *El efecto* de las bonificaciones de las cotizaciones a la Seguridad Social para el empleo en la afiliación a la Seguridad Social: un intento de evaluación macroeconómica, microeconómica e institucional. Department of Labour and Immigration, 2008. http://www.seg-social.es/wps/wcm/ connect/wss/62d7c3ea-0908-4706-8dfa-6c2607661a8f/F81_07N. pdf?MOD=AJPERES&CVID=.

⁷⁸ AIReF. Estudio programa políticas activas de empleo. Evaluación del gasto público 2018. Madrid, 2019. https://www.airef.es/wp-content/ uploads/2019/06/Estudio3-PAE/protegido_Proyecto_03.pdf.

⁷⁹ There are a series of obstacles of an administrative nature (for example, the opening of a new Personalised Insertion Itinerary) that hinder mobility between autonomous communities, due to the fact that each autonomous community organises its policies and services according to the resources available and with criteria that, on occasions, are not shared by other regions. In fact, in the first quarter of 2020, 4 out of 5 unemployed had not changed residence in the last 5 years. For further details, see: INE. *Estadística de movilidad laboral y geográfica. Parados por comunidad autónoma, sexo y según el tiempo de residencia en el municipio.* https://www.ine.es/dyngs/INEbase/operacion.htm?c=E stadística_C&cid=1254736176909&menu=resultados&secc=125473 6195112&idp=1254735976597.

⁸⁰ For further details, see: Card, David, Jochen Kluve, and Andrea Weber. "Active labour market policy evaluations: a meta-analysis." *The Economic Journal* 120, n.º 548, 2010. https://doi.org/10.1111/j.1468-0297.2010.02387.x; Card, David, Jochen Kluve, and Andrea Weber. "What works? A meta-analysis of recent active labor market program evaluations." *Journal of the European Economic Association* 16, n.º 3, 2018. https://academic.oup.com/jeea/article/16/3/894/4430618; and Dolado, Juan José, *et al.* "Youth labour market performance in Spain and its determinants: a micro-level perspective." *OECD Economics Department Working Papers*, n.º 1039, Paris: OECD Publishing, 2016. https://doi.org/10.1787/5k487n5bfz5c-en.

⁸¹The EU-8 average is constructed as the simple average of the values of the individual countries. EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Long-term unemployment by sex - annual data [une_ltu_a]*. https://ec.europa.eu/eurostat/data/ database.

⁸² For further details, see: Anghel, Brindusa, *et al.* "Income, consumption and wealth inequality in Spain." *SERIEs* 9, 2018. https://doi.org/10.1007/s13209-018-0185-1; and Ayala, Luis, *et al.* "Social needs in Spain." *Social Observatory of "La Caixa*", Palma: "La Caixa" Banking Foundation Publishing, 2019. https://observatoriosociallacaixa. org/documents/22890/166850/iNeSo_2_Labour%20Market_June.pdf/dccd2acb-0ace-a2fd-910c-bdfd223c5bed.

⁸³ For further details, see: Cabrales, Antonio, Juan José Dolado, and Ricardo Mora. "Dual employment protection and (lack of) on-the-job training: PIAAC evidence for Spain and other European countries." *SERIEs* 8, 2017. https://doi.org/10.1007/s13209-017-0166-9; Dolado, Juan José, Salvador Ortigueira, and Rodolfo Stucchi. "Does dual employment protection affect TFP? Evidence from Spanish manufacturing firms." *SERIEs* 7, 2016. https://doi.org/10.1007/ s13209-016-0150-9; and García-Pérez, J. Ignacio, Ioana Marinescu, and Judit Vall Castello. "Can fixed-term contracts put low skilled youth on a better career path? Evidence from Spain." *Economic Journal* 129, 2018. https://doi.org/10.1111/ecoj.12621. ⁸⁴ Cantó, Olga, Inmaculada Cebrián, and Gloria Moreno. "Household job insecurity and youth living arrangements in Spain: evidence for a complete business cycle." *ECINEQ Working Paper*, n.º 499, 2019. http:// www.ecineq.org/milano/WP/ECINEQ2019-499.pdf.

⁸⁵ Ibáñez Garzarán, Zyab, *et al.* "Empleo y maternidad: obstáculos y desafíos a la conciliación de la vida laboral y familiar." Barcelona: *IGOP-FUNCAS*, 2015. https://igop.uab.cat/wp-content/uploads/2016/01/ Informe-FUNCAS-IGOP.pdf.

⁸⁶ For further details, see: Arnetz, Bengt B., *et al.* "Neuroendocrine and immunologic effects of unemployment and job insecurity." *Psychotherapy and Psychosomatics* 55, 1991. https://www.jstor. org/stable/45113918; Clark, Andrew E., and Andrew J. Oswald, "Unhappiness and Unemployment." *Economic Journal* 104, 1994. https://www.jstor.org/stable/2234639; Hollander, Anna-Clara, *et al.* "Hospitalisation for depressive disorder following unemployment differentials by gender and immigrant status: a population-based cohort study in Sweden." *Journal of Epidemiology and Community Health* 67, 2013. https://www.jstor.org/stable/43281630; and Mendolia, Silvia. "The impact of husband's job loss on partners' mental health." *Review of Economics of the Household* 12, 2014. https://doi.org/10.1007/s11150-012-9149-6.

⁸⁷While total employment fell by 3% in 2020, employment among young people (16-24) and those on temporary contracts fell by 15% and 11%, respectively. For further details, see: INE. *Encuesta de población activa*. *Ocupados por tipo de contrato, por nacionalidad y por sexo*. https:// www.ine.es/dynt3/inebase/es/index.htm?padre=982&capsel=985.

⁸⁸This mechanism has facilitated the survival of thousands of companies and has provided additional security for many workers, as it ensures the maintenance of the job and the company's commitment to maintain employment for up to 6 months after the resumption of activity. For further details, see: Official State Gazette. *Real Decreto-ley 8/2020, de 17 de marzo, de medidas urgentes extraordinarias para hacer frente al impacto económico y social del COVID-19. Artículo 6.* Madrid, 2020. https://www.boe.es/boe/dias/2020/03/18/pdfs/BOE-A-2020-3824. pdf.

⁸⁹ In the first half of 2020, the number of hours worked fell by 25%, while employment losses were 8%. This is a milestone compared to previous recessions, in which the drop in hours and people was of a similar magnitude. For further details, see: INE. *Contabilidad nacional trimestral de España: principales agregados (CNTR). Empleos por ramas de actividad.* https://www.ine.es/dyngs/INEbase/es/operacion. htm?c=Estadistica_C&cid=1254736164439&menu=ultiDatos&i dp=1254735576581.

⁹⁰ The 2008-09 crisis includes from the third quarter of 2008 to the fourth quarter of 2009; the 2011-2012 crisis, from the first quarter of 2011 to the second quarter of 2013; and the COVID-19 crisis, from the second to the fourth quarter of 2020. For further details, see: INE. *Contabilidad nacional trimestral de España: principales agregados (CNTR). PIB pm Oferta (Índices de volumen encadenado); y Empleos por ramas de actividad.* https://www.ine.es/dyngs/INEbase/es/operacion. httm?c=Estadistica_C&cid=1254736164439&menu=ultiDatos&i dp=1254735576581.

⁹¹The MECUIDA Plan allows for the flexibilisation of the working day in order to exercise the duty of care towards the spouse or relatives by

blood up to the second degree for exceptional circumstances related to COVID-19. For further details, see: Official State Gazette. *Real Decreto-ley 8/2020, de 17 de marzo, de medidas urgentes extraordinarias para hacer frente al impacto económico y social del COVID-19. Artículo* 6. Madrid, 2020. https://www.boe.es/boe/dias/2020/03/18/pdfs/ BOE-A-2020-3824.pdf.

⁹² Telework in Spain was a relatively minority practice until the emergence of COVID-19. In 2019, only 8% of employed people used the option of working from home, either regularly or occasionally (compared to 15% in the Eurozone). For further details, see: Anghel, Brindusa, Marianela Cozzolino, and Aitor Lacuesta. "El teletrabajo en España." *Artículos Analíticos, Boletín Económico*, n.º 2/2020, Banco de España, 2020. https://www.bde.es/f/webbde/SES/Secciones/ Publicaciones/InformesBoletinesRevistas/ArticulosAnaliticos/20/T2/ descargar/Fich/be2002-art13.pdf; Brás, Ana, and Lukas Schaefer. "La COVID-19 da un empujón al teletrabajo." *Caixabank Research*, 2020. https://www.caixabankresearch.com/es/economia-y-mercados/ mercado-laboral-y-demografia/covid-19-da-empujon-al-teletrabajo; and Eurostat. *Employed persons working from home as a percentage of the total employment, by sex, age and professional status* (%) [lfsa_ ehomp]. https://ec.europa.eu/eurostat/data/database.

⁹³ Among the measures approved to mitigate the effects of the pandemic on the working population, the introduction of an exceptional unemployment benefit due to lack of activity for people integrated in the Special System for Domestic Employees of the General Social Security Scheme stands out. For further details, see: Official State Gazette. *Real Decreto-ley 11/2020, de 31 de marzo, por el que se adoptan medidas urgentes complementarias en el ámbito social y económico para hacer frente al COVID-19. Artículos 30, 31, 32, y 33. Madrid, 2020. https:// www.boe.es/boe/dias/2020/04/01/pdfs/BOE-A-2020-4208.pdf.*

⁹⁴ This lower take-up of teleworking compared to the European benchmark countries is related to "a face-to-face business culture" and, to a lesser extent, to a sectoral composition biased towards economic activities where remote working is more difficult to carry out. In fact, the bulk of telework during confinement was concentrated in those enterprises and service sector jobs that were most technology intensive. For further details, see: Eurofound. Living, working and COVID-19 dataset. Dublin, 2020. http://eurofound.link/covid19data; OECD. Capacity for remote working can affect shutdowns' costs differently across places. OCDE COVID-19 Policy Note, 2020. https://read.oecdilibrary.org/view/?ref=134_134296-u9iq2m67ag&title=Capacity-forremote-working-can-affect-lockdown-costs-differently-across-places; and Sostero, Matteo, et al. "Teleworkability and the COVID-19 crisis: a new digital divide?" JRC Working Papers Series on Labour, Education and Technology, n.º 121193, 2020. https://ec.europa.eu/jrc/sites/jrcsh/ files/jrc121193.pdf.

⁹⁵ INE. Encuesta de Población Activa. Tasas de paro por sexo y grupo de edad. https://www.ine.es/dynt3/inebase/es/index. htm?padre=982&capsel=986.

⁹⁶ INE. Encuesta de Población Activa. Parados por sexo y grupo de edad. Valores absolutos y porcentajes respecto del total de cada sexo. https:// www.ine.es/dynt3/inebase/es/index.htm?padre=982&capsel=986.

⁹⁷ With data as of 31 March 2021, there were over 740,000 persons in ERTE (layoff). For further details, see: Department of Social Inclusion, Social Security and Migration. "El mes de marzo termina con 743.628

personas en ERTE." Department for Inclusion, Social Security and Migration, https://prensa.inclusion.gob.es/WebPrensaInclusion/ noticias/seguridadsocial/detalle/4016.

⁹⁸ The beneficiaries of the cessation of activity benefits include those in self-employment who have been forced to suspend their activity temporarily due to an administrative decision related to the control of the pandemic, the benefits compatible with the activity, the extraordinary benefits for low income and the aid for seasonal selfemployed, in addition to the extraordinary benefits whose application period has already ended. Based on data as of 31 March 2021, there were 470,000 self-employed persons receiving a termination benefit. For further details, see: Department of Social Inclusion, Social Security and Migration. "La Seguridad Social abona 435 millones en ayudas por la pandemia a 470.000 autónomos." Department for Inclusion, Social Security and Migration, https://prensa.inclusion.gob.es/ WebPrensaInclusion/noticias/seguridadsocial/detalle/4013.

⁹⁹For further details, see: Official State Gazette. *Real Decreto-ley 5/2021*, *de 12 de marzo, de medidas extraordinarias de apoyo a la solvencia empresarial en respuesta a la pandemia de la COVID-19*. Madrid, 2021. https://www.boe.es/boe/dias/2021/03/13/pdfs/BOE-A-2021-3946.pdf ; and Government of Spain. *,Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/ actividades/Documents/2021/130421-%20Plan%20de%20 recuperacion%2C%20Transformacion%20y%20Resiliencia.pdf.

¹⁰⁰ Data published before 10 April 2021. The FUNCAS consensus reflects the estimates of the main national analysts. For further details, see: Banco de España. "Proyecciones macroeconómicas." Banco de España, https://www.bde.es/bde/es/areas/analisis-economi/analisiseconomi/proyecciones-mac/Proyecciones_macroeconomicas.html; European Comission. Statistical Annex. European Economic Forecast. Autumn 2020. Brussels, 2020. https://ec.europa.eu/info/sites/info/files/ economy-finance/ecfin_forecast_autumn_2020_statistical-annex_ en.pdf; International Monetary Fund. Spain 2020 Article IV Consultation. Washington, D.C., 2020. https://www.imf.org/en/Publications/CR/ Issues/2020/11/12/Spain-2020-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-Executive-49883; FUNCAS. Panel de previsiones de la economía española. Marzo 2021. Madrid, 2021. https://www.funcas.es/wp-content/uploads/2021/03/ PP2103.pdf; OECD. OECD Economic Outlook, Volume 2020 Issue 2. Paris: OECD Publishing, 2020. https://doi.org/10.1787/39a88ab1en; and Department of Economic Affairs and Digital Transformation. Presentación Escenario Macro. Madrid, 2021. https://www.lamoncloa. gob.es/serviciosdeprensa/notasprensa/asuntos-economicos/ Documents/2021/090421-Presentaci%C3%B3n_previsiones_macro. pdf.

¹⁰¹ The working-age population considered here ranges from 16 (the legal minimum age) to 64, unlike the one used in the analysis of the recent past which also included the 15-year-old population to facilitate international historical comparison. For further details, see: Eurostat. *Population on 1 January by age and sex [demo_pjan];* and *Population on 1st January by age, sex and* type of projection [*proj_19np*]. https:// ec.europa.eu/eurostat/data/database.

¹⁰² It is estimated that, between 2020 and 2050, the volume of net migration in Spain will exceed 6 million people, which represents an average annual flow of about 197,000 people, similar to the average observed between 2002 and 2018. For further details, see: Eurostat. *Population on 1st January by age, sex and type of projection [proj_19np]; Immigration by age and sex [migr_imm8];* and *Emigration by age and sex [migr_emi2]*. https://ec.europa.eu/eurostat/data/database.

¹⁰³ Due to this demographic effect alone, the country would go from growing at rates of 2% (average for the period 1996-2018) to 1%.111 If we add to this scenario of a smaller working-age population112 a productivity dynamic similar to that observed over the last few decades, then our economic growth could be even lower: with an average of between 0.3% and 1.1% the period 2023-50.113 The advance in per capita income would be of a similar order [Fig. 26], something that would distance us from the most advanced countries in Europe.

¹⁰⁴ Eurostat projections foresee a decline in the ratio of working age population to total population of 11 percentage points over the next 30 years, from 65% in 2020 to 54% in 2050. The EU-8 is constructed as the weighted average of the values of the individual countries, with active population being the reference for the calculation of weights. For further details, see: Eurostat. *Population on 1 January by age and sex [demo_pjan]*; and Population on 1st January by age, sex and type of projection [*proj_19np*]. https://ec.europa.eu/eurostat/data/database.

¹⁰⁵ The EU-8 is constructed as the weighted average of the values of the individual countries, with working age population being the reference for the calculation of weights. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan];* and *Population on 1 January by age and sex [demo_pjan].* https://ec.europa.eu/eurostat/data/database.

¹⁰⁶ Department of Education and Vocational Training. *Series históricas de estudiantes universitarios desde el curso 1985-1986. Total SUE. Egresados por tipo y modalidad de la universidad, nivel de estudio, sexo y rama de enseñanza. Curso 2018-2019.* http://estadisticas.mecd.gob.es/ EducaDynPx/educabase/index.htm?type=pcaxis&path=/Universitaria/ Alumnado/Nueva_Estructura/Serie/TotalSUE/&file=pcaxis.

¹⁰⁷ Torre, Margarita. "Structural and individual Determinants of Sex Segregation in blue-Collar occupations." *Gender & Society* 33, n.º 3, 2019. https://doi.org/10.1177/0891243219830974.

¹⁰⁸ Platt, Lucinda, and Javier Polavieja. "Saying and Doing Gender: Intergenerational Transmission of Attitudes towards the Sexual Division of Labour." *European Sociological Review* 32, 2016. https:// doi.org/10.1093/esr/jcw037.

¹⁰⁹ See: De Quinto, Alicia, Laura Hospido , and Carlos Sanz. "The Child Penalty in Spain." *Banco de España, Documentos Ocasionales*, n.º 2017, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Files/do2017e. pdf; and de la Rica, Sara, Lucía Gorjón, and Odra Quesada. "Woman and mother: double employment penalty?" *ISEAK Working Paper*, n.º 2020/2, 2020. https://iseak.eu/wp-content/uploads/2020/10/Womanand-mother-double-employment-penalty-1.pdf.

¹¹⁰ In this regard, it will be necessary to continue moving towards effective policies that implement co-responsibility and that, following Directive 2019/1158, guarantee the reconciliation of family, personal and professional life (ninth pillar of European social rights). For further details, see: Official State Gazette. *Directive (EU) 2019/1158 of the European Parliament and of the Council of 20 June 2019 on work-life balance for parents and carers and repealing Council Directive 2010/18/*

EU Madrid, 2019. https://www.boe.es/doue/2019/188/L00079-00093. pdf; and European Commission. "El pilar europeo de derechos sociales en 20 principios." European Commision, https://ec.europa.eu/info/ strategy/priorities-2019-2024/economy-works-people/jobs-growthand-investment/european-pillar-social-rights/european-pillar-socialrights-20-principles_es.

¹¹¹ Martínez-Mazza, Rodrigo. "Mom, Dad: I'm staying. Initial labor market conditions, housing markets, and welfare." *IEB Working Paper*, n.º 2020/13, 2020. https://ieb.ub.edu/wp-content/uploads/2020/12/ Doc2020-14.pdf.

¹¹² Currie, Janet, and H. Schwandt. "Short- and Long-term Effects of Unemployment on Fertility." *Proceedings of the National Academy of Sciences of the United States of America* 111, 2014. https://doi. org/10.1073/pnas.1408975111.

¹¹³ Among the main reasons for the low non-financial commitment of young Spaniards to employment are low levels of education and long periods of unemployment. For further details, see: Demel, Simona, Petr Mariel, and Luis Miller. "Education and the Non-financial Employment Commitment in Times of Economic Recession Among the Youth." *Social Indicators Research* 140, 2018. https://doi.org/10.1007/s11205-017-1789-8.

¹¹⁴ Anghel, Brindusa, and Aitor Lacuesta. "Envejecimiento, productividad y situación laboral." *Artículos Analíticos, Boletín Económico*, n.º 1/2020, Banco de España, 2020. https://www.bde.es/f/webbde/SES/Secciones/ Publicaciones/InformesBoletinesRevistas/ArticulosAnaliticos/20/T1/ descargar/Fich/be2001-art2.pdf.

¹¹⁵ Hudomiet, Péter, *et al.* "The effects of job characteristics on retirement." *Journal of Pension Economics and Finance*, 2020. https:// doi.org/10.1017/S147474220000025.

¹¹⁶ Fundación Adecco, and Fundación SERES. *Libro Blanco. Talento Sénior*. Madrid, 2020. http://www.fundacionadecco.org/talentosenior/ talentosenior.pdf .

¹¹⁷ For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; Population on 1 January by age and sex [demo_pjan]; and Population on 1st January by age, sex and type of projection [proj_19np].* https://ec.europa.eu/eurostat/data/database.

¹¹⁸ This implies a slightly higher employment rate in 2050 than maintaining the 1995-2019 trend (78% in 2050). Under this scenario of an increase in the employment rate to 80% in 2050, average employment growth between 2022-50 would be 0.2% per annum, well below the 2.0% recorded between 1996 and 2019 but higher than if the employment rate were to remain stable at 65% (-0.5% per annum)

 $^{\scriptscriptstyle 119}$ For futher details, see chapter 1 and the $\it Methodological \ note$ number V.

¹²⁰ The EU-8 is constructed as the weighted average of the values of the individual countries, with working age population being the reference for the calculation of weights. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; Population on 1 January by age and sex [demo_pjan];* and *Population on 1st January by age, sex and type of projection [proj_19np]*. https://ec.europa.eu/eurostat/data/database.

¹²¹ For further details, see: Eurostat. Employment by sex, age and

citizenship (1 000) [lfsa_egan]; Population on 1 January by age and sex [demo_pjan]; and Population on 1st January by age, sex and type of projection [proj_19np]. https://ec.europa.eu/eurostat/data/database.

¹²² This is Eurostat's baseline scenario projection for Spain's migration balance (average for the period 2021-50). For further details, refer to the *Methodologic note* number III. For further details, see: Eurostat. Assumptions for fertility rates by age, and type of projection [proj_19nanmig]. https://ec.europa.eu/eurostat/data/database.

¹²³ This is the projection of Eurostat's favourable scenario (*higher inmigration*) for Spain's migration balance (average for the period 2021-50). For further details, see: Eurostat. Assumptions for net migration by age, sex and type of projection [proj_19nanmig]. https://ec.europa.eu/ eurostat/data/database.

¹²⁴ The empirical literature has not found a significant effect of immigration on employment, either positive or negative. Although there may be an initial *shock*, beyond that, any effects, positive or negative, are reduced. In the medium to long run, the evidence for the US shows that the arrival of immigrants leads to increases in the productive capacity of the economy by stimulating investment and promoting productive specialisation, with little impact on the employment opportunities of native workers. Indeed, the counties where immigration was most important between 1850 and 1920 enjoy today, almost a century later, higher per capita incomes and levels of urbanisation, lower poverty and unemployment, and better educational outcomes. For further details, see: D'Albis, Hippolyte, Ekrame Boubtane, and Dramane Coulibaly. "Macroeconomic evidence suggests that asylum seekers are not a "burden" for Western European countries." Science Advances 4, n.º 6, 2018. https://advances.sciencemag.org/content/4/6/eaaq0883. For the case of Spain, see: Carrasco, Raquel, Juan F. Jimeno, and A. Carolina Ortega. "The effect of immigration on the labor market performance of native-born workers: some evidence for Spain." Journal of Population Economics 21, 2008. https://link.springer.com/article/10.1007/ s00148-006-0112-9; Fernández-Huertas Moraga, Jesús. "Inmigración y políticas migratorias en España." FEDEA, Estudios sobre la Economía Española, n.º 2021/10, 2021. https://documentos.fedea.net/pubs/eee/ eee2021-10.pdf; and González, Libertad, and Francesc Ortega. "How do very open economies adjust to large immigration flows? Evidence from Italian Regions." Labour Economics 18, n.º 1, 2011. https://doi. org/10.1016/j.labeco.2010.06.001 For medium- and long-term effects in the United States, see: Peri, Giovanni. "The Effect Of Immigration On Productivity: Evidence From U.S. States." Review of Economics and Statistics 94, n.º 1, 2012. https://doi.org/10.1162/REST_a_00137; Peri, Giovanni, and Chad Sparber. "Task Specialization, Immigration, and Wages." American Economic Journal: Applied Economics 1, n.º 3, 2009. https://www.aeaweb.org/articles?id=10.1257/app.1.3.135; and Sequeira, Sandra, Nathan Nunn, and Nancy Qian. "Inmigrants and the Making of America." Review of Economic Studies 87, n.º 1, 2020. https:// doi.org/10.1093/restud/rdz003.

¹²⁵ INE. Principales series de población desde 1998. Población extranjera. https://www.ine.es/dynt3/inebase/es/index.htm?type=pcaxis&path=/ t20/e245/p08/&file=pcaxis&dh=0&capsel=1.

¹²⁶ The total employment rate is defined as the ratio of total employed persons to the population aged 16-64. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan].* https://ec.europa.eu/eurostat/data/database.

¹²⁷ In 2019, the activity rate of the foreign population was 50% for those aged 16-24 and 39% for those aged 55 and over, while these rates were 35% and 26%, respectively, for the Spanish population. Similarly, the employment rate of the foreign population was 34% for those aged between 16 and 24, and 33% for those aged 55 and over, while these rates were 23% for the Spanish population. For further details, see: INE. *Encuesta de Población Activa. Ocupados por nacionalidad, sexo y grupo de edad; y Tasa de actividad por nacionalidad, sexo y grupo de edad.* https://www.ine.es/dyngs/INEbase/operacion.htm?c=Estadistica_C&cid=125473617691 8&menu=resultados&secc=1254736195128&idp=1254735976595.

¹²⁸ The behaviour and characteristics of the population of immigrant origin in Spain have meant that, until now, their pressure on the welfare state has not been greater than that of those born in Spain. Immigrants represent a smaller proportion of recipients of unemployment protection (only 9.7% of the total) and, in contrast to national beneficiaries, receive comparatively more contributory benefits than welfare benefits. Likewise, the requirements of continuous residence in the country or the autonomous community in order to receive some welfare benefits, such as minimum income, mean that their participation in these benefits is also relatively lower, since it is common for foreigners to change residence more quickly than Spaniards when faced with a situation of unemployment. On the other hand, the small number of immigrants over 65 years of age also means that very few of them receive retirement pensions. For further details, see: Economic and Social Council. La inmigración en España: efectos y oportunidades. Madrid, 2019. http:// www.ces.es/documents/10180/5209150/Inf0219.pdf; and Muñoz de Bustillo Llorente, Rafael, and Rafael Grande Martín. "Inmigración y Estado de bienestar en España." In Arango, Joaquín, Ramón Mahía, David Moya, and Elena Sánchez-Montijano (dirs.). La inmigración en el ojo del huracán. Barcelona: Anuario CIDOB de la Inmigración, 2017. 206-231. https://www.cidob.org/es/publicaciones/serie_de_ publicacion/anuario_cidob_de_la_inmigracion/la_inmigracion_en_el_ ojo_del_huracan_anuario_cidob_de_la_inmigracion_2017.

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¹³³ IBM Watson, https://www.ibm.com/watson.

¹³⁴ For further details, see: LawGeex, https://www.lawgeex.com/; and LegalRobot, https://legalrobot.com/.

¹³⁵Google translator, https://translate.google.es/?hl=es.

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¹³⁹ The EU-8 and the EU-27 are constructed as the simple average of the values of the individual countries. Due to data availability, the EU-27 does not include all countries. In Arntz, Gregory and Zierahn Bulgaria, Croatia, Cyprus, Hungary, Latvia, Luxembourg, Malta, Portugal, Romania, Greece, Slovenia and Lithuania do not join. Nedelkoska and Quintini do not include Bulgaria, Croatia, Hungary, Latvia, Luxembourg, Malta, Portugal and Romania. In Josten and Lordan, Bulgaria, Luxembourg, Malta, Romania and Slovenia are not included. The PriceWaterhouseCoopers study does not include Bulgaria, Croatia, Estonia, Hungary, Latvia, Luxembourg, Malta, Portugal and Romania. For further details, see: Arntz, Melanie, Terry Gregory, and Ulrich Zierahn. "Revisiting the risk of automation." Economics Letters 159, 2017. https:// doi.org/10.1016/j.econlet.2017.07.001; Doménech, Rafael, et al. "¿Cuán vulnerable es el empleo en España a la revolución digital?" BBVA Research, Observatorio económico, 2018. https://www.bbvaresearch. com/publicaciones/cuan-vulnerable-es-el-empleo-en-espana-a-larevolucion-digital/; Frey, Carl Benedikt, and Michael A. Osborne. "The future of employment: how susceptible are jobs to computerisation?" Technological Forecasting and Social Change 114, 2017. https:// doi.org/10.1016/j.techfore.2016.08.019; Josten, Cecily, and Grace Lordan. "Robots at work: automatable and non automatable jobs." IZA Discussion Paper Series, n.º 12520, 2019. http://ftp.iza.org/dp12520. pdf; Morron Salmeron, Adrià. "¿Llegará la Cuarta Revolución Industrial a España?" Informe Mensual Caixabank, nº. 398, 2016. https://www. caixabankresearch.com/es/economia-y-mercados/mercado-laboral-ydemografia/llegara-cuarta-revolucion-industrial-espana; Nedelkoska, Ljubica, and Glenda Quintini. "Automation, skills use and training." OECD Social, Employment and Migration Working Papers, n.º 202, París: OECD Publishing, 2018. https://doi.org/10.1787/2e2f4eea-en; and PriceWaterhouseCoopers. Will robots steal our jobs? An international analysis of the potential long term impact of automation. 2018. https:// www.pwc.co.uk/economic-services/assets/international-impact-ofautomation-feb-2018.pdf.

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¹⁵³ Workers can be classified into four categories according to the hours and percentage of their income that platform work represents: (1) *occasional*, less than once a month in the last year; (2) *marginal*, less than 10 hours per week and direct income from this activity represents less than 25% of the total; (3) *secondary*, more than 10 hours per week and direct income from this activity represents between 25% and 50% of the total; and (4) *main*, more than 20 hours per week and direct income from this activity represents more than 50% of the total. For further details, see: Urzl Brancati, Maria Cesira, Annarosa Pesole, and Enrique Fernández-Macías. "New evidence on platform workers in Europe. Results from the second COLLEEM survey." *European Commission* JRC, Luxembourg: Publications Office of the European Union, 2020. https://publications.jrc.ec.europa.eu/repository/bitstream/ JRC118570/jrc118570_jrc118570_final.pdf.

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¹⁶⁷ The beginning of the universalisation of care has its origin in Article 41 of the 1978 Constitution, which recognises that "the public authorities shall maintain a public Social Security system for all citizens, guaranteeing sufficient social assistance and benefits in situations of need," and is consolidated with the General Health Act of 1986. For further details, see: Official State Gazette. *Spanish Constitution Art. 41.* Madrid, 1978. https://www.boe.es/legislacion/documentos/ ConstitucionCASTELLANO.pdf ;Official State Gazette. *Ley 14/1986, de 25 de abril, General de Sanidad.* Madrid, 1986. https://www.boe.es/ buscar/pdf/1986/BOE-A-1986-10499-consolidado.pdf .

¹⁶⁸ The total employment rate is defined as the ratio of total employed persons to the population aged 16-64. This rate differs slightly from that included in Figs. 1 and 2 because the former uses the OECD as a source for historical data since 1980. This implies slight differences in the denominator, as the OECD reports the population between 15 and 64 years old, while in this case the population between 16 and 64 years old is used (the minimum legal working age in Spain is 16 years old). The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 16-64 population being the reference for the calculation of weights. La UE-27 se construye a partir de los agregados reportados por Eurostat. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan]*. https://ec.europa. eu/eurostat/data/database.

¹⁶⁹ It should be noted that among the headline targets of the EU 2020 strategy, 75% of men and women aged 20-64 should be in employment. In 2019, this employment rate for Spain was 74% for men and 62% for women, below the target and far from the EU-27 average. (79% and 67% respectively). For further details, see: European Commission. *Europe 2020: A European strategy for smart, sustainable and inclusive* growth. Brussels: European Commission, 2020. https://ec.europa.eu/ eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20 -%20Europe%202020%20-%20EN%20Version.pdf; and INE. *Tasas de empleo según niveles de educación. Brecha de género.* https://www. ine.es/ss/Satellite?L=es_ES&c=INESeccion_C&cid=1259925461647& p=1254735110672&pagename=ProductosYServicios/PYSLayout&par am1=PYSDetalle¶m3=1259924822888 ¹⁷⁰ Expenditure on active training policies includes both the employed and unemployed population. The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries when these are available. The latest data available is from 2018. For further details, see: OECD. *Public expenditure as a percentage of GDP. 20: Training.* https://stats.oecd.org/.

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¹⁷² The employment rate of women is defined as the ratio of total employed women to the population of women aged 16-64. This rate differs slightly from that included in Fig. 2 because it uses the OECD as a source for historical data since 1980. This implies slight differences in the denominator, as the OECD reports the population between 15 and 64 years old, while in this case the population between 16 and 64 years old is used (the minimum legal working age in Spain is 16 years old). The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 16-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan].* https://ec.europa. eu/eurostat/data/database.

¹⁷³The youth unemployment rate is defined as the ratio of unemployed persons aged 18-24 to active persons in the same age range. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 18-24 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. *Active population by sex, age and citizenship (1 000) [lfsa_agan]; and Unemployment by sex and age – annual data [une_rt_a]*. https://ec.europa.eu/eurostat/data/database.

¹⁷⁴ The employment rate of those people aged 55-64 is defined as the ratio of employed persons to the population in that age range The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 55-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan].* https://ec.europa. eu/eurostat/data/database.

¹⁷⁵ The temporariness rate is defined as the ratio of employees with a temporary contract to the total number of employees aged 15-74. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 15-74 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. *Temporary employees by sex, age and educational attainment level (1 000) [lfsa_etgaed]; y Employees by sex, age and educational attainment level (1 000) [lfsa_eegaed].* https://ec.europa.eu/eurostat/data/database ¹⁷⁶The involuntary part-time rate is defined as the ratio of the total number of involuntary part-time workers (15-74 years) to the total number of employees. The EU-8 is constructed as the weighted average of the values of the individual countries, with active population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; Full-time and part-time employment by sex, age and educational attainment level (1 000) [lfsa_epgaed]; and Involuntary part-time employment as percentage of the total part-time employment, by sex and age (%) [lfsa_eppgai]. https://ec.europa.eu/eurostat/data/database*

¹⁷⁷ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. Average number of usual weekly hours of work in main job, by sex, professional status, full-time/ part-time and occupation (hours) [lfsa_ewhuis]. https://ec.europa.eu/eurostat/data/database

¹⁷⁸ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2018. For further details, see: Eurostat. *Gender pay gap in unadjusted form [sdg_05_20]*. https://ec.europa.eu/eurostat/data/database

¹⁷⁹ The proportion of people satisfied with their job is defined as the percentage of people who rate their job satisfaction as medium or high.. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2018. For further details, see: Eurostat. *Percentage of the population rating their satisfaction as high, medium or low by domain, sex, age and educational attainment level [ilc_pw05]*. https://ec.europa.eu/eurostat/data/database

¹⁸⁰ The draft of the "Recovery, Transformation and Resilience Plan" can play a key role on this front. Component 23 "New public policies for a dynamic, resilient and inclusive labour market," with funding in the order of 2.4 billion euros, aims, among other things, to boost the digitalisation of the SEPE; to reorient active employment policies towards guidance; and, within the social dialogue, to promote the modernisation of collective bargaining. For further details, see: *Government of Spain. Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf

¹⁸¹ Cortes, Guido Matias. "Where Have the Middle-Wage Workers Gone? A Study of Polarization Using Panel Data." Journal of Labor Economics 34, n.º 1, 2016. https://www.journals.uchicago.edu/doi/ abs/10.1086/682289

¹⁸² Employment Portal. "Empléate." Employment Portal, https://www. empleate.gob.es/empleo/#/

¹⁸³ The proposed measures reinforce some of the main lines set out in the Reincorpor-T Plan of the Ministry of Labour and Social Economy. For further details, see: Servicio de Empleo Público (State Public Employment Service). *Reincorpora-T: Three-year plan to prevent and reduce long-term unemployment*. Madrid, 2019. https://www.sepe.es/

HomeSepe/Personas/encontrar-trabajo/plan-reincorpora-T.html

¹⁸⁴ Belot, Michèle, Philipp Kircher, and Paul Muller. "Providing Advice to Jobseekers at Low Cost: An Experimental Study on Online Advice." Review of Economic Studies 86, n.º 4, 2019. https://doi.org/10.1093/ restud/rdy059

¹⁸⁵ Principle 4, "Active support for employment" of the European Pillar of Social Rights, states that "Everyone has the right to transfer social protection and training rights during career transitions". For further details, see: European Commission. *European Pillar of Social Rights. Luxembourg*: Publication Office of the European Union, 2018. http:// dx.doi.org/10.2792/95934

¹⁸⁶ In this regard, the Shock Plans that have been implemented since 2018 have yielded good results thanks to the cross-referencing of databases and big data for the mass mailing of letters to companies where fraud was suspected. For further details, see: Servicio de Empleo Público (State Public Employment Service). "El Plan Director por un Trabajo Digno duplica los resultados de la Inspección en la lucha contra el fraude en la contratación temporal y a tiempo parcial." Servicio Público de Empleo Estatal, https://www.sepe.es/HomeSepe/que-es-elsepe/comunicacion-institucional/noticias/historico-de-noticias/2019/ detalle-noticia.html?folder=/2019/Diciembre/&detail=plan-directortrabajo-digno-duplica-resultados-inspeccion-lucha-contra-fraudecontratacion-temporal-tiempo-parcial

¹⁸⁷ Rodríguez Fernández, María Luz(.). Plataformas digitales y mercado de trabajo. Madrid: Department for Labour, Migration and Social Security, 2018

¹⁸⁸ De Stefano, Valerio, y Antonio Aloisi. "European Legal framework for digital labour platforms." European Commission JRC, 2018. http:// dx.doi.org/10.2760/78590

¹⁸⁹ Recent laws regulating data protection and telecommuting are important developments that point the way forward. For further details, see: Official State Gazette. *Ley Orgánica 3/2018, de 5 de diciembre, de protección de datos personales y garantía de los derechos digitales.* Madrid, 2018. https://www.boe.es/eli/es/lo/2018/12/05/3/dof/spa/ pdf; Official State Gazette. *Decreto-Ley 28/2020, de 22 de septiembre, de trabajo a distancia.* Madrid, 2020. https://www.boe.es/boe/ dias/2020/09/23/pdfs/BOE-A-2020-11043.pdf

¹⁹⁰ European Commission. Proposal for a Council Recommendation on access to social protection for workers and the self-employed, COM(2018) 132 final. Strasbourg, 2018. https://eur-lex.europa.eu/ legal-content/GA/TXT/?uri=COM%3A2018%3A132%3AFIN; European Commission. Commission staff working document impact assessment accompanying the document "Proposal for a Council recommendation on access to social protection for workers and the self-employed", COM(2018) 132 final. Estrasburgo, 2018. https://eur-lex.europa.eu/ legal-content/EN/TXT/PDF/?uri=CELEX:52018SC0070&from=EN; y Spasova, Slavina, et al. Access to social protection for people working on non-standard contracts and as self-employed in Europe: A study of national policies. Brussels: European Commission, 2017. http://dx.doi. org/10.2767/700791

¹⁹¹ Currently, Law 20/2007 recognises the capacity to sign "agreements of professional interest", but only in the case of economically dependent self-employed workers (TRADE). To date, its impact has been limited. For further details, see: Official State Gazette. *Ley 20/2007, de 11 de* julio, del Estatuto del trabajo autónomo. Art. 13. Madrid, 2007. https:// www.boe.es/buscar/pdf/2007/BOE-A-2007-13409-consolidado.pdf

¹⁹² Servicio de Empleo Público (State Public Employment Service). *Plan de Choque por el Empleo Joven 2019-2021*. Madrid, 2019. https://www.sepe.es/HomeSepe/Personas/encontrar-trabajo/plan-de-choque-empleo-joven-2019-2021

¹⁹³ Danish Agency for Labour Market and Recruitment. "Building Bridge to Education." Danish Agency for Labour Market and Recruitment, https://star.dk/en/active-labour-market-policy-measures/tacklingyouth-unemployment-in-denmark/building-bridge-to-education/

¹⁹⁴ Dabla-Norris, Era, and Kalpana Kochhar. "Closing the Gender Gap". IMF, Finance and Development, 2019. https://www.imf.org/external/ pubs/ft/fandd/2019/03/pdf/fd0319.pdf; OECD. Is the Last Mile the Longest? Economic Gains from Gender Equality in Nordic Countries. Paris: OECD Publishing, 2018. https://doi.org/10.1787/9789264300040en; and Thévenon, Olivier, et al. "Effects of Reducing Gender Gaps in Education and Labour Force Participation on Economic Growth in the OECD." *OECD Social, Employment and Migration Working Papers, n.*° 138, 2012. https://doi.org/10.1787/5k8xb722w928-en

¹⁹⁵ Molinero Gerbeau, Yoan. "Dos décadas desplazando trabajadores extranjeros al campo español: una revisión del mecanismo de contratación en origen." *Panorama Social*, n.º 31, 2020. https://www. funcas.es/wp-content/uploads/2020/09/Yoan-Molinero-Gerbeau.pdf.

¹⁹⁶ Official Gazette of the Spanish Parliament. *Informe de evaluación y reforma del Pacto de Toledo*. Madrid, 2020. https://www.congreso.es/public_oficiales/L14/CONG/BOCG/D/BOCG-14-D-187.PDF

¹⁹⁷ Economic and Social Council. La inmigración en España: efectos y oportunidades. Madrid, 2019. http://www.ces.es/ documents/10180/5209150/Inf0219.pdf

¹⁹⁸ Ibid.

¹⁹⁹ Both Royal Decree-Law 6/2019 and the COVID-19 labour standards have established procedures in this direction. For further details, see: Official State Gazette. Real Decreto-ley 6/2019, de 1 de marzo, de medidas urgentes para garantía de la igualdad de trato y de oportunidades entre mujeres y hombres en el empleo y la ocupación. Madrid, 2019. https://www.boe.es/eli/es/rdl/2019/03/01/6

²⁰⁰ For further details, see: Banco de España. Informe Anual 2015. Madrid: Banco de España, 2015. https://www.bde.es/f/webbde/SES/ Secciones/Publicaciones/PublicacionesAnuales/InformesAnuales/ descargar/15/Fich/inf2015.pdf; and World Management Survey. Management Matters: Manufacturing Report 2014. 2014. https:// cdnstatic8.com/worldmanagementsurvey.org/wp-content/ images/2015/06/Manufacturing-Report-2014-EUROPE-ENGLISH.pdf.

CHALLENGE #8: REDUCING POVERTY AND INEQUALITY AND REPAIRING THE SOCIAL ELEVATOR

¹Rodríguez Cabrero, Gregorio. "The Consolidation of the Spanish Welfare State (1975-2010." In Guillén, Ana Marta, and Margarita León (eds.). *The Spanish Welfare State in European Context*. London: Routledge, 2011. https://www.taylorfrancis.com/books/e/9781315552552/chap ters/10.4324/9781315552552-9.

²Public expenditure on active training policies went from PIB in 1985 to 19.1% in 1990. See: OECD. *Social Expenditure - Aggregated data [SOCX_AGG]*. https://stats.oecd.org/Index.aspx?DataSetCode=SOCX_ AGG.

³ Calonge Ramírez, Samuel, and Antonio Manresa Sánchez. "Crisis económica y desigualdad de la renta en España. Efectos distributivos de las políticas públicas." *Estudios de la funcación Funcas* 92, 2019. https://www.funcas.es/libro/crisis-economica-y-desigualdad-de-larenta-en-espana-efectos-distributivos-de-las-politicas-publicasoctubre-2019/.

⁴ See: Ayala, Luís, and Mercedes Sastre. "Políticas redistributivas y desigualad." *ICE, Revista de Economía* 837, 2007. http://www. revistasice.com/index.php/ICE/article/view/1068; Ayala, Luís, Rosa Martínez, and Jesús Ruiz-Huerta. "La distribución de la renta en España en los años ochenta: una perspectiva comparada", *I Simposio sobre Igualdad y Distribución de la Renta y la Riqueza, volumen II*. Madrid: Fundación Argentaria, 1993; and Gimeno Ullastres, Juan Antonio. "La incidencia redistributiva de las prestaciones públicas en especie: sanidad y educación." In José María Maravall Herrero (ed.), *Dimensiones de la desigualdad*. Madrid: Fundación Argentaria, 1999.

⁵ See: Ayala, Luís, and Mercedes Sastre. "Políticas redistributivas y desigualad." *ICE, Revista de Economía* 837, 2007. http://www. revistasice.com/index.php/ICE/article/view/1068; Ayala, Luís, Rosa Martínez, and Jesús Ruiz-Huerta. "El enfoque de la dominancia en el análisis de la pobreza". In José María Maravall Herrero (ed.), *Dimensiones de la desigualdad*. Madrid: Fundación Argentaria, 1999.

⁶ Rodríguez Cabrero, Gregorio. "Valoración de los programas de rentas mínimas en España." EU network of independent experts on social inclusion, 2009. http://ec.europa.eu/social/BlobServlet?docId=9043 &langId=es.

⁷ The Gini Coefficient is a measure of inequality represented by a number between 1 and 100, where 1 corresponds to perfect equality (everyone has the same income) and the value 100 corresponds to perfect inequality (one person has all the income and the others, none). Therefore, the higher the coefficient, the greater the inequality. There are various definitions for calculating the Gini Coefficient, depending on what types of income are considered. For this figure, the equivalent disposable income per adult person is used. The data come from the Household Budget Survey (HBS), which has undergone several methodological changes since the 1970s, making it complex to interpret. Each of the three different segments represented in the graph use different versions of the survey and this makes them not directly comparable. The text will focus on the trends in each of these segments and not on the level of the variable. For further details, see: Cantó, Olga, and Luís Ayala. "The Driving Forces of Rising Inequality in Spain." In Nolan, Brian (ed.). Inequality and Inclusive Growth in Rich Countries: Shared Challenges and Contrasting Fortunes. Oxford: Oxford University Press, 2018. http://www.equalitas.es/sites/default/files/WP-51-1.pdf.

⁸ It should be noted that, despite this boost to social protection, total social protection expenditure as a share of GDP remained relatively stable in the period 2000-07. Refer to: Eurostat. *General government expenditure in social protection [gov_10a_exp]*. https://ec.europa.eu/eurostat/data/database; and Department of Education and Vocational Training. *Plan Nacional de Acción para la Inclusión Social del Reino de España. Junio-2001-Junio-2003*. https://sid.usal.es/idocs/F8/8.4.1-3247/8.4.1-3247.pdf.

⁹Anghel, Brindusa, *et al.* "Income, consumption and wealth inequality in Spain." *SERIEs* 9, 2018. https://doi.org/10.1007/s13209-018-0185-1.

¹⁰ Fernández-Kranz, Daniel. "Wage adjustment in Spain during the economic crisis." *Spanish Economic and Financial Outlook* 3, n.º 3, 2014. https://www.funcas.es/wp-content/uploads/Migracion/Articulos/ FUNCAS_SEFO/013art07.pdf.

¹¹ In particular, market inequality (inequality before social transfers) worsened sharply during these years as a result of rising unemployment and falling wages.

¹²This was despite a significant increase in social protection spending. Between 2007 and 2014, social protection spending increased by almost 50 billion euros, from 13% to 18% of GDP and from 33% to 40% of public spending. Spending on public services such as health and education declined in relative terms. In education, it decreased by almost 1 billion and went from 10% to 9% of public spending and health spending increased by 2 billion, but its weight in public spending also decreased by 1%, from 14.5% to 13.5%. See: Eurostat. *General government expenditure by function [gov_10a_exp]*. https://ec.europa. eu/eurostat/data/database.

¹³ See: Ayala, Luis and Olga Cantó. "Ciclo económico, clases medias y políticas públicas." In Luis Ayala and Jesús Ruiz-Huerta (dir.). *Tercer informe sobre la desigualdad en España*. Madrid: Fundación Alternativas, 2018. http://www.fundacionalternativas.org/las-publicaciones/ informes/3er-informe-sobre-la-desigualdad-en-espana-2018; and Eurostat. *At-risk-of-poverty rate by poverty threshold [ilc_li02]*. http:// appsso.eurostat.ec.europa.eu/nui/show.do?lang=en&dataset=ilc_li02.

¹⁴ Calonge Ramírez, Samuel, and Antonio Manresa Sánchez. "Crisis económica y desigualdad de la renta en España. Efectos distributivos de las políticas públicas." *Estudios de la fundación Funcas* 92, 2019. https://www.funcas.es/libro/crisis-economica-y-desigualdad-de-larenta-en-espana-efectos-distributivos-de-las-politicas-publicasoctubre-2019/.

¹⁵ While in the EU-27, the risk of poverty increased by only 6 tenths of a percentage point between 2007 and 2014, in Spain it increased by 2.5%. Similarly, the Gini index increased by 4 tenths in the EU-27 in that period, while in Spain it increased by almost 3 points. See: Eurostat. *Gini coefficient of equivalised disposable income [ilc_di12]* https:// ec.europa.eu/eurostat/data/database; and Eurostat. *At-risk-of-poverty* *rate by poverty threshold [ilc_li02]*. https://ec.europa.eu/eurostat/data/ database.

¹⁶ Vizán Rodríguez, Carmen. *La caída del peso económico de las rentas del trabajo*. Madrid: Fundación Alternativas, Zoom Económico. 2018. https://www.fundacionalternativas.org/public/storage/laboratorio_ documentos_archivos/67191fa0e178c4aff9bca00189d2210a.pdf.

¹⁷ To calculate the difficulties in making ends meet, the percentages of those reporting "with difficulty", "with some difficulty" and "with great difficulty" are added together For further details, refer to: INE. *Living conditions survey 2019: Personas de 16 y más años por dificultades para llegar a fin de mes*, https://www.ine.es/jaxiT3/Datos.htm?t=9987#ltabs-grafico, e *Incapacidad de hacer frente a gastos económicos imprevistos por sexo y periodo.* https://www.ine.es/jaxi/Datos.htm?path=/t00/ICV/dim1/&file=13203.px#!tabs-tabla.

¹⁸ INE. Encuesta de Condiciones de Vida 2007, 2014, 2017 (base 2004 y 2013). https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadis tica_C&cid=1254736176807&menu=ultiDatos&idp=1254735976608.

¹⁹ According to official estimates, the MVI will reach 850,000 households (2.3 million people) living in extreme poverty. Their coverage would triple the protection offered by regional minimum incomes in 2018. The approval of the MVI is a historic step forward, covering the basic needs of the most deprived population, although its deployment will necessarily be gradual and may take some time to achieve its objectives. This policy will also help to reduce the impact of the COVID-19 pandemic. However, the programme does not cover households that fall within the financial vulnerability band between the severe and moderate poverty lines. Reducing this vulnerability and the dependence of many households in this situation on the economic upturn will require advances in other forms of non-contributory protection. Ministerio de Inclusión, Seguridad Social, y Migraciones. Ingreso Mínimo Vital. http://www.seg-social.es/ wps/portal/wss/internet/Trabajadores/PrestacionesPensionesTrabaj adores/65850d68-8d06-4645-bde7-05374ee42ac7?changeLangu age=es.

²⁰ The data come from various sources such as INE's Household Budget Survey and Eurostat's EU-SILC. For further details, see: Cantó, Olga, and Luís Ayala. "The Driving Forces of Rising Inequality in Spain." In Nolan, Brian (ed.). *Inequality and Inclusive Growth in Rich Countries: Shared Challenges and Contrasting Fortunes*. Oxford: Oxford University Press, 2018. http://10.1093/oso/9780198807032.001.0001.

²¹ Ibid.

²²In this case, the equivalent disposable income per adult person after taxes and contributions and before transfers is used to calculate the Gini Coefficient.

²³ Between 2014-2018, Spain was the 7th, 6th, 5th, 4th and 7th most unequal economy in the EU-27. For further details on the construction of the EU-8, see the *Metodologic Note* number I. See: Eurostat. *Gini coefficient of equivalised disposable income* [*ilc_di12*] https://ec.europa. eu/eurostat/data/database.

²⁴ EAPN. El Estado de la Pobreza: Seguimiento del Indicador de Pobreza y Exclusión Social en España 2008-2019. Madrid: EAPN España, 2020. https://www.eapn.es/ARCHIVO/documentos/ documentos/1602601812_informe_arope_2020.pdf.

²⁵ At-risk-of-poverty is defined as an income level below 60% of the

national median, which in Spain is about 740 euros per month. If one considers the differences between regions, the situation becomes even more alarming. While in Spain there are several autonomous regions with poverty risk rates below the European average, there are six that are twice as high as the highest EU rate. For further details, see: INE. Living conditions survey 2019: Tasa de riesgo de pobreza por comunidades autónomas. https://www.ine.es/jaxiT3/Datos.htm?t=9963#!tabs-tabla; and Department of Health, Consumer Affairs and Social Welfare. *Evolución de la pobreza en España 2009-2018*. Madrid, 2018. https://www.mscbs.gob.es/ssi/familiasInfancia/inclusionSocial/spana/Evolucion_indica_pobreza_09_18.pdf.

²⁶ The poverty risk is calculated using the cut-off point of 60% of the median equivalent income after social transfers. See: Eurostat. *Atrisk-of-poverty rate by poverty threshold [ilc_li02]*. https://ec.europa.eu/eurostat/data/database.

²⁷ The percentage of the population that was in poverty in the reference year and in two of the last three years (14% in 2018) is higher than the EU-27 average (11%). See: Eurostat. *Persistent at-risk-of-poverty rate [ilc_li21]*. https://ec.europa.eu/eurostat/data/database.

²⁸ The percentage of the population aged 15-29 at risk of poverty was 26.6% in 2019, more than 7 points above the European average and more than 6 points above the national average. See: Eurostat. *At-risk-of-poverty rate by poverty threshold [ilc_li02]*. https://ec.europa.eu/eurostat/data/database.

^{2º} See: Blanco, Roberto, et al. El Mercado de la Vivienda en España entre 2014 y 2019. Banco de España, Documentos ocasionales, nº 2013, 2020. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ PublicacionesSeriadas/DocumentosOcasionales/20/Fich/do2013.pdf; y Department of Health, Consumer Affairs and Social Welfare. Estrategia Nacional de Prevención y Lucha contra la Pobreza y Exclusión Social para el periodo 2019-2023. Madrid, 2019. https://www.mscbs.gob.es/ ssi/familiasInfancia/inclusionSocial/inclusionSocialEspana/Estrategia_ Prev_y_Lucha_Pobreza_2019-23.pdf.

³⁰ Save the Children. *Infancia en Reconstrucción: medidas para luchar contra la desigualdad en la nueva normalidad*. Madrid: Save the Children, 2020. https://www.savethechildren.es/sites/default/files/2020-07/Informe_Infancia_En_Reconstruccion.pdf.

³¹ Alto Comisionado Contra la Pobreza Infantil. *La transmisión intergeneracional de la desigualdad en España*, 2020. https://www. comisionadopobrezainfantil.gob.es/sites/default/files/DB%2016. pdf; e INE. Encuesta de Condiciones de Vida 2019: Módulo sobre la transmisión intergeneracional de la pobreza. Nota de prensa, 2020. https://ine.es/prensa/ecv_2019_m.pdf.

³² Breaking this cycle is the main purpose of the Zero Child Poverty Country Alliance, promoted by the High Commission Against Child Poverty, with the participation of companies, foundations and social organisations. For further details, see: https://www. comisionadopobrezainfantil.gob.es/es/alianza-pais-pobreza-infantilcero.

³³ For example, 56% of children of low-educated parents in our country end up with a low level of education as well, compared to the OECD average of 42%. See: OECD. *A Broken Social Elevator? How to Promote Social Mobility*. Paris: OECD Publishing, 2018. https://www.oecd.org/ spain/social-mobility-2018-ESP-ES.pdf. ³⁴ Fundación Felipe González and Fundación COTEC. "Atlas de Oportunidades." COTEC, 2020. https://www.cotec.es/ fundacionfelipegonzalez/oportunidades/; and OCDE. *A Broken Social Elevator? How to Promote Social Mobility*. Paris: OECD Publishing, 2018. https://doi.org/10.1787/9789264301085-en.

³⁵ For further details, see: Serrano, Lorenzo. "El abandono educativo temprano: análisis del caso español." Instituto Valenciano de Investigaciones Económicas, 2013. http://web2016.ivie.es/wpcontent/ uploads/2017/06/Informe_Abandono_Educativo_Temprano.pdf.

³⁶ UNICEF. Worlds of Influence Understanding What Shapes Child Wellbeing in Rich Countries. Florence: UNICEF Office of Research, 2020. https://www.unicef-irc.org/publications/pdf/Report-Card-16-Worldsof-Influence-child-wellbeing.pdf.

³⁷ Eurostat. *In-work at-risk-of-poverty rate [tespm070]*, 2019. https:// ec.europa.eu/eurostat/data/database.

³⁸ The poverty rate is the proportion of people (in a given age group) whose income is below the poverty line, in this case calculated as 60% of the average household income of the total population. See: Eurostat. *At-risk-of-poverty rate by poverty threshold [ilc_li02]*. https://ec.europa.eu/eurostat/data/database.

³⁹ Banco de España. Encuesta Financiera de las Familias. 2017. https:// www.bde.es/bde/es/areas/estadis/estadisticas-por/encuestas-hogar/ relacionados/Encuesta_Financi/eff_2017.html.

⁴⁰ The 90/50 ratio indicates the percentage of wealth owned by the richest 10% as a function of that owned by the poorest 50%. The EU-8 includes the average of Belgium, Finland, France, Austria, the Netherlands and Germany. The EU-27 includes all countries except Denmark, Sweden, Bulgaria and Romania. For further details, see: European Central Bank. *Household Finance and Consumption Survey* (HFCS). https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index. en.html.

⁴¹ Artola Blanco, Miguel, Luis E. Bauluz, and Clara Martínez-Toledano. "Wealth in Spain, 1900-2017: A Country of Two Lands." *The Economic Journal*, n.º ueaa103, 2020. https://doi.org/10.1093/ej/ueaa103.

⁴² Martínez-Toledano, Clara. "House Price Cycles, Wealth Inequality and Portfolio Reshuffling." *World Inequality Lab working paper*, nº 2, 2020. https://wid.world/document/house-price-cycles-wealth-inequality-andportfolio-reshuffling-wid-world-working-paper-2020-02/.

⁴³ Refer to: Clara Martínez-Toledano. "House Price Cycles, Wealth Inequality and Portfolio Reshuffling." *World Inequality Lab working paper*, n° 2, 2020. https://wid.world/document/house-price-cycleswealth-inequality-and-portfolio-reshuffling-wid-world-workingpaper-2020-02/; Garbinti, Bertrand, Jonathan Goupille-Lebret, and Thomas Piketty. "Accounting for Wealth Inequality Dynamics: Methods, Estimates and Simulations for France." *Journal of the European Economic Association*, n.º jvaa025, 2020. https://doi.org/10.1093/ jeea/jvaa025; and Federal Reserve Board. *Survey of Consumer Finances*. 2019. https://www.federalreserve.gov/econres/scfindex.htm.

⁴⁴ De Dominicis, Laura, Raymond J.G.M Florax, and Henri L. F. de Groot. "A Meta-Analysis On The Relationship Between Income Inequality And Economic Growth." *Scottish Journal of Political Economy* 55, n.º 5, 2008. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9485.2008.00470.x. ⁴⁵ Welch, Finis. "In defense of inequality." *The American Economic Review* 89, n.° 2, 1999. https://www.aeaweb.org/articles?id=10.1257/ aer.89.2.1; and Mueller, Holger, Paige Ouimet, and Elena Simintzi. "Within-firm pay inequality." *The Review of Financial Studies* 30, n.° 10, 2017. https://doi.org/10.1093/rfs/hhx032.

⁴⁶ The OECD estimates that, between 1970 and 2010, income inequality reduced economic growth in 31 countries by an average of 4.7 percentage points. The relationship also runs in the opposite direction: the IMF finds that longer periods of growth are associated with lower income inequality. Moreover, an improvement in the wage share of low incomes and ensuring that there is no hollowing out of the middle class is good for growth. See: OECD. In it Together: Why Less Inequality Benefits All. Paris: OECD Publishing, 2015. https://doi. org/10.1787/9789264235120-en; Berg, Andrew G., and Jonathan D. Ostry. "Inequality and Unsustainable Growth: Two Sides of the Same Coin?" International Monetary Fund Discussion Note, n.º 11/08, 2011. https://www.imf.org/en/Publications/Staff-Discussion-Notes/ Issues/2016/12/31/Inequality-and-Unsustainable-Growth-Two-Sidesof-the-Same-Coin-24686; Piketty, Thomas. Capital in the Twenty-First Century. Cambridge: Harvard University Press, 2017; y Dabla-Norris, Eva, et al. "Causes and consequences of income inequality: a global perspective." IMF Discussion Note, n.º 15/13, 2015. https://www.imf. org/en/Publications/Staff-Discussion-Notes/Issues/2016/12/31/ Causes-and-Consequences-of-Income-Inequality-A-Global-Perspective-42986.

⁴⁷ Rajan, Raghuram G. *Fault lines: How hidden fractures still threaten the world economy*. NewJersey: Princeton University Press, 2010.

⁴⁸The effect of inequality on innovation is complex. On the one hand, a certain level of inequality can generate positive incentives for investment. However, when inequality is very high, it tends to be transmitted intergenerationally, thus reducing entrepreneurship and innovation by the most vulnerable, who will not contribute to innovation as they are unlikely to have sufficient resources to do so. See: De Nardi, Mariacristina. "Wealth Inequality and Intergenerational Links." Review of Economic Studies 71, n.º 3, 2004. http://users.nber.org/~denardim/research/ denardi.pdf; Piketty, Thomas. "On the Long-Run Evolution of Inheritance - France 1820-2050." The Quarterly Journal of Economics 126, n.º 3, 2011. https://academic.oup.com/qje/article-abstract/126/3/1071/1 853329?redirectedFrom=fulltext; Jacobs, Elisabeth. What Do Trends in Economic Inequality Imply for Innovation and Entrepreneurship?: A Framework for Future Research and Policy. Washington Center for Equitable Growth, 2016. http://cdn.equitablegrowth.org/wp-content/ uploads/2016/02/16094329/021616-innovation-jacobs.pdf; Zweimüller, Josef. "Schumpeterian Entrepreneurs Meet Engel's Law: The Impact of Inequality on Innovation-Driven Growth." Journal of Economic Growth 5, 2000. https://doi.org/10.1023/A:1009889321237; and Weinhold, Diana, and Usha Nair-Reichert. "Innovation, Inequality and Intellectual Property Rights." World Development 37, n.º 5, 2009. https://doi.org/10.1016/j.worlddev.2008.09.013.; and Murphy, Kevin M., Andrei Shleifer, and Robert Vishny. "Income Distribution, Market Size, and Industrialization." The Quarterly Journal of Economics 104, n.º 5, 1989. https://doi.org/10.2307/2937810.

⁴⁹ Stiglitz, Joseph E. *The price of inequality: How today's divided society endangers our future*. New York: WW Norton & Company, 2012.

⁵⁰ Alesina, Alberto, and Roberto Perotti. "Income distribution, political

instability, and investment." *European Economic Review* 40, n.º 6, 1996. https://doi.org/10.1016/0014-2921(95)00030-5; and Vidal, Guillem. "Participación electoral y desigualdad política en España." In Alberto Penadés de la Cruz (dir.) *Informe sobre la Democracia en España* 2019. Madrid: Fundación Alternativas, 2020. https://www.fundacionalternativas.org/public/storage/publicaciones_archivos/423 630e5d43b0775509d13d7a725aa88.pdf.

⁵¹ Kelly, Morgan. "Inequality and crime." *The Review of Economics and Statistics* 82, n.º 4, 2006. https://doi.org/10.1162/003465300559028.

⁵²Østby, Gudrun. "Horizontal Inequalities, Political Environment, And Civil Conflict: Evidence From 55 Developing Countries, 1986-2003." *The World Bank, Policy Research, Working Papers*, 2007. https://doi. org/10.1596/1813-9450-4193.

⁵³ Jong-Sung, You, and Sanjeev Khagram. "A comparative study of inequality and corruption." *American Sociological Review* 70, n.º 1, 2005. https://doi.org/10.1177/000312240507000107.

⁵⁴ Olivera, Javier. "Changes in Inequality and Generalized Trust in Europe." *Social Indicators Research* 124, 2015. https://doi.org/10.1007/ s11205-014-0777-5; and Gustavsson, Magnus, and Henrik Jordahl. "Inequality and trust in Sweden: Some inequalities are more harmful than others." *Journal of Public Economics* 92, n.º 1-2, 2008. https://doi. org/10.1016/j.jpubeco.2007.06.010.

⁵⁵ Wilkinson, Robert, and Kate Pickett. *The Spirit Level: Why Equality is Better for Everyone*. London: Penguin, 2010.

⁵⁶ International Monetary Fund. IMF *Fiscal Monitor: Tackling Inequality*. Washington D.C., 2017. https://www.imf.org/en/Publications/FM/ Issues/2017/10/05/fiscal-monitor-october-2017.

⁵⁷ OECD. A Broken Social Elevator? How to Promote Social Mobility. Paris: OECD Publishing, 2018. https://doi.org/10.1787/9789264301085-en.

⁵⁸ This has stopped later for women as they started from a more unfavourable situation and benefited from a later entry into higher education and the labour market. Despite this more positive development for women in recent years, the gender pay gap is far from closing and motherhood is associated with a 28% annual pay penalty 10 years after childbirth. On this issue, see: De Quinto, Alicia, Laura Hospido and Carlos Sanz. "The Child Penalty in Spain." *Banco de España, Documentos Ocasionales*, nº 2017, 2020. https://repositorio. bde.es/bitstream/123456789/10459/1/do2017e.pdf.

⁵⁹ OECD. A Broken Social Elevator? How to Promote Social Mobility. Paris: OECD Publishing, 2018. https://doi.org/10.1787/9789264301085-en; Bukodi, Erzsébet, Marii Paskov, and Brian Nolan. "Intergenerational Class Mobility in Europe: A New Account." Social Forces 98, n° 3, 2020. https://doi.org/10.1093/sf/soz026; and Breen, Richard, y Walter Müller (eds.). Education and Intergenerational Social Mobility in Europe and the United States. Standford: Stanford Unviersity Press, 2020.

⁶⁰ Fundación Felipe González and Fundación COTEC. "Atlas de Oportunidades." COTEC, 2020. https://www.cotec.es/ fundacionfelipegonzalez/oportunidades/.

⁶¹ Marqués Perales, Ildefonso. *La movilidad social en España*. Madrid: Catarata, 2015. ⁶² For example, it is estimated that, at the current level of intergenerational mobility, it would take four generations for a low-income family to reach middle income. See: OECD. *A Broken Social Elevator? How to Promote Social Mobility*. Paris: OECD Publishing, 2018. https://doi.org/10.1787/9789264301085-en.

⁶³ Gil-Hernández, Carlos J., Fabrizio Bernardi, and Ruud Luijkx. "Intergenerational social mobility in twentieth-century Spain: Social fluidity without educational equalization." In Richard Breen y Walter Müller (eds.). *Education and Intergenerational Social Mobility in Europe and the United States*. Stanford: Stanford Unviersity Press, 2020; and Gil-Hernández, Carlos J., Ildefonso Marqués Perales, and Sandra Fachelli. "Intergenerational social mobility in Spain between 1956 and 2011: The role of educational expansion and economic modernisation in a late industrialised country." *Research in Social Stratification and Mobility* 51, 2017. https://doi.org/10.1016/j.rssm.2017.06.002.

⁶⁴ Alto Comisionado Contra la Pobreza Infantil. *Pobreza Infantil y Desigualdad educativa en España*. 2020. https://www.comisionadopobrezainfantil.gob.es/sites/default/files/Informe%20 ACPI-Educación%20mini.pdf.

⁶⁵The EU-8 does not include Austria due to lack of data and is calculated as the simple average of the values for each of its countries. The OECD averages shown are calculated as the simple average of the available OECD countries for each variable. The indicators for "educational mobility" and "occupational mobility" correspond to figures 4.6 and 5.13.A, respectively, in the above-mentioned report. Data are from the European Social Survey (2002-2014). See: OECD. *A Broken Social Elevator? How to Promote Social Mobility*. Paris: OECD Publishing, 2018. https://doi.org/10.1787/9789264301085-en.

⁶⁶ For example, 64% of people born into the poorest quintile end up staying there, compared to 57% in the OECD. Moreover, according to the Opportunity Atlas, children from poor families have lower incomes when they grow up. On average, those from poor households (<20% of income) have incomes around the 40th percentile. In contrast, those who have grown up in wealthy families (>80%) have them above the 60th percentile. See: OECD.. *A Broken Social Elevator? How to Promote Social Mobility*. Paris: OECD Publishing, 2018. https://www.oecd. org/spain/social-mobililty-2018-ESP-ES.pdf; and Fundación Felipe González, and Fundación COTEC. "Atlas de Oportunidades." COTEC, 2020. https://www.cotec.es/fundacionfelipegonzalez/oportunidades/.

⁶⁷For example, the percentage of sons and daughters from lower-middle socio-economic status families reaching professional or managerial occupations in our country is 15%, while in high status families it is 40-45%. See: Marqués Perales, Ildefonso. *La movilidad social en España*. Madrid: Catarata, 2015.

⁶⁸ For example, in 2017, while overweight affected 12% of adults in the richest quintile of the population, the percentage was twice as high in the poorest quintile. See: Department of Health, Consumer Affairs and Social Welfare. *Encuesta Nacional de Salud* 2017. Madrid, 2017. https://www.mscbs.gob.es/estadEstudios/estadisticas/ encuestaNacional/encuesta2017.htm; Zapata Moya, Ángel R., *et al.* "Social inequality in morbidity, framed within the current economic crisis in Spain." *International Journal for Equity in Health* 14, nº 131, 2015. https://doi.org/10.1186/s12939-015-0217-4; Gullón, Pedro, *et al.* "Social Inequities in Cardiovascular Risk Factors in Women and Men by Autonomous Regions in Spain." *Gaceta Sanitaria*, 2020. https://doi. org/10.1016/j.gaceta.2020.04.014; Gil, José, and Samia Takourabt. "Socio-Economics, Food Habits and the Prevalence of Childhood Obesity in Spain." *Child: Care, Health and Development* 43, n° 2, 2017. https://doi.org/10.1111/cch.12408; and Balaj, Mirza, *et al.* "The Social Determinants of Inequalities in Self-Reported Health in Europe: Findings from the European Social Survey (2014) Special Module on the Social Determinants of Health." *European Journal of Public Health* 27, n° suppl_1, 2017. https://doi.org/10.1093/eurpub/ckw217.

⁶⁹The data for Madrid are from the City Council and the difference is 10 years (78.4 years in the neighbourhood of Amposta, district of San Blas; 88.7 in the neighbourhood of El Goloso, district of Fuencarral-El Pardo). In Barcelona the differences are by districts, not neighbourhoods. Differences in 2016 were, for men: 78.1 in Ciutat Vella and 83 in Les Corts; for women: 85.2 in Ciutat Vella and 87.7 in Nou Barris. Logically, the differences will be much greater when looking at neighbourhoods. See: Agència de Salut Pública de Barcelona. *La salut a Barcelona 2017*. Barcelona, 2017. https://www.aspb.cat/wp-content/uploads/2018/11/ Informe-Salut-2017-web.pdf; and Madrid. Districts in figures. https:// www.madrid.es/portales/munimadrid/es/Inicio/El-Ayuntamiento/ Estadistica/Distritos-en-cifras/Distritos-en-cifras-Informacion-de-Distritos-/?vgnextfmt=default&vgnextoid=74b33ece5284c310Vgn VCM100000b205a0aRCRD&vgnextchannel=27002d05cb71b31-0VgnVCM100000b205a0aRCRD.

⁷⁰ See: OECD. *Under Pressure: The Squeezed Middle Class*. Paris: OECD Publishing, 2019. https://doi.org/10.1787/689afed1-en; and Milanovic, Branko. *Global Inequality: A New Approach for the Age of Globalization*. Cambridge (MA): Harvard University Press, 2016.

⁷¹Between 1980 and 2016, the incomes of the poorest half of the world's population, mostly concentrated in emerging countries, grew significantly, as did the incomes of the richest 1%, which captured 27% of total growth during this period. In contrast, the incomes of the European and North American middle and working classes fell. See: Alvaredo, Facundo, *et al.* (eds.). *World Happiness Report 2018*. Cambridge: Harvard University Press, 2018.

⁷²Goos, Maarten, Alan Manning, and Anna Salomons. "Explaining Job Polarization: Routine-Biased Technological Change and Offshoring." *The American Economic Review* 104, n°8, 2014. https://doi.org/10.1257/ aer.104.8.2509.

⁷³ Sebastián, Raquel. "Explaining job polsarisation in Spain from a task perspective." SERIES 9, 2018. https://doi.org/10.1007/s13209-018-0177-1.

⁷⁴ Cantó, Olga, Carmelo García-Pérez, and Marina Romaguera-de-la-Cruz. "The dimension, nature and distribution of economic insecurity in European countries: A multidimensional approach." *Economic Systems*, 2020. https://doi.org/10.1016/j.ecosys.2020.100807.

⁷⁵ On the idea of predistribution, see: Zalakain, Joseba and Borja Barragué. *Repensar las políticas sociales: predistribución e inversión social*. Madrid: Grupo 5, 2017.

⁷⁶ The redistributive effect of taxes is calculated by subtracting two Gini coefficients. The first corresponds to primary or market income (including pensions), and the second to disposable income plus direct taxes. The lower redistributive effect of direct taxes in Spain has to do with two characteristics of direct taxes in our country: the lower weight of personal income tax (which is progressive) compared to social security contributions, and the role of tax benefits, which moderate the progressivity of personal income tax. See: European Commission. *Taxation Trends in the European Union*. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/taxation_customs/sites/taxation/files/taxation_trends_report_2019.pdf; and EUROMOD. *Statistics on Distribution and Decomposition of Disposable Income*. https://www.euromod.ac.uk/using-euromod/statistics.

⁷⁷ World Inequality Database 2020. Post/pre-tax national income, P90/10. https://wid.world/.

⁷⁸ The EU-8 is calculated as the simple average of the values of its member countries. EU-27 is the data directly provided by Eurostat. See: Eurostat. *Main national accounts tax aggregates [gov_10a_taxag]: Total receipts from taxes and compulsory social contributions after deduction of amounts assessed but unlikely to be collected.* https://ec.europa.eu/eurostat/data/database.

⁷⁹ See: López Laborda, Julio, Carmen Marín González, and Jorge Onrubia. "Observatorio sobre el reparto de los impuestos y las prestaciones monetarias entre los hogares españoles. Cuarto informe: 2016 y 2017." *FEDEA, Estudios sobre la Economía Española*, nº 36, 2019. Https://www.fedea.net/observatorio-sobre-el-reparto-delos-impuestos-y-las-prestaciones-monetarias-entre-los-hogaresespanoles-cuarto-informe-2016-y-2017/;; and Deparment of Health, Consumer Affairs and Social Welfare. *Evolución de la pobreza en España 2009-2018.* Madrid, 2018. https://www.mscbs.gob.es/ssi/ familiasInfancia/inclusionSocial/inclusionSocialEspana/Evolucion_ indica_pobreza_09_18.pdf.

⁸⁰ Ibid.

⁸¹ In 2019, personal income tax revenues accounted for 41% of state tax revenues. This tax is followed by VAT (34%) and corporate income tax (11%). See: Tax Agency. "Informe Anual de Recaudación Tributaria." Agencia Tributaria, https://www.agenciatributaria.es/AEAT. internet/Inicio/La_Agencia_Tributaria/Memorias_y_estadisticas_ tributarias/Estadisticas/Recaudacion_tributaria/Informes_anuales_ de_Recaudacion_Tributaria/_Ayuda_Ejercicio_2019/_Ayuda_ Ejercicio_2019.html.

⁸² Although Spain's personal income tax collection is close to the EU average (around 7.8% of GDP), so far the tax benefits of personal income tax have benefited comparatively more the richer population. Thus, the 10% of taxpayers with the highest net wealth obtain personal income tax benefits that account for at least 33% of the total collection cost of the tax. This cost is mostly explained by the reduction in the tax base of contributions to social security systems (private pension plans), as well as by reductions for renting housing. For further details, see: AIRef. *Evaluación del gasto público 2019: Beneficios Fiscales*. Madrid, 2020. https://www.airef.es/wp-content/uploads/2020/PDF-WEB-BF-1. pdf#page=75.

⁸³ In order to increase the revenue and progressivity of the system, in 2021 the personal income tax has been increased by two points for earned income above 300,000 euros. See: Department of Finance. *Presupuestos Generales del Estado*. https://www.hacienda.gob.es/es-ES/ areas%20tematicas/presupuestos%20generales%20del%20estado/ Paginas/Presupuestos.aspx.

⁸⁴ The General State Budget for 2021 has modified the reduction for

contributions to private social security systems from 8,000 to 2,000 euros. See: Department of Finance. Presentación del Proyecto de Presupuestos Generales del Estado 2021. Madrid, 2021. https://www. sepg.pap.hacienda.gob.es/sitios/sepg/es-ES/Presupuestos/PGE/ ProyectoPGE2021/Documents/LIBROAMARILL02021.pdf.

⁸⁵ The objective assessment method in personal income tax does not directly collect the income obtained by taxpayers who carry out certain economic activities. See: Tax Agency. "Regimenes para determinar el rendimiento de las actividades económicas. Estimación Objetiva." Agencia Tributaria, https://www.agenciatributaria.es/ AEAT.internet/Inicio/_Segmentos_/Empresas_y_profesionales/ Empresarios_individuales_y_profesionales/Rendimientos_de_ actividades_economicas_en_el_IRPF/Regimenes_para_determinar_ el_rendimiento_de_las_actividades_economicas/Estimacion_Objetiva. shtml.

⁸⁶ Practices such as the deferral of income from movable capital (taxation at the time the asset is transferred even though there may be a latent gain in previous years) reduce the collection capacity of this tax. See: AIRef. *Evaluación del gasto público 2019: Beneficios Fiscales*. Madrid, 2020. https://www.airef.es/wp-content/uploads/2020/PDF-WEB-BF-1.pdf#page=75.

⁸⁷ Spain is one of the EU countries that collects the least in indirect taxes (24th in the EU, with 11.9% of GDP in 2018) and consumption taxes (26th in the EU, with 9.6% of GDP in 2018). In the specific case of VAT, our implicit rate is among the lowest in Europe (24th, 6.6% of GDP), due to the existence of reduced and super-reduced rates for a broad base of products. Overall, VAT and Excise Taxes enjoy the highest tax benefits of any tax category (amounting to a tax expenditure of around 3.5% of GDP). However, VAT tax benefits seem to fulfil their role of limiting the regressivity of the tax, so that any revenue increases that might be gained by eliminating them should be accompanied by measures to ensure access to goods covered by reduced rates for lowerincome households. For further details, see: AIRef. Evaluación del gasto público 2019: Beneficios Fiscales. Madrid, 2020. https://www.airef.es/ wp-content/uploads/2020/PDF-WEB-BF-1.pdf#page=75; y European Commission. Taxation Trends in the European Union. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/ taxation_customs/sites/taxation/files/taxation_trends_report_2019. pdf.

⁸⁸ For further details, see: López Laborda, Julio, Carmen Marín González, and Jorge Onrubia. "Observatorio sobre el reparto de los impuestos y las prestaciones monetarias entre los hogares españoles. Cuarto informe: 2016 y 2017." *FEDEA, Estudios sobre la Economía Española*, nº 36, 2019. https://www.fedea.net/observatorio-sobre-el-repartode-los-impuestos-y-las-prestaciones-monetarias-entre-los-hogaresespanoles-cuarto-informe-2016-y-2017/.

⁸⁹ Assessing the progressivity of taxation of corporate profits requires joint consideration of corporate income tax and personal income tax, as the latter is responsible for taxing dividends distributed to shareholders and capital gains generated by share transfer transactions. However, it should be noted that a significant volume of this corporate income is taxed differently for personal income tax purposes as it is capitalised in portfolios of investment funds and SICAVs (Sociedades de Inversión de Capital Variable)

⁹⁰Net revenue from corporate income tax fell from 44,823 million euros

in 2007 to just 16,198 million euros in 2010, which as a percentage of GDP meant a loss of three percentage points from 4.5% to 1.5% of GDP. Since 2012, revenue collection has remained stable at levels around 1.9% of GDP. This trend towards lower revenue collection has been quite generalised at a global and European level after the 2008 financial crisis, although in Spain the fall has been more pronounced. See: Tax Agency. "El Impuesto sobre Sociedades." Tax Agency, https:// www.agenciatributaria.es/AEAT.internet/Inicio/La_Agencia_Tributaria/ Memorias_y_estadisticas_tributarias/Estadisticas/Recaudacion_ tributaria/Informes_anuales_de_Recaudacion_Tributaria/_Ayuda_ Ejercicio_2018/3__El_Impuesto_sobre_Sociedades/3__El_Impuesto_ sobre_Sociedades.html; and OECD. *Corporate Tax Statistics Database*. OCDE, https://www.oecd.org/tax/tax-policy/corporate-tax-statisticsdatabase.htm.

⁹¹ In the OECD economies as a whole, the average statutory tax rate reached 28.0% in 2000, falling to 20.6% in 2020. In the EU-27, the marginal (highest) corporate income tax rate has been gradually reduced from 26.5% in 2006 to 21.5% in 2020. See: European Commission. *Taxation Trends in the European Union*. Luxembourg: Publications Office of the European Union, 2020. https://op.europa.eu/en/publicationdetail/-/publication/c0b00da7-c4b1-11ea-b3a4-01aa75ed71a1; y OCDE. "Corporate Tax Statistics Database." OECD, https://www.oecd. org/tax/tax-policy/corporate-tax-statistics-database.htm.

⁹² The ability of multinationals to relocate profits, often within EU borders, means that the Spanish Treasury receives up to 13% less than it would be entitled to in corporate tax. For further details, see: Tørsløv, Thomas R., Ludvig S. Wier, and Gabriel Zucman. "The Missing Profits of Nations." *NBER Working Paper*, n.º 24701, 2020. https://www.nber.org/ system/files/working_papers/w24701/w24701.pdf.

⁹³ Inheritance and Gift Tax and Wealth Tax are state taxes whose regulatory capacity is ceded to the autonomous communities (Law 14/1996), which has generated a high degree of regulatory heterogeneity that sometimes distorts the aggregate collection of these taxes and undermines the progressivity of the system. For further details, see: Official State Gazette. Ley 14/1996, de 30 de diciembre, de cesión de tributos del Estado a las Comunidades Autónomas y de medidas fiscales complementarias. Madrid, 1996. https://www.boe. es/eli/es/l/1996/12/30/14/dof/spa/pdf; López Laborda, Julio and Fernando Rodrigo Sauco. "Movilidad de los contribuyentes de rentas altas en respuesta a las diferencias regionales en los impuestos personales." FEDEA, Studies on the Spanish Economy. 2017. https:// ideas.repec.org/p/fda/fdaeee/eee2017-28.html; and Department of Finance. Tributación Autonómica. Medidas 2020. Madrid. 2020. https://www.hacienda.gob.es/Documentacion/Publico/PortalVarios/ FinanciacionTerritorial/Autonomica/Cap%C3%ADtulo%20I%20 Tributaci%C3%B3n%20Auton%C3%B3mica%202020.pdf.

⁹⁴ European Commission. *Taxation Trends in the European Union*. Luxembourg: Publications Office of the European Union, 2020. https:// op.europa.eu/en/publication-detail/-/publication/c0b00da7-c4b1-11ea-b3a4-01aa75ed71a1.

⁹⁵ López Laborda, Julio, Carmen Marín González, and Jorge Onrubia. "Observatorio sobre el reparto de los impuestos y las prestaciones monetarias entre los hogares españoles. Cuarto informe: 2016 y 2017." FEDEA, Estudios sobre la Economía Española, nº 36, 2019. https:// www.fedea.net/observatorio-sobre-el-reparto-de-los-impuestos-y-

las-prestaciones-monetarias-entre-los-hogares-espanoles-cuartoinforme-2016-y-2017/.

⁹⁶ Hemerijc, Anton. *The uses of social investment*. Oxford: Oxford University Press, 2017.

⁹⁷ In fact, spending on health and education alone has come to account for more than half and a third, respectively, of the incomes of the poorest two deciles, compared to just 5% of the incomes of the richest decile. For further details, see: Calonge Ramírez, Samuel, and Antonio Manresa Sánchez. "Crisis económica y desigualdad de la renta en España. Efectos distributivos de las políticas públicas." *Estudios de la Funcación Funcas* 92, 2019. https://www.funcas.es/libro/crisis-economica-y-desigualdadde-la-renta-en-espana-efectos-distributivos-de-las-politicas-publicasoctubre-2019/.

⁹⁸ Eurostat. *Gini coefficient of equivalised disposable income [ilc_di12];* y *Gini coefficient of equivalised disposable income before social transfers (pensions included in social transfers) [ilc_d112b].* https://ec.europa. eu/eurostat/data/database.

⁹⁹ Eurostat. Impact of social transfers (excluding pensions) on poverty reduction by sex [tespm050]. https://ec.europa.eu/eurostat/data/ database.

¹⁰⁰ Social expenditure is the set of current account transfers made by states for redistributive purposes. Data for France, Spain, Croatia and Slovakia are provisional, and those for Portugal are estimates. See: Eurostat. *Total government expenditure on social protection [gov_10a_ exp]*. https://ec.europa.eu/eurostat/data/database.

¹⁰¹ The introduction of the Minimum Living Income in May 2020 may represent a turning point in this respect, bringing us closer in redistributive terms to other European benchmark countries, although its real impact will depend on the final volume of beneficiaries and the average amount of benefits recognised

¹⁰² That is, only in these three countries are transfers per person in the poorest quintile further away from the average

¹⁰³ Data for Ireland are from 2015, and for Hungary from 2014. See: OECD. *Society at a Glance 2019*. OECD Publishing, 2019. https://doi. org/10.1787/soc_glance-2019-en.

¹⁰⁴ According to Eurostat, in 2019, 38% of people living in rented accommodation in Spain had to spend more than 40% of their disposable income on rent. This is 13 percentage points higher than the EU-27 average. For further details, see: Eurostat. *Housing cost overburden rate by tenure status [tessi164]*. https://ec.europa.eu/ eurostat/data/database.

¹⁰⁵ It should also be noted that renting can bring some advantages over owning in terms of the absence of financial costs and vulnerability in case the property is accessed through a mortgage

¹⁰⁶ Eurostat. Distribution of population by tenure status, type of household and income group [ilc_lvho02]. https://ec.europa.eu/eurostat/data/ database.

¹⁰⁷ Consejo General del Poder Judicial. *Datos sobre el efecto de la crisis en los órganos judiciales por TSJ hasta Segundo Trimestre 2020*. http:// www.poderjudicial.es/cgpj/es/Temas/Estadistica-Judicial/Estudios-e-Informes/Efecto-de-la-Crisis-en-los-organos-judiciales/Efecto-de-la-

Crisis-en-los-organos-judiciales.

¹⁰⁸ Fundación Foessa. *VIII Informe sobre Exclusión y Desarrollo Social en España*. Madrid: Cáritas Española Editores, 2019. http://www. plataformatercersector.es/sites/default/files/20190612%20VIII%20 Informe-FOESSA-2019-completo.pdf.

¹⁰⁹ Banco de España. *Indicadores del Mercado de la Vivienda,* 2020. https://www.bde.es/webbde/es/estadis/infoest/si_1_5.pdf.

¹¹⁰ Between 2014 and 2017, the percentage of owner-occupied households headed by a person under 35 years of age has fallen by more than 8 percentage points to 41.3%. For further details, see: Banco de España. *Boletín Económico: Encuesta Financiera de las Familias (EFF) 2017: Métodos, Resultados y Cambios desde 2014.* Madrid, 2019. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/ InformesBoletinesRevistas/ArticulosAnaliticos/19/T4/descargar/Fich/ be1904-art38.pdf.

¹¹¹ Palomino, Juan C., Gustavo A. Marrero, Brian Nolan, and Juan Gabriel Rodriguez. "Wealth Inequality, Intergenerational Transfers and Socioeconomic Background." *Working Papers 537, ECINEQ, Society for the Study of Economic Inequality*, 2020. https://doi.org/10.2139/ ssrn.3623547.

¹¹² Between 1980 and 2018, the nominal value of wealth grew, on average annually, by 3.3% compared to GDP growth of 2.5%, led by housing. In 1980, housing accounted for half of gross household assets, but two decades later, coinciding with the real estate boom, it reached 65% of the total. After the 2008 crisis, these levels have fallen back to 60% in 2017. This growth in housing wealth was due to both an increase in the number of dwellings and an increase in their prices (they rose by almost 2% per year above inflation in the period 1980-2018). For further details, see: Artola Blanco, Miguel, Luis E. Bauluz, and Clara Martínez-Toledano. "Wealth in Spain, 1900-2017: A Country of Two Lands." *The Economic Journal*, n.º ueaa103, 2020. https://doi. org/10.1093/ej/ueaa103.

¹¹³ Ibid.

¹¹⁴ See: Aspachs, Oriol, *et al.* "Measuring income inequality and the impact of the welfare state during COVID-19: Evidence from bank data." VoxEU.Org (blog), 2020. https://voxeu.org/article/incomeinequality-and-welfare-state-during-covid-19#.X2pKVgf9LH8; Moisés Martín, José. *Estimación Del Efecto Del Covid-19 En La Pobreza Y La Distribución De La Renta En España.* Madrid: Oxfam Intermón, 2020. https://oxfam.app.box.com/s/ewkxpwf6amaux3rq2fb3hri5zxqj6s8l; and Eurostat. "Impact of COVID-19 on employment income – advanced estimates." *Online publication*, 2020. https://ec.europa.eu/eurostat/ statistics-explained/index.php?title=Impact_of_COVID-19_on_ employment_income_-_advanced_estimates#E2.80.A6and_skewed_ towards_the_left_of_the_distribution_with_low_wage_earners_having_ losses_3_to_6_times_larger_for_half_of_the_countries.

¹¹⁵ A recent Eurostat report estimates that the difference between the loss of income due to the spring 2020 containment measures in low income groups was up to 8 percentage points higher than in high income groups in Spain, well above the rest of European countries. For further details, see: Eurostat. "Impact of COVID-19 on employment income – advanced estimates." *Online publication*, 2020. https:// ec.europa.eu/eurostat/statistics-explained/index.php?title=Impact_ of_COVID-19_on_employment_income_-_advanced_estimates#E2.80. A6and_skewed_towards_the_left_of_the_distribution_with_low_ wage_earners_having_losses_3_to_6_times_larger_for_half_of_the_ countries.

¹¹⁶Work by the *Institute for Fiscal Studies* for the UK found comparable results. The case of the so-called "state of hibernation", declared by the government between 30 March and 9 April, presents a different profile. With the closure of much of industry and professional services, in addition to the sectors described above, the deciles that could be identified as "middle classes" were hit harder than the rest. However, this episode lasted for only 10 days, so its impact in aggregate terms should be minor. For further details, see: Joyce, Robert, and Xiaowei Xu. *Sector shutdowns during the coronavirus crisis: which workers are most exposed*? Institute for Fiscal Studies Briefing Note, 2020. https://www. ifs.org.uk/publications/14791.

¹¹⁷ Ministerio de Inclusión, Seguridad Social y Migraciones. Muestra Continua de Vidas Laborales con datos fiscales (MCVL-CDF). http:// www.seg-social.es/wps/portal/wss/internet/EstadisticasPresupuesto sEstudios/Estadisticas/EST211?changeLanguage=es.

¹¹⁸ Aspachs, Oriol, *et al.* "Evolución de la desigualdad en tiempo real y efectividad del Estado de Bienestar para amortiguar el impacto de la crisis." *CaixaBank Research, Nota Breve,* 2020. https://www. caixabankresearch.com/es/publicaciones/notas-breves-actualidadeconomica-y-financiera/espana/evolucion-desigualdad-tiempo.

¹¹⁹ Eurostat. "Impact of COVID-19 on employment income – advanced estimates." *Online publication*, 2020. https://ec.europa.eu/eurostat/ statistics-explained/index.php?title=Impact_of_COVID-19_on_ employment_income_-_advanced_estimates.

¹²⁰ Ministerio de Inclusión, Seguridad Social y Migraciones. Muestra Continua de Vidas Laborales con datos fiscales (MCVL-CDF). http:// www.seg-social.es/wps/portal/wss/internet/EstadisticasPresupuesto sEstudios/Estadisticas/EST211?changeLanguage=es.

¹²¹Aspachs, Oriol, *et al.* "Real-time inequality and the welfare state in motion: Evidence from COVID-19 in Spain" *Economic Working Paper Series*, n.º 1734, 2020. https://econ-papers.upf.edu/papers/1734.pdf.

¹²² Eurostat. "Impact of COVID-19 on employment income – advanced estimates." *Online publication*, 2020. https://ec.europa.eu/ eurostat/statistics-explained/index.php?title=Impact_of_COVID-19_ on_employment_income_-_advanced_estimates; OXFAM. *Una Reconstrucción Justa es Posible y Necesaria*. 2020. https://www. oxfamintermon.org/es/publicacion/reconstruccion-justa-posiblenecesaria?hsLang=es; and Palomino, Juan C., Juan G. Rodríguez, y Raquel Sebastián. "Wage inequality and poverty effects of lockdown and social distancing in Europe." *INET Oxford Working Paper*, n.º 13, 2020. https://www.inet.ox.ac.uk/files/Lockdown_inequality_Palomino_ Rodriguez_Sebastian_WP.pdf.

¹²³ OXFAM. Una Reconstrucción Justa es Posible y Necesaria. 2020. https://www.oxfamintermon.org/es/publicacion/reconstruccion-justaposible-necesaria?hsLang=es.

¹²⁴ Aspachs, Oriol, *et al.* "Measuring income inequality and the impact of the welfare state during COVID-19: Evidence from bank data." VoxEU. Org (blog), 2020. https://voxeu.org/article/income-inequality-andwelfare-state-during-covid-19#.X2pKVgf9LH8.

¹²⁵ OECD- Income Inequality Data. https://data.oecd.org/inequality/

income-inequality.htm.

¹²⁶ Bonal, Xavier y Sheila González. "The impact of lockdown on the learning gap: family and school divisions in times of crisis". *International Review of Education*, 2020. https://doi.org/10.1007/s11159-020-09860-z.

¹²⁷ COTEC. "El Impacto De La Escuela En Casa En Las Brechas De Aprendizaje." 2020. https://cotec.es/el-impacto-de-la-escuela-encasa-en-las-brechas-de-aprendizaje/.

¹²⁸ The Gini indices in this figure are obtained from the anonymised processing of CaixaBank's internal payroll data. See: CaixaBank Research. *Monitor de Desigualdad*. https://inequality-tracker. caixabankresearch.com.

¹²⁹ Furceri, Davide, Prakash Loungani, Jonathan D. Ostry, and Pietro Pizzuto. "Will Covid-19 affect inequality? Evidence from past pandemics". *Covid Economics* 12, nº 1, 2020. https://cepr.org/file/9050/ download?token=R4U7P5E8.

¹³⁰ OXFAM Intermon. *Superar la pandemia y reducir la desigualdad.* https://f.hubspotusercontent20.net/hubfs/426027/Oxfam-Website/ oi-informes/superar-covid-reducir-desigualdad-oxfam-intermon.pdf.

¹³¹ Moisés Martín, José. *Estimación Del Efecto Del Covid-19 En La Pobreza Y La Distribución De La Renta En España*. Madrid: Oxfam Intermon, 2020. https://oxfam.app.box.com/s/ewkxpwf6amaux3rq2 fb3hri5zxqj6s8l.

¹³²The few quantitative studies available point in precisely this direction. See in this regard: Rao, Narasimha D., Petra Sauer, Matthew Gidden, and Keywan Riahi. "Income inequality projections for the Shared Socioeconomic Pathways (SSPs)." *Futures* 105, 2018. https://doi. org/10.1016/j.futures.2018.07.001.

¹³³ Herce, José Antonio. "La protección social de los trabajadores no convencionales." Dictamen para ATA, 2018. http://www. fundacionalternativas.org/las-publicaciones/informes/3er-informesobre-la-desigualdad-en-espana-2018.

¹³⁴ Vizán Rodríguez, Carmen. La caída del peso económica de las rentas del trabajo. Madrid: Fundación Alternativas, Zoom Económico, 2018. https://www.fundacionalternativas.org/public/storage/laboratorio_ documentos_archivos/67191fa0e178c4aff9bca00189d2210a.pdf.

¹³⁵ Acemoglu, Daron and Pascuel Restrepo. "The Race between Man and Machine: Implications of Technology for Growth, Factor Shares, and Employment." *American Economic Review* 108, n.º 6, 2018. https:// pubs.aeaweb.org/doi/pdfplus/10.1257/aer.20160696.

¹³⁶ AMECO. Adjusted wage share: total economy: as percentage of GDP at current prices (Compensation per employee as percentage of GDP at market prices per person employed). https://ec.europa.eu/info/ business-economy-euro/indicators-statistics/economic-databases/ macro-economic-database-ameco/ameco-database_en.

¹³⁷ Roy, J., P. Tschakert and H. Waisman (coords.). "Sustainable Development, Poverty Eradication and Reducing Inequalities." En Masson-Delmotte, V., et. al. Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. IPCC, 2018. https://www.ipcc.ch/site/assets/uploads/2018/11/sr15_ chapter5.pdf.

¹³⁸ Sterner, Thomas (ed.). *Fuel Taxes and the Poor. The Distributional Effects of Gasoline Taxation and Their Implications for Climate Policy.* Washington D.C.: RFF Press, 2015.

¹³⁹ Household savings include the retained earnings of the enterprises they own. Since the 1980s, Spanish households have saved, on average, 12% of national income, but the differences between groups have been very marked. For further details, see: Bauluz, Luis, Filip Novokmet, and Moritz Schularick. "Anatomy of the Global Wealth Boom." University of Bonn, en prensa.

¹⁴⁰ In the medium to long term, national house prices are expected to grow in line with consumer price (inflation) growth. Over the period 1995-2015, house price growth in Spain has outpaced inflation by 2%. For further details, see: Bauluz, Luis, Filip Novokmet, and Moritz Schularick. "Anatomy of the Global Wealth Boom." University of Bonn, en prensa.

¹⁴¹ This exercise is based on work in progress (Bauluz, Luis, Filip Novokmet, and Moritz Schularick. "Anatomy of the Global Wealth Boom." University of Bonn, in press) that decomposes the dynamics of wealth accumulation between savings and capital gains on different assets, by wealth groups in high-income countries. The results for France and Germany indicate that the dynamics of wealth concentration since 1980 have depended primarily on the distribution of savings (mostly concentrated in the top 10% of the wealth distribution), and housing capital gains (which have moderated inequality in favour of the middle classes). As is well known, inequality in savings depends critically on income inequality. The projections for Spain are therefore based on assuming how (i) real estate prices and (ii) savings inequality (in turn influenced by income inequality) will evolve. Both scenarios assume that house prices follow inflation (such as the Consumer Price Index (CPI)) and differ in the evolution of savings by wealth group. The first scenario assumes that the trends in savings observed from 1984 to 2015 will continue into the future. The second scenario projects developments since 1995, which have been more uneven than in the previous period. For further details, see: Saez, Emmanuel, and Gabriel Zucman. "Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data." The Quarterly Journal of Economics 131, n.º 2, 2016. https://doi.org/10.1093/qje/qjw004; Artola Blanco, Miguel, Luis E. Bauluz, and Clara Martínez-Toledano. Clara Martínez-Toledano. "Wealth in Spain, 1900-2017: A Country of Two Lands." The Economic Journal, n.º ueaa103, 2020. https://doi.org/10.1093/ej/ueaa103; and Clara Martínez-Toledano. "House Price Cycles, Wealth Inequality and Portfolio Reshuffling." World Inequality Lab working paper, nº 2, 2020. https://wid.world/document/houseprice-cycles-wealth-inequality-andportfolio-reshuffling-wid-world-working-paper-2020-02/.

¹⁴²The recently approved Recovery, Transformation and Resilience Plan (RRTP) includes a broad agenda of reforms that coincide with some of the areas described below. See: https://www.boe.es/diario_boe/txt. php?id=BOE-A-2020-17340.

¹⁴³ Rao, Narasimha D., Petra Sauer, Matthew Gidden, Keywan Riahi. "Income inequality projections for the Shared Socioeconomic Pathways (SSPs)." *Futures* 105, 2018. https://doi.org/10.1016/j. futures.2018.07.001. ¹⁴⁴ See: Kuzmenko, Olha, and Victoria Roienko. "Nowcasting income inequality in the context of the Fourth Industrial Revolution." Socio Economic Challenges 1, n.º 1, 2017. https://core.ac.uk/download/ pdf/141466113.pdf; Roberts, Carys, Mathew Lawrence, and Loren King. "Managing automation: Employment, inequality and ethics in the digital age." IPPR Commission on Economic Justice Discussion Paper, 2017. http://www.ippr.org/publications/managing-automation; Karabarbounis, Loukas, and Brent Neiman. "The global decline of the labor share." The Quarterly Journal of Economics 129, n.º 1, 2014. https://doi.org/10.1093/qje/qjt032; Ford, Martin. Rise of the robots: technology and the threat of a jobless future. New York: Basic Books, 2015; Arntz, Melanie, Terry Gregory, and Ulrich Zierahn "The risk of automation for jobs in OCDE countries: A comparative analysis", OCDE Social, Employment and Migration Working Papers, n.º 189, París: OECD Publishing, 2016. https://doi.org/10.1787/1815199X; OECD. Achieving inclusive growth in the face of digital transformation and the future of work. Paris: OECD Publishing, 2018. https://www.oecd.org/ g20/OECD_Achieving%20inclusive%20growth%20in%20the%20 face%20of%20FoW.pdf; Graetz, Georg, and Guy Michaels. "Robots at work." The Review of Economics and Statistics, n.º 5, 2018. https://www. mitpressjournals.org/doi/pdf/10.1162/rest_a_00754; Rogers, Brishen. "The social costs of Uber." University of Chicago Law Review Dialogue, Temple University Legal Studies Research Paper, n.º 2015/28, 2015. http://dx.doi.org/10.2139/ssrn.2608017; Tapscott, Don, and Anthony D. Williams. Wikinomics: How mass collaboration changes everthing. London: Penguin, 2008; and Hargittai, Eszter. "The Digital Reproduction of Inequality." In David Grusky (ed.). Social Stratification. Boulder: Westview Press, 2008. 936-944.

¹⁴⁵See: Markkanen, Sanna. "Social impacts of climate change mitigation policies and their implications for inequality." Climate Policy 19, n.º 7, 2019. https://doi.org/10.1080/14693062.2019.1596873; Islam, Nazrul, and John Winkel. "Climate Change and Social Inequality." United Nations, Department of Economic and Social Affairs. UN/DESA Working Papers, n.º 152, 2017. https://www.un.org/esa/desa/papers/2017/ wp152_2017.pdf; Alexandri, Eva, et al. "The Macroeconomic and Other Benefits of Energy Efficiency." European Commission, 2016. https://ec.europa.eu/energy/sites/ener/files/documents/final_report_ v4 final.pdf; Owen, Anne, and John Barrett. "Reducing inequality resulting from UK low-carbon policy." *Climate Policy* 20, n.º 10, 2020. https://doi.org/10.1080/14693062.2020.1773754; International Labour Organization, and OECD.. Sustainable development, green growth and quality employment: Realizing the potential for mutually reinforcing policies. 2012. https://www.oecd.org/els/emp/50318559. pdf; Taconet, Nicolas, Aurélie Méjean, and Céline Guivarch. "Influence of climate change impacts and mitigation costs on inequality between countries." Climate Policy 160, 2020. https://doi.org/10.1007/s10584-019-02637-w; Gouldson, Andy, Andrew Sudmant, Haneen Khreis, and Effie Papagyropoulou. The Economic and Social Benefits of Low-Carbon Cities: A Systematic Review of the Evidence. London and Washington D.C.: Coalition for Urban Transitions, 2018. http://newclimateeconomy.net/ content/cities-working-papers; Just Transition Centre. Just transition: A report for OECD. Paris: OECD Publishing, 2017. https://www.oecd.org/ environment/cc/g20-climate/collapsecontents/Just-Transition-Centrereport-just-transition.pdf; Chancel, Lucas. Unsustainable Inequalities. Cambridge: Harvard University Press, 2020. https://www.hup.harvard. edu/catalog.php?isbn=9780674984653&content=bios.

¹⁴⁶On the Universal Public Inheritance proposal, see: Atkinson, Anthony

B. Inequality: *What can be done?* Cambridge: Harvard University Press, 2015.

¹⁴⁷ Moreover, such funds have a distributional dimension, as they ensure a more equitable distribution of returns to capital, which have increased over the last decades at the expense of labour income. See: Karabarbounis, Loukas, and Brent Neiman. "The global decline of the labor share." *The Quarterly Journal of Economics* 129, n.º 1, 2014. https://doi.org/10.1093/qje/qjt032.

¹⁴⁸ Mazzucato, Mariana. *El estado emprendedor*. Barcelona: RBA libros, 2014.

¹⁴⁹ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. Gini coefficient of equivalised disposable income [ilc_di12] https://ec.europa.eu/eurostat/data/ database.Tax Agency. For further details, see: Eurostat. Gini coefficient of equivalised disposable income [ilc_di12] https://ec.europa.eu/ eurostat/data/database.

¹⁵⁰ Estimation based on the model of Rao et al consistent with the projections of growth, productivity improvement and education indicators proposed in chapters 1 and 2 of this *Strategy. See:* Rao, Narasimha D., Petra Sauer, Matthew Gidden, and Keywan Riahi. "Income inequality projections for the Shared Socioeconomic Pathways (SSPs)." *Futures* 105, 2018. Https://doi.org/10.1016/j.futures.2018.07.001.. Estimation based on the model of Rao et al consistent with the projections of growth, productivity improvement and education indicators proposed in chapters 1 and 2 of this Strategy See: Rao, Narasimha D., Petra Sauer, Matthew Gidden, and Keywan Riahi. "Income inequality projections for the Shared Socioeconomic Pathways (SSPs)." Futures 105, 2018. https://doi.org/10.1016/j.futures.2018.07.001.

¹⁵¹The poverty risk is calculated using the cut-off point of 60% of the median equivalent income after social transfers. Data of Italy and Ireland are of 2018. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: *Eurostat. Atrisk-of-poverty rate by poverty threshold [ilc_li02]*. https://ec.europa.eu/eurostat/data/database.The poverty risk is calculated using the cut-off point of 60% of the median equivalent income after social transfers. Data of Italy and Ireland are of 2018. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. At-risk-of-poverty rate by poverty threshold [ilc_li02]. https://ec.europa.eu/eurostat/data/database.

¹⁵² The odds ratio is used, i.e. at equal mathematics and science proficiency, how many times higher is the probability of repeating an academic year for a student from a more disadvantaged background compared to a student with more resources. For example, a value of 4 means that, with equivalent skills in mathematics and science, a student with fewer resources (25% of students with fewer resources) is four times more likely to have repeated an academic year than a student from a more favourable background (25% of students with more resources). The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries from PISA 2018 microdata. The EU-27 exludes the countries that are not members of the OECD. Bulgaria, Croatia, Cyprus, Malta and Romania. For further details, see: Ferrer, Álvaro. Todo lo que debes saber de PISA 2018 sobre equidad. Madrid, 2019. https://www.savethechildren.es/sites/default/files/imce/ dossier_pisa2018_espanadatos.pdf; and OECD. PISA 2018. https:// www.oecd.org/pisa/.

¹⁵³ Tax revenue is the total revenue from taxes and compulsory social security contributions. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Main national accounts tax aggregates [gov_10a_taxag]: Total receipts from taxes and compulsory social contributions after deduction of amounts assessed but unlikely to be collected.* https://ec.europa.eu/eurostat/data/database

¹⁵⁴ Social protection expenditure includes, among other items, public spending on pensions, unemployment benefits, active employment policies (including training and guidance policies) and other social assistance. The observed figure is the average from 2015 to 2018. For further details, see: European Commission. *Manual on sources and methods for the compilation of COFOG statistics*. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/ eurostat/documents/3859598/10142242/KS-GQ-19-010-EN-N.pdf/ ed64a194-81db-112b-074b-b7a9eb946c32?t=1569418084000; and Eurostat. Total government expenditure on social protection [gov_10a_ exp]. https://ec.europa.eu/eurostat/data/database

¹⁵⁵ The observed figure is the average from 2015 to 2017 For further details, see: Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" *IMF Working Papers*, n.º 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last-20-Years-45583

¹⁵⁶On the degree of effectiveness of personal income tax and corporate tax benefits, see: AIReF. *Evaluación del gasto público 2019: Beneficios Fiscales*. Madrid, 2020. https://www.airef.es/wp-content/uploads/2020/ PDF-WEB-BF-1.pdf#page=75

¹⁵⁷ On BEPS Inclusive Framework, see: http://www.oecd.org/tax/beps/

¹⁵⁸ Tax on Certain Digital Services, which entered into force in January 2021, is a step in this direction and recognises, in its preamble, the need for international coordination in this type of taxation. For further details, see: https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-12355

¹⁵⁹ For a European comparison of tax rates on labour income, capital income and consumption, see: Directorate-General for Taxation and Customs Union (European Commission). *Taxation Trends in the European Union*. Luxembourg: Publications Office of the European Union, 2020. https://op.europa.eu/en/publication-detail/-/publication/ c0b00da7-c4b1-11ea-b3a4-01aa75ed71a1

¹⁶⁰ Measures to increase the progressivity of income and wealth taxes could include the following: 1) explore new forms of taxation that increase the taxation of capitalised income from investment funds and SICAVs, 2) review the tax incentives and instruments applied to rental income [see Chapter 6], and 3) raise the rate of imputation of rental income for housing at the disposal of users.

¹⁶¹ Gago, Alberto, et al. Impuestos energético-ambientales en España: situación y propuestas eficientes y equitativas. Madrid: Fundación Alternativas, 2019. https://www.fundacionalternativas.org/public/ storage/publicaciones_archivos/58ce043c930b1da7b5d92cffac
6f5215.pdf

¹⁶² The percentage of net financial wealth held by Spaniards in tax havens was estimated to be 23% in 2012, a much higher value than the 8% obtained by Gabriel Zucman (2014) at the global level. For further details, see: Artola Blanco, Miguel, Luis E. Bauluz, y Clara Martínez-Toledano. "Wealth in Spain, 1900-2017: A Country of Two Lands." *The Economic Journal*, n.º ueaa103, 2020. https://doi.org/10.1093/ej/ ueaa103); Zucman, Gabriel. "Taxing across Borders: Tracking Personal Wealth and Corporate Profits." *Journal of Economic Perspectives* 28, nº 4, 2014. https://doi.org/10.1257/jep.28.4.121

¹⁶³ In this regard, the draft law on measures to prevent and combat tax fraud is currently before the Spanish Parliament.https://www.congreso. es/public_oficiales/L14/CONG/BOCG/A/BOCG-14-A-33-1.PDF

¹⁶⁴ On the concept of tax morale (tax morale), see: Rodroguez-Justicia, David y Bern Theilen. "Education and Tax Morale". Journal of Economic Psychology 64, 2018

¹⁶⁵ The "National Plan for Recovery, Transformation and Resilience" devotes, in its component 23 "New public policies for a dynamic, resilient and inclusive labour market" EUR 298 million to fostering inclusive growth by linking social inclusion policies to the minimum living income. It seeks to improve access to the MVI for people at risk of social exclusion who are not receiving it (improvement of the take up), which requires proactive work by the State Administration in collaboration with the entities and organisations closest to the potential beneficiaries: social services and entities of the Third Sector of Social Action. Secondly, it seeks to increase the effectiveness of the Minimum Living Income through inclusion policies by developing inclusion pathways with sub-national public administrations, the third social action sector and the private sector. See: Government of Spain. Proyecto Plan de Recuperación, Transformación y Resiliencia. Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf

¹⁶⁶ Deductions for disabled ascendants or descendants, large families, for ascendants with two dependent children who are not entitled to maintenance payments and for dependent spouses with an income of less than 8,000 euros can be obtained by taxpayers who are not obliged to file a tax return, by means of advance payment, which in practice means a direct transfer of income to the beneficiaries of these deductions. https://www.agenciatributaria.es/AEAT.internet/ Inicio/Ayuda/Modelos_Procedimientos_y_Servicios/Ayuda_ Modelo_143/Informacion_general/Esquema_de_la_deduccion. shtml#:~:text=Familia%20numerosa%3A%201.200%20euros%20 anuales,euros%20anuales%20por%20cada%20ascendiente ¹⁶⁷ UNICEF. Universal Child Benefits in Europe and Central Asia. Geneve, 2020. https://www.unicef.org/eca/reports/universal-child-benefitseurope-and-central-asia

¹⁶⁸Some countries, such as Australia, have already implemented such a system of distributive national accounts and others are working on their design. For further details, see: Piketty, Thomas, et al. "Distributional National Accounts: Methods and Estimates for the United States." *The Quarterly Journal of Economics* 133, N° 2, 2018, https://academic.oup. com/qje/article/133/2/553/4430651

¹⁶⁹ It has just been approved, in this sense, the Royal Decree 902/2020 of 13 October on Equal Pay for Women and Men. https://www.boe.es/ buscar/act.php?id=BOE-A-2020-12215

¹⁷⁰ The social economy accounts for 10% of Spain's GDP and employs more than two million people. Examples can be found in all productive sectors and throughout the country. For further details, see: For further details, see: CEPES. *Las empresas más relevantes de la economía social* 2019-2020. Madrid, 2020. https://www.cepes.es/publicaciones

¹⁷¹ One example is Sweden's employee funds, where money from increased corporate income taxes is used to invest in the purchase of shares in Swedish companies. See: Blyth, Mark. *Great Transformations: Economic Ideas and Institutional Change in the Twentieth Century.* Cambridge University Press: United Kingdom, 2002

CHALLENGE 9: BROADEN THE FOUNDATIONS OF OUR FUTURE WELL-BEING

¹Note that progress in means and end do not always go hand in hand. For further details, see: Comte-Sponville, André, Delumeau, Jean, and Arlette Farge. *La historia más bella de la felicidad*. Barcelona: Anagrama, 2005; Darrin M. McMahon. *Una historia de la felicidad*. Madrid: Anagrama, 2006; Darrin M. McMahon. "The History of Happiness and Contemporary Happiness Studies." In Amitava Krishna Dutt, and Benjamin Radcliff (eds.). *Happiness, Economics and Politics*. Edward Elgar Publishing, 2009. https://doi.org/10.4337/9781849801973.00 007; and Nisbet, R. *History of the Idea of Progress*. Basic Books, 1980.

² Cortes Generales. *Constitución política de la Monarquía española*. Cádiz, 1812.

³ Gross Domestic Product is the sum of the value of all final goods and services produced in a territory during a given period of time.

⁴ For further details, see: United Nations Development Programme. "Human Development Reports." United Nations Development Programme, http://hdr.undp.org/en/content/human-developmentindex-hdi.

⁵ For further details, see: Andrés, Javier, and Rafael Doménech. *La era de la disrupción digital*. Barcelona: Ediciones Deusto, 2020; Brynjolfsson, Eric, Avinash Collis, and Felix Eggers. "Using massive online choice experiments to measure changes in well-being." *Proceedings of the National Academy of Sciences of the United States of America* 116, 2019. https://doi.org/10.1073/pnas.1815663116; and Brynjolfsson, Eric, *et al.* "GDP-B: Accounting for the Value of New and Free Goods in the Digital Economy." *NBER Working Paper*, n.º 25695, 2019. https://doi.org/10.3386/w25695.

⁶ Many of the alternative proposals to GDP try to incorporate John K. Galbraith's classic idea that in post-industrial societies human welfare does not depend solely on the continued growth of production, and that we should distinguish between those products and activities that have a positive impact on people (e.g. education) and those that have a negative impact (e.g. crime), irrespective of their market value. Refer to: Galbraith, John Kenneth. The Affluent Society. Boston: Houghton Mifflin, 1958; Mazzucato, Mariana. The Value of Everything: Making and Taking in the Global Economy. Penguin Books, 2017; Pilling, David. The Growth Delusion: Wealth, Poverty, and the Well-Being of Nations. London: Tim Duggan Books, 2018; Rojas, M. "The 'Measurement of Economic Performance and Social Progress' Report and Quality of Life: Moving Forward." Social Indicators Research 102, n.º 1, 2011. https://www. jstor.org/stable/41476473; and Stigliz, Joseph E., Amartya Sen, and Jean-Paul Fitoussi. Report by the Commission on the Measurement of Economic Performance and Social Progress. 2009. https://www.uio.no/ studier/emner/sv/oekonomi/ECON4270/h09/Report%20in%20English. pdf.

⁷ This includes the measurement of "equivalent consumption wellbeing", which incorporates consumption level, life expectancy and leisure time, as well as inequalities in consumption and leisure time. Taking into account this broader definition of well-being, the differences, for example, between the US and the more developed countries of Europe are drastically reduced. Also interesting is the human development index adjusted for planetary pressures (HPDI), which adjusts the standard HDI by each country's carbon dioxide emissions and ecological footprint (both variables expressed in per capita terms). In the case of Spain, its position in the international ranking improves by 11 places when comparing the HPDI with the HDI, moving from 23rd to 12th out of 169 countries. See: Andrés, Javier, and Rafael Doménech. *La era de la disrupción digital*. Barcelona: Ediciones Deusto, 2020; y Jones, Charles I., and Peter Klenow. "Beyond GDP? Welfare across Countries and Time." *American Economic Review* 106, n.º 9, 2016. https:// www.aeaweb.org/articles?id=10.1257/aer.20110236; and United Nations Development Programme. *Human Development Report 2020. The next frontier: Human development and the Anthropocene*. Nueva York, 2020. http://hdr.undp.org/en/content/human-developmentreport-2020.

⁸ Refer to: Diener, Ed. Assessing Well-Being: The Collected Works of Ed Diener. New York: Springer, 2009; Rojas, M. El Estudio Científico de la Felicidad. Ciudad de México: Fondo de Cultura Económica, 2014; Rojas, M. "The Subjective Object of Well-Being Studies." In G. Brulé and F. Maggino (eds.). Metrics of Subjective Well-Being: Limits and Improvements. Springer, 2017. 43-62; and Vázquez Valverde, Carmelo, and Gonzalo Hervás Torres. La ciencia del bienestar: Fundamentos para una psicología positiva. Madrid: Alianza Editorial, 2009.

^o Subjective (emotional/hedonic) well-being consists of good states of mind, which includes both affective reactions to different experiences and the full range of positive and negative assessment people make of their lives. For further details, see: Diener, Ed. "New findings and future directions for subjective well-being research." *American Psychologist* 67, n.º 8, 2012. https://doi.org/10.1037/a0029541; OECD. *Guidelines on Measuring Subjective Well-being*. Paris: OECD Publishing, 2013. https://doi.org/10.1787/9789264191655-en; and Rojas, M., and R. Veenhoven. "Contentment and Affect in the Estimation of Happiness." *Social Indicators Research* 110, n.º 2, 2013. 415-431.

¹⁰ In a scale from 1 to 10, satisfied persons are those with a score of 6 or above.

¹¹ For further details, see: European Commission. *Eurobarometer survey 2019*. https://ec.europa.eu/commission/presscorner/detail/es/ IP_19_2528; World Values Survey. *WVS Wave 6* (2011-2014). https:// www.worldvaluessurvey.org/WVSNewsShow.jsp?ID=249; European Social Survey. Satisfaction with life. https://www.europeansocialsurvey. org/about/country/spain/; and INE. *Living conditions survey 2019*. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica _C&cid=1254736176807&menu=ultiDatos&idp=1254735976608.

¹² Refer to: World Bank. *GNI per capita, PPP (constant 2017 international \$).* https://ec.europa.eu/commission/presscorner/detail/es/IP_19_2528; and World Values Survey. *WVS Wave 7 (2017-2020).* http://www.worldvaluessurvey.org/WVSOnline.jsp.

¹³ For further details, see: World Bank. *Life expectancy at birth, total (years).* https://ec.europa.eu/commission/presscorner/detail/es/ IP_19_2528; and World Values Survey. *WVS Wave 7 (2017-2020).* http://www.worldvaluessurvey.org/WVSOnline.jsp. ¹⁴ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: European Commission. *Eurobarometer survey 2019*. https://ec.europa.eu/commission/presscorner/detail/es/IP_19_2528.

¹⁵ For further details on the construction of the EU-8, see the*Apunte metodológico número I.*

¹⁶ For example, after the 2008 crisis, the gap between the percentage of satisfied highly educated and uneducated doubled to 10 percentage points. For further details, see: European Social Survey. *Satisfaction with life*. https://www.europeansocialsurvey.org/about/country/spain/.

¹⁷ Herreros Vázquez, Francisco. "¿Son las relaciones sociales una fuente de recursos? Una definición del capital social." *Papers: revista de sociología*, 2002. https://papers.uab.cat/article/view/v67-herreros; and Rojas, M. "The Complexity of Well-Being: A Life-Satisfaction Conception and a Domains-of-Life Approach." In Ian Gough y Allister McGregor (eds.). *Researching Well-Being in Developing Countries: From Theory to Research.* Cambridge University Press, 2007. 259-280.

¹⁸ Paldam, Martin. "Social Capital: One or Many? Definition and Measurement." *Journal of Economic Surveys* 14, n.º 5, 2000. https:// doi.org/10.1111/1467-6419.00127; and Rojas, M. "Relational Wealth: Quantity and Quality of Interpersonal Relations." In M. Rojas (ed.). *Well-Being in Latin America: Drivers and Policies*. Springer, 2020. 103-124.

¹⁹Leisure is a source of well-being in itself: participation in leisure activities, especially more active ones (such as participation in artistic and cultural activities), substantially increases people's well-being. The results of citizen satisfaction with leisure are explained by both the availability of free time and the satisfaction obtained from it. The availability of time is highly conditioned by the length of the working day, to which commuting time is added, hence the work situation explains, to a certain extent, the degree of dissatisfaction shown by a part of Spanish citizens in the "leisure" dimension. On the other hand, satisfaction with personal relationships would partly offset this effect, given that many leisure activities are carried out in the company of friends or family, and in this domain the satisfaction of the Spanish population increases notably. See: Ateca-Amestoy, Victoria, et al. "How do cultural activities influence happiness? Investigating the relationship between self-reported well-being and leisure." Estudios Económicos 31, 2016. https://estudioseconomicos.colmex.mx/index.php/economicos/article/ view/16.

²⁰ The "dissatisfied" incorporates the categories of those who are "neither satisfied nor dissatisfied" as well as those who are "dissatisfied or not satisfied at all". This survey is based on a categorical scale (5 categories), so the overall satisfaction results are not comparable with the Eurobarometer results shown above. For further details, refer to: Iglesias de Ussel, Julio, *et al. La felicidad de los españoles.* Madrid: Tecnos, 2017.

²¹García-Muñoz, María Teresa, Juliette Milgram-Baleix, and Omar Odeh-Odeh. "Inequality and Life Satisfaction in Low- and Middle-Income Countries: The Role of Opportunity." *Societies* 9, n.º 2, 2019. https://doi. org/10.3390/soc9020037; and Guardiola, Jorge, and Monica Guillen-Royo. "Income, unemployment, higher education and wellbeing in times of economic crisis: Evidence from Granada (Spain)." *Social Indicators Research* 120, n.º 2, 2014. https://doi.org/10.1007/s11205-014-0598-6. ²² Kahneman, Daniel, and Angus Deaton. "High Income improves evaluation of life but not emotional wellbeing." *Proceedings of the national academy of sciences of the United States* 107, n.º 38, 2010. https://doi.org/10.1073/pnas.1011492107; and Stevenson, Betsey, and Justin Wolfers. "Economic growth and subjective well-being: Reassessing the Easterlin Paradox." *Brookings Papers on Economic Activity*, 2008. https://www.brookings.edu/bpea-articles/economicgrowth-and-subjective-well-being-reassessing-the-easterlin-paradox/.

²³ Iglesias de Ussel, Julio, *et al. La felicidad de los españoles*. Madrid: Tecnos, 2017.

²⁴ Easterlin, Richard A. "Does Economic Growth Improve the Human Lot? Some Empirical Evidence." *Nations and Households in Economic Growth. Academic Press*, 1974. https://huwdixon.org/teaching/cei/ Easterlin1974.pdf; and Jebb, Andrew T., *et al.* "Happiness, income satiation and turning points around the world." *Nature Human Behaviour* 2, 2018. https://www.nature.com/articles/s41562-017-0277-0.

²⁵ The moderation of the effect of income on well-being is due to the fact that it is not only the absolute level of income that matters, but also relative income, especially among high-income earners. In this respect, two effects have to be taken into account: the first is psychological, which assumes that well-being is relative to an individual benchmark (income level) that also increases when income increases; and the second is social, whereby well-being also depends on the comparison with the income of the social reference group, which dampens the effect of an increase in individual income on well-being. This relative income effect is smaller among low-income people, whose well-being is more dependent on the absolute level of income.See: Budría, S., and Ada Ferrer-i-Carbonell. "Life Satisfaction, Income Comparisons and Individual Traits." Review of Income and Wealth 65, n.º 2, 2019. https://doi.org/10.1111/roiw.12353; Ferrer-i-Carbonell, Ada. "Income and well-being: an empirical analysis of the comparison income effect." Journal of Public Economics 89, 2005. https://doi.org/10.1016/j.jpubeco.2004.06.003; McBride, Michael. "Relative-income effects on subjective well-being in the cross-section." Journal of Economic Behavior and Organization 45, 2018. https://www. sciencedirect.com/science/article/pii/S0167268101001457; y Rojas, M. "Economía de la Felicidad: Hallazgos Relevantes sobre el Ingreso y el Bienestar." El Trimestre Económico LXXVI, n.º 3, 2009. https://www. eltrimestreeconomico.com.mx/index.php/te/article/view/489/633.

²⁶ De Neve, Jan-Emmanuel, *et al.* "The Asymmetric Experience of Positive and Negative Economic Growth: Global Evidence Using Subjective Well-Being Data." *The Review of Economics and Statistics* 100, n.º 2, 2018. https://ideas.repec.org/a/tpr/restat/v100y2018i2p362-375.html.

²⁷ Easterlin, Richard A. "Income and happiness. Towards a unified theory." *The Economic Journal* 111, 2001. http://www.uvm.edu/pdodds/ research/papers/others/2001/easterlin2001a.pdf.

²⁸ Pena-López, José Atilano, and Manuel Sánchez-Santos. "Ocupación, desempleo y felicidad." In Iglesias de Ussel, Julio and Rebeca de Juan Díaz (coords.). *La felicidad de los españoles.* Madrid: Tecnos, 2017. 171-200.

²⁹ Sánchez, Angeles, and María J. Ruiz-Martos. "Europe 2020 Strategy and Citizens' Life Satisfaction." *Journal of Happiness Studies* 19, n.º 8, 2018. https://doi.org/10.1007/s10902-017-9928-0.

³⁰ Salanova, Marisa, and Wilmar B. Schaufeli. *El "engagement" en el*

trabajo. Cuando el trabajo se convierte en pasión. Madrid: Alianza, 2009.

³¹ Precisely because of the greater likelihood of entering the labour market and better working conditions, Spaniards with tertiary education report higher life satisfaction than those with primary education or no formal education. For further details, see: Iglesias de Ussel, Julio, *et al. La felicidad de los españoles.* Madrid: Tecnos, 2017.

³² Helliwell, John F., and Haifang Huang. "New measures of the costs of unemployment: Evidence from the subjective well-being of 3.3 million Americans." *Economic Inquiry* 52, 2014. https://ideas.repec.org/p/nbr/ nberwo/16829.html.

³³ In the case of Spain, the prevalence of depression is 2.5 times more frequent among the unemployed (7.9%) than among the employed (3.1%), and reaches 30% among people who are unable to work. For further details, see: Department of Health, Consumer Affairs and Social Welfare. *Technical note: Encuesta Nacional de Salud. España 2017*. Madrid, 2018. https://www.mscbs.gob.es/ estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ ENSE2017_notatecnica.pdf; and Murphy, Gregory C., and James A. Athanasou. "The effect of unemployment on mental health." *Journal of Occupational and Organizational Psychology* 72, 1999. https://doi. org/10.1348/096317999166518.

³⁴ Winkelmann, Liliana, and Rainer Winkelmann. "Why are the unemployed so unhappy? Evidence from panel data." *Economica* 65, n.º 257, 1998. https://www.zora.uzh.ch/id/eprint/1194/1/ WinkelmannWhy2006V.pdf.

³⁵ European social survey. *Satisfaction with life*. https://www. europeansocialsurvey.org/about/country/spain/.

³⁶ De Neve, Jan-Emmanuel. "Work and Well-being: A Global Perspective." In Global Council for Happiness and Wellbeing (eds). *Global Happiness Policy Report.* New York: Sustainable Development Solutions Network, 2018. 74–127.

³⁷ For further details, see: European Agency for Safety and Health at Work "Los riesgos psicosociales y el estrés en el trabajo." Agencia Europea para la Seguridad y la Salud en el Trabajo, https://osha.europa.eu/es/ themes/psychosocial-risks-and-stress; Cinfa. *VII Estudio Cinfasalud: Percepción y hábitos de la población española en torno al estrés*. Madrid, 2017. http://www.infocoponline.es/pdf/ESTUDIO-ANSIEDAD. pdf; INE. *Nivel medio de estrés laboral según sexo y clase social basada en la ocupación de referencia. Media y desviación. Población de 15 y más años ocupada 2017.* https://www.ine.es/dynt3/inebase/es/index. htm?type=pcaxis&path=/t15/p419/a2017/p03/&file=pcaxis; y OECD. *OECD Employment Outlook 2017.* Paris: OECD Publishing, 2017. https:// doi.org/10.1787/empl_outlook-2017-en.

³⁸ Gallup. *State of the Global Workplace*. 2017. https://www.gallup.com/ workplace/238079/state-global-workplace-2017.aspx.

³⁹ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Eurofound. *European Quality of Life Survey 2016*. https://www.eurofound.europa.eu/surveys/european-quality-of-life-surveys/european-quality-of-life-survey-2016.

⁴⁰ According to the WHO, mental health is a state of well-being in which an individual develops their capacities, can handle the normal difficulties of life, can work productively, and is able to contribute to their community. For further details, see: WHO *Promoting mental health: concepts, emerging evidence, practice.* Ginebra, 2004. https://www.who. int/mental_health/evidence/en/promoting_mhh.pdf. According to a World Bank/WHO global study on diseases and illnesses, chronic back pain, headaches and depression are the main obstacles to a fulfilling life. For further details, see: GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. "Global, regional, and national incidence, prevalence, and years lived with disability for 354 Diseases and Injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017." *The Lancet:* 392, n.º 10159, 2018. https://doi.org/10.1016/S0140-6736(18)32279-7.

⁴¹Accumulating evidence shows that subjective well-being has a modest but significant effect on long-term recovery and survival from physical illness. For further details, see: Lamers, Sanne M. A., *et al.* "The impact of emotional well-being on long-term recovery and survival in physical illness: A Meta- Analysis." *Journal of Behavioral Medicine* 35, 2012. https://doi.org/10.1007/s10865-011-9379-8.

⁴² It should be noted that these results on Spanish people's life satisfaction with their health are prior to the coronavirus pandemic.

⁴³ In the same survey conducted for 2016, no questions regarding satisfaction with health were included. The EU-27 has been constructed as the simple average of the values of the individual countries. On this issue, see: Eurofound. *European Quality of Life Survey 2012*. https:// www.eurofound.europa.eu/surveys/european-quality-of-life-surveys/ european-quality-of-life-survey-2012.

⁴⁴ According to the WHO, health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Therefore, the health of an individual or a population cannot be assessed solely on the basis of the prevalence of physical illness or mental disorders (*negative health*), but must also incorporate the possibility of developing one's physical, intellectual and social potential to the best of one's ability (*positive health*). For further details, see: WHO "Constitution." WHO, https://www.who.int/about/ who-we-are/constitution.

⁴⁵ For further details, see: GBD 2016 Healthcare Access and Quality Collaborators. "Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016." *The Lancet* 391, n.º 10136, 2018. https:// doi.org/10.1016/S0140-6736(18)30994-2; and OCDE. *Health at a Glance 2019: OECD Indicators*. Paris: OECD Publishing, 2019. https:// doi.org/10.1787/4dd50c09-en.

⁴⁶ The classification of diseases corresponding to the "disability-adjusted life years" provided in the following study is considered: Soriano, Joan B., *et al.* "La carga de enfermedad en España: resultados del Estudio de la Carga Global de las Enfermedades 2016." *Medicina Clínica* 151, n.° 5, 2018. https://doi.org/10.1016/j.medcli.2018.05.011.

⁴⁷ For further details, see: Bergsma, Ad, and Ruut Veenhoven. "The happiness of people with a mental disorder in modern society." *Psychology of Well-Being: Theory, Research and Practice,* 2011. https://doi.org/10.1186/2211-1522-1-2; Clark, Andrew, *et al.* "The Key Determinants of Happiness and Misery." In John Helliwell, Richard Layard, *et al* (eds.). *World Happiness Report 2017.* New York: Sustainable Development Solutions Network, 2017. 122-142; and Tobío, Constanza, *et al.* "A national representative study of the relative impact of physical and psychological problems on life satisfaction." *Journal of Happiness Studies* 16, 2015. https://doi.org/10.1007/s10902-014-9501-z.

⁴⁸ Global Health Data Exchange. *IHME Global Burden of Disease, 2017.* http://ghdx.healthdata.org/.

⁴⁹ Ministerio de Sanidad, Consumo y Bienestar Social. *Encuesta Nacional de Salud* 2017. Madrid, 2017. https://www.mscbs.gob.es/ estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ SALUD_MENTAL.pdf.

⁵⁰ Conduras Martínez, Alicia, and Juan E. del Llano Señarís. "La sanidad Española en Cifras 2018." *Círculo de la Sanidad*, 2018. https://www. aeesme.org/observatorio-nacional-de-enfermeria-de-salud-mental/ gestion/la-sanidad-espanola-en-cifras-2018/.

⁵¹ The OECD is the aggregate indicator reported by the OECD of 34 member states. For further details, see: OECD. *How's Life? 2020: Measuring Well-being.* Paris: OECD Publishing, 2020. https://doi.org/10.1787/47a3e4c8-en.

⁵² The OECD has been constructed as the simple average of the values of each of the 29 member countries of the OECD when data were available. If data for 2000 or 2018 was not available for a particular country, the closest available year has been selected. For further details, see: OCDE. *Health Statistics*. https://stats.oecd.org/Index.aspx?ThemeTreeId=9#.

⁵³ Lara, Elvira, *et al.* "Exploring the effect of loneliness on all-cause mortality in Spain: are there differences between older adults and young and middle-aged adults?" *Social Science & Medicine*, 2020. https://doi. org/10.1016/j.socscimed.2020.113087.

⁵⁴Wang, Philip S., *et al.* "Use of mental health services for anxiety, mood, and substance disorders in 17 countries in the WHO world mental health surveys." *The Lancet* 370, 2007. https://pubmed.ncbi.nlm.nih. gov/17826169/.

⁵⁵ Benich, Joseph J., Scott W. Bragg, and John R. Freedy. "Psychopharmacology in Primary Care Settings." *Primary Care: Clinics in Office Practice* 43, n.º 2, 2016. https://doi.org/10.1016/j. pop.2016.01.002.

⁵⁶ Becchetti, Leonardo, Giovanni Trovato, and David Londono Bedoya. "Income, Relational Goods and Happiness." *Applied Economics* 43, n.º 3, 2009. https://econpapers.repec.org/article/tafapplec/ v_3a43_3ay_3a2011_3ai_3a3_3ap_3a273-290.htm; and Rojas, M. "Happiness in Latin America has Social Foundations." In J. Helliwell, R. Layard and J. Sachs (eds.). *World Happiness Report 2018*. New York: Sustainable Development Solutions Network, 2018. 114-146.

⁵⁷ Neira, Isabel, Maricruz Lacalle-Calderon, Marta Portela Maseda, and Manuel Perez-Trujillo. "Social Capital Dimensions and Subjective Well-Being: A Quantile Approach." *Journal of Happiness Studies* 20, n.º 8, 2019. https://doi.org/10.1007/s10902-018-0028-6.

⁵⁸ Iglesias-Vázquez, Emma, José Atilano Pena-López, and José Manuel Sánchez-Santos. "Bienestar subjetivo, renta y bienes relacionales: Los determinantes de la felicidad en España." *Revista internacional de sociología* 71, n.º 3, 2013. https://doi.org/10.3989/ris.2012.04.11; and Pena-López, José Atilano, José Manuel Sánchez-Santos, and Matias Membiela-Pollán. "Individual Social Capital and Subjective Wellbeing: The Relational Goods." *Journal of Happiness Studies* 18, n.º 3, 2017. ⁵⁹ The EU-27 isconstructed as the simple average of the values of each of the countries. For further details, see: Eurofound. *European Quality of Life Survey 2012*. https://www.eurofound.europa.eu/surveys/european-quality-of-life-survey/2012.

⁶⁰ OECD. *Better Life Index*, *community 2019*. http://www. oecdbetterlifeindex.org/es/topics/community-es/.

⁶¹ See: Cava, María Jesús, Gonzalo Musitu, and Alejandro Vera. "Efectos directos e indirectos de la autoestima en el ánimo depresivo." *Revista Mexicana de Psicología* 17.2, 2000. https://www.uv.es/~lisis/ mjesus/5cava.pdf; and Leaper, Campbell. "Exploring the consequences of gender segregation on social relationships." *New Directions for Child and Adolescent Development*. 65, 1994. https://doi.org/10.1002/ cd.23219946507.

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¹²⁷ Chaves, Covadonga, *et al.* "Preventing depression and anxiety in young people: A review of the joint efficacy of universal, selective and indicated prevention." *Psychological Medicine* 46, 2016. https://www. researchgate.net/publication/281287131_Preventing_depression_ and_anxiety_in_young_people_a_review_of_the_joint_efficacy_of_ universal_selective_and_indicated_prevention.

¹²⁸ Defensor del Pueblo. "Comunicado: El defensor del pueblo recomienda al Gobierno y las CCAA incrementar la asistencia psicológica en el Sistema Nacional de Salud." Defensor del Pueblo, https://www. defensordelpueblo.es/noticias/salud-mental/.

¹²⁹ Eurostat. *Physicians by medical speciality [hlth_rs_spec]*. https:// ec.europa.eu/eurostat/data/database.

¹³⁰ In this regard, it is worth noting the conceptual framework of health promoting schools of the Schools for Health in Europe Network (SHE Network), which emphasises the importance of student participation and health literacy teaching. Refer to: Paakkari, Leena, Venka Simovska, Ulla Pedersen, and Anette Schulz. *Materiales para docentes: Aprender sobre salud y promoción de la salud en las escuelas.* Schools for Health in Europe Network Foundation, 2019. https://www.schoolsforhealth. org/resources/materials-and-tools/teachers-resources; and Rojas, M. "Education and Well-being." En M. Rojas (ed.). *Well-Being in Latin America: Drivers and Policies.* Springer, 2020. 125-139.

¹³¹ For further details, see: Arguís, Ricardo, *et al.* "Programa "Aulas Felices". Psicología Positiva aplicada a la Educación." Educaposit. http://educaposit.blogspot.com/; and UNESCO, and Regional Bureau for Education in Asia and the Pacific (Bangkok Office). *Happy Schools: A framework for learner well-being in the Asia-Pacific*. Paris: United Nations Educational, Scientific and Cultural Organization, 2016. https:// bit.ly/30NNwBW.

¹³² For further details, see: Aguilar, Pilar, *et al.* "Social and Emotional Competences in Spain: A Comparative Evaluation Between Spanish Needs and an International Framework Based on the Experiences of Researchers, Teachers, and Policymakers." *Frontiers in Psychology* 10, 2019. https://doi.org/10.3389/fpsyg.2019.02127; American Institutes for Research. "School Climate Survey Compendium." American Institutes for Research, https://safesupportivelearning.ed.gov/topicresearch/school-climate-measurement/school-climate-surveycompendium; Estévez López, Estefanía, *et al.* "Clima familiar, clima escolar y satisfacción con la vida en adolescentes." *Revista Mexicana de Psicología* 25, n.º 1, 2008. https://www.uv.es/~lisis/david/mexicana.pdf; and Taylor, Rebecca D., *et al.* "Promoting positive youth development through school-based social and emotional learning interventions: a meta-analysis of Follow-Up effects." *Child Development* 88, 2017. ¹³³ Council of Europe. Conference of Ministers responsible for Family Affairs: Council of Europe Recommendation on policy to support positive parenting. Coucil of Europe, 2006. https://www.coe.int/t/dc/ files/ministerial_conferences/2009_family_affairs/Positive_Parenting_ en.pdf

¹³⁴ For further details, see: Layard, Richard, and Judy Dunn. *Una buena infancia: En busca de valores en una edad competitiva*. Alianza Editorial, 2011; Leijten, Patty, *et al.* "Meta-Analyses: Key Parenting Program Components for Disruptive Child Behavior." *Journal of the American Academy of Child and Adolescent Psychiatry* 58, n.° 2, 2019. https://doi.org/10.1016/j.jaac.2018.07.900; Rodrigo, María José, *et al. Manual Práctico de Parentalidad Positiva*. Madrid: Síntesis, 2015; y Rodrigo, María José, Sonia Byrne, and Miriam Álvarez. "Interventions to Promote Positive Parenting in Spain." In Moshe Israelashvili, and John L. Romano (eds.). *Cambridge Handbook of International Prevention Science*. Cambridge, UK: Cambridge University Press, 2016. https://doi.org/10.1017/9781316104453.040

EPILOGUE: REDISCOVERING OPTIMISM

¹Mumford, Lewis. *The Story of Utopias*. Azafran Books, 1992.

²On this question, see, for example: Brady, A., and E. Butterworth. *The Uses of the Future in Early Modern Europe*. Routledge, 2010; Giddens, Anthony. *The Consequences of Modernity*. Cambridge: Polity Press, 1991; and Hölscher, Lucian. *El descubrimiento del futuro*. Madrid: España Siglo XXI, 2014.

³ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The specific question of the survey is as follows: "Generally speaking, do you think that the life of those in the EU who are children today will be easier, more difficult or about the same as the life of those from your own generation?". For further details, see: European Commission. *Future of Europe: Social issues*. European Commission, Special Eurobarometer 467, 2017. https://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/ResultDoc/download/DocumentKy/80645.

⁴The specific question of the survey is as follows: "When children today in our country grow up they will be worse off or better off financially than their parents?". For further details, see: Stokes, Bruce. "Global Publics More Upbeat About the Economy: But many are pessimistic about children's future." *Pew Research Center*, 2017. https://www. pewresearch.org/global/2017/06/05/global-publics-more-upbeatabout-the-economy/.

⁵Difference in life expectancy between those born in 1920 (39.4 years) and those born in 1980 (75.4). The 1920 data is from the *Human Mortality Database* and the 1980 data is from the INE. For further details, see: Human Mortality Database. *Esperanza de vida al nacer.* https://www.mortality.org/; and INE. *Tablas de mortalidad. Tablas de mortalidad por año, sexo, edad y funciones.* https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736177004& menu=resultados&idp=1254735573002.

⁶ Between years 2000 and 2018. Eurostat. *Municipal waste by waste management operations [env_wasmun]*. https://ec.europa.eu/eurostat/data/database.

⁷ Department for Ecological Transition. Perfil ambiental España 2018. Madrid, 2019. https://www.miteco.gob.es/es/calidad-y-evaluacionambiental/publicaciones/pae2018_tcm30-504010.pdf.

⁸Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. For further details, see: Eurostat. *GDP and main components* (*output, expenditure and income*) [*nama_10_gdp*]; *Employment by A*10 industry breakdowns* [*nama_10_a10_e*]; *y Purchasing power parities* (*PPPs*), price level indices and real expenditures for ESA 2010 aggregates [*prc_ppp_ind*]. https://ec.europa.eu/eurostat/data/database; and OCDE. Annual Labour Force Statistics summary tables; and Level of GDP per capita and productivity. https://stats.oecd.org/.

⁹ The total employment rate is defined as the ratio of total employed persons to the population aged 16-64 For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan].* https://ec.europa.eu/eurostat/data/database; and OCDE. *Historical population y Annual Labour Force*

Statistics summary tables. https://stats.oecd.org/.

¹⁰ OECD. PISA 2018 Results (Volume I): What Students Know and Can Do. Annex B1 Results for countries and economies. Mean mathematics performance, 2003 through 2018. Paris: OECD Publishing, 2019. https:// doi.org/10.1787/5f07c754-en.

¹¹The population aged 25-34 with a qualification higher than secondary education is defined as the percentage of people in this age range whose highest level of education is the second stage of secondary education (Bachillerato or Intermediate Level Vocational Training) or tertiary education (University or Higher Level Vocational Training). For further details, see: Eurostat. *Population by educational attainment level, sex and age* (%) - *main indicators [edat_lfse_03]*. https://ec.europa.eu/ eurostat/data/database.

¹² The target for 2030 is the reduction 23% from the 1990 level according to the PNIEC. Regarding the target for 2050 is a 90% reduction from the 1990 level according to the ELP. For further details, see: Department for Ecological Transition and Demographic Challenge Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2018. https://www.miteco.gob.es/es/calidad-y-evaluacionambiental/temas/sistema-espanol-de-inventario-sei-/Inventario-GEI. aspx; and Department for Ecological Transition and Demographic Challenge. Information Note on the Greenhouse Gas Emissions Preview for the year 2019. Madrid, 2020. https://www.miteco.gob.es/es/calidady-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/ avance-gei-2019_tcm30-510162.pdf. Objective 2030: Department for Ecological Transition and Demographic Challenge Plan Nacional Integrado de Energía y Clima 2021-2030. Madrid, 2020. https://www. miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf. Objective 2050: Department for Ecological Transition and Demographic Challenge Long Term Decarbonisation Strategy 2050. Madrid, 2020. https://www. miteco.gob.es/es/prensa/documentoelp_tcm30-516109.pdf.

¹³ The 2030 target is according to the PNIEC and the 2050 target is according to the ELP. See: Eurostat. *Share of energy from renewable sources* [*NRG_IND_REN*]. *Renewable energy sources in electricity*. Https://ec.europa.eu/eurostat/data/database;; and Department for Ecological Transition and Demographic Challenge. *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www. miteco.gob.es/es/prensa/documentoelp_tcm30-516109.pdf; and Department for Ecological Transition and Demographic Challenge.. *Plan Nacional Integrado de Energía y Clima 2021-2030*. Madrid, 2020. https://www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410. pdf.

¹⁴ We establish this indicator to monitor fuel poverty although it is necessary to analyse the joint evolution of the four indicators established by the European Observatory on Fuel Poverty: 1) percentage of the population unable to maintain an adequate temperature at home; 2) percentage of the population in arrears with bill payments; 3) percentage of households whose energy expenditure is excessively low (hidden fuel poverty) and 4) percentage of households whose expenditure on energy supplies is disproportionate to the level of income. The objective for 2030 isn line with the National Fuel Poverty Strategy, which aims to reduce to at least 6% the percentage of the population unable to keep their homes at an adequate temperature for 2025. The objective for 2050 is in line with the European Committee of the Regions proposal. See: European Committee of the Regions. *Opinion: Multilevel governance and cross-sectoral cooperation to fight energy poverty*. Brussels: European Commission, 2019. https://cor.europa.eu/ES/our-work/Pages/ OpinionTimeline.aspx?opId=CDR-5877-2018; Eurostat. *Inability to keep home adequately warm - EU-SILC survey [ILC_MDES01]*. Https:// ec.europa.eu/eurostat/data/database;; and Department for Ecological Transition and Demographic Challenge Actualización de indicadores de la Estrategia Nacional contra la Pobreza Energética. 2020. https://www.miteco.gob.es/es/prensa/20201106_actualizaciondeindicadores2020_final__tcm30-516466.pdf.

¹⁵Percentage of population exposed to an annual average concentration of particulate matter (PM2.5) above 10 micrograms per cubic metre (WHO recommended limit). The objectives for years 2030-2050 are in line with the analyses included in the European Union's Second Clean Air Outlook presented in 2021. In this regard: European Environment Agency. "ECT/ATNI reports." European Topic Centre or Air Pollution, transport, noise and industrial pollution, https://www.eionet.europa. eu/etcs/etc-atni/products/etc-atni-reports; European Commission. Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The Second Clean Air Outlook. Brussels, 2021. https://eur-lex. europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A3%3AFIN; and WHO. Air quality guidelines for particulate matters, ozone, nitrogen dioxide and sulphur dioxide. Global update 2005. Geneva: World Health Organisation, 2005. http://www.who.int/phe/health_topics/outdoorair/ outdoorair agg/en/index.html.

¹⁶ Unquantified public expenditure items are assumed to maintain the same weight in GDP. As mentioned above, many of the public policy measures contained in this Strategy are aimed at achieving efficiency gains in spending. Between 2015-18, public expenditure in the EU-8 averaged 50.4% of GDP, although with relevant differences by country (e.g. in France it was 56.5% of GDP and in the Netherlands 43.2%).

¹⁷ Eurostat. General government expenditure by function (COFOG) [gov_10a_exp]. https://ec.europa.eu/eurostat/data/database.

¹⁸Objective 13 of this Strategy.

¹⁹ Objective 4 of this *Strategy* includes both public and private R&D expenditure. The increase in the public component would result approximately from applying to the targets set for Spain the share of public expenditure in total R&D expenditure that the EU-8 currently has. Therefore, the target of 4% of GDP set for 2050 should not be interpreted as a target for public R&D expenditure. This, following the above criteria, would be in the order of 1.5% of GDP, as opposed to the current 0.5%.

²⁰ Objective 29 of this Strategy. Excludes expenditure on long-term care

²¹Objective 30 of this Strategy

²² Social protection expenditure includes, among other items, public spending on pensions, unemployment benefits, active employment policies (including training and guidance policies) and other social assistance. For further details, see: European Commission. *Manual on sources and methods for the compilation of COFOG statistics*. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/eurostat/documents/3859598/10142242/

KS-GQ-19-010-EN-N.pdf/ed64a194-81db-112b-074bb7a9eb946c32?t=1569418084000.

²³ Cabrales, Antonio, *et al. Public spending preferences of citizens.* Fundación Cotec, 2021. https://cotec.es/proyecto/preferencias-degasto-publico-en-la-ciudadania/.

²⁴ Please note that the scoreboard quantifies some public expenditure and revenue items, but not all of them. Thus, there are no changes in expenditure items such as defence, public order, security, recreation and culture, interest on the debt, or others; nor are there any changes in the part of public revenue that does not come from tax collection and social contributions. Therefore, a mere subtraction between the public expenditure and revenue items presented here cannot be interpreted in terms of long-term public deficit or surplus. For more details on the structure of general government revenue and expenditure, see: European Commission. Manual on sources and methods for the compilation of COFOG statistics. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/eurostat/ documents/3859598/10142242/KS-GQ-19-010-EN-N.pdf/ed64a194-81db-112b-074b-b7a9eb946c32?t=1569418084000; European Commission. Taxation Trends in the European Union. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/ taxation_customs/sites/taxation/files/taxation_trends_report_2019. pdf; and Eurostat. "Glossary: Total general government revenue." Eurostat, https://ec.europa.eu/eurostat/statistics-explained/index. php?title=Glossary:Total_general_government_revenue.

25 Objective 47 of this Strategy

²⁶ For reference, among other studies, see the following: Bouabdallah, Othman, *et al.* "Debt sustainability analysis for euro area sovereigns: a methodological framework." *ECB Occasional paper series*, n.º 185, 2017. https://www.ecb.europa.eu/pub/pdf/scpops/ecbop185.en.pdf.

²⁷ Between 2015 and 2019, Spain recorded a government deficit of 3.6% of GDP (average for the period); a level well above the EU-27 and EU-8 average (deficits of 1 and 0.4% of GDP, respectively). Part of this imbalance is explained by the larger structural deficit (that which is not determined by the evolution of the economic cycle) of our country. According to European Commission estimates, this stood at 3% of potential GDP for the years 2015-19. Alternative estimates such as those made by the IMF also point to similar levels of structural deficits, in the order of 2.5% of potential GDP in the same years. Refer to: AMECO. General Government. Excessive Deficit Procedure. Net lending [UBLGE]; y Cyclical adjustment of Public Finance Variables. Based on Potential GDP (ESA 2010). Structural balance, % GDP [UBLGAPS]. https://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie. cfm; and World Economic Forum. Fiscal Monitor. Policies for the recovery. Washington, D.C., 2020. https://www.imf.org/en/Publications/FM/ Issues/2020/09/30/october-2020-fiscal-monitor.

²⁸ For further details, see: Eurostat. *General government expenditure by function (COFOG) [gov_10a_exp] y Government revenue, expenditure and main aggregates [gov_10a_main]*. https://ec.europa.eu/eurostat/data/database.

50 GOALS FOR 2050: SCOREBOARD

¹ The income per capita gap measures the relative differences in GDP per capita between Spain and the EU-8. GDP per capita is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total population. The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. For data from 1980 to 1994, growth is assumed from the OECD database and later data from Eurostat. For further details, see: Eurostat. *GDP and main components (output, expenditure and income) [nama_10_gdp];* Population on 1 January by age and sex [demo_pjan]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/database; and OCDE. Employment; and Level of GDP per capita and productivity. https://stats.oecd.org/.

² Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. The EU-8 is constructed as the weighted average of the values of the individual countries, with total hours worked being the reference for the calculation of weights. The EU-27 is calculated on the basis of the aggregate indicators reported by Eurostat. For data from 1980 to 1994, growth is assumed from the OECD database and later data from Eurostat. For further details, see: Eurostat. *GDP and main components* (*output, expenditure and income*) [*nama_10_gdp*]; Employment by A*10 industry breakdowns [*nama_10_a10_e*]; y Purchasing power parities (*PPPs*), price level indices and real expenditures for ESA 2010 aggregates [*prc_ppp_ind*]. https://ec.europa.eu/eurostat/data/database; and OCDE. Level of GDP per capita and productivity. https://stats.oecd.org/.

³ The total employment rate is defined as the ratio of total employed persons to the population aged 16-64 The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 16-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. The series is constructed from Eurostat data except for historical data, usually prior to 1995, where growths from the OECD database are assumed (in the case of the EU-27, growths from the EU-22 are used). For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan].* https://ec.europa.eu/eurostat/data/database; and OCDE. *Historical population y Annual Labour Force Statistics summary tables.* https://stats.oecd.org/.

⁴ It should be noted that among the headline targets of the EU 2020 strategy, 75% of men and women aged 20-64 should be in employment. In 2019, this employment rate for Spain was 74% for men and 62% for women, below the target and far from the EU-27 average. (79% and 67% respectively). For further details, see: European Commission. *Europe 2020: A European strategy for smart, sustainable and inclusive growth.* Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROS0%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf; and INE. *Tasas de empleo según niveles de educación. Brecha de género.* https://www.ine.es/ss/Satellite?L=es_ES&c=INESeccion_C&cid=1259925461647&p=1254735110672&pagename=ProductosYServicios/PYSLayout&par

am1=PYSDetalle¶m3=1259924822888.

⁵ Total R&D expenditure includes expenditure by the General Government, higher education, the business sector and non-profit institutions. In the case of Spain, R&D expenditure by General Government and higher education represents 0.5% of GDP for the period 2015-19, i.e. about 45% of the country's total R&D expenditure. In the case of the EU-27, expenditure by general government and higher education accounts for 0,7% of GDP, i.e. 34% of aggregate R&D expenditure, while in the EU-8 these proportions are 0,9% and 32% respectively. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. Data for the EU-8 start in 1995 and for the EU-27 in 2000 from Eurostat. For Spain, data are available from the Bank of Spain for 1985 and 1990 and from 1995 onwards from Eurostat: Banco de España. Indicadores estructurales de la economía española y de la UE. Madrid, 2020. https://www.bde.es/webbde/es/ estadis/infoest/si_1_4.pdf; and Eurostat. Intramural R&D expenditure (GERD) by sectors of performance [rd_e_gerdtot]. https://ec.europa.eu/ eurostat/data/database.

⁶ The 2020 European Strategy sets an R&D investment target of 3% of GDP. For further details, see: European Commission. *Europe 2020: A European strategy for smart, sustainable and inclusive growth.* Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20 Europe%202020%20-%20EN%20version.pdf.

⁷ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For the EU-8, data are available for 1998 (EU-15 data), 2010 (or closest) and 2018 (or latest available year). For the EU-27, data are available for 2010 (or closest) and 2018 (or latest year available). Finally, the data for Spain are from 1998 and from 2010 to 2018. Data for 1998 are from Carreras and Tafunell and later data from Eurostat. For further details, see: Carreras, Albert, y Xavier Tafunell (coords). *Estadísticas históricas de España: siglos XIX-XX*. Fundación BBVA, 2005. https://www.fbbva.es/wp-content/uploads/2017/05/dat/DE_2006_estadisticas_historicas.pdf; y Eurostat. *Persons employed in the non-financial business economy by size class of employment [tin00148]*. https://ec.europa.eu/eurostat/data/database.

⁸ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. Data for the EU-8 start in 1991 and for the EU-27 in 2004. The latest data available is from 2017. For further details, see: Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?" *IMF Working Papers*, no. 18/17, 2018. https://www.imf.org/en/Publications/WP/Issues/2018/01/25/Shadow-Economies-Around-the-World-What-Did-We-Learn-Over-the-Last-20-Years-45583.

^o The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018 microdata. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The latest data available is from 2018. For further details, see: Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad*. Madrid: Save the Children, 2019. https://www.savethechildren.es/sites/default/files/imce/dossier_pisa2018_espanadatos.pdf; and OECD. *PISA 2018*. https://www.oecd.org/pisa/.

¹⁰ The early school drop out rate is defined as the percentage of the population between 18 and 24 years of age whose highest educational level is secondary education or lower, and who are not currently in formal education. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. Data of Spain from 1980 to 1991 are from Felgueroso *et al.* The latest data available is from 2019. For further details, see: Eurostat. *Early leavers from education and training by sex and labour status [edat_lfse_14].* https://ec.europa.eu/eurostat/data/database; and Felgueroso, Florentino, Maria Gutiérrez-Domènech, and Sergi Jiménez-Martín. "¿Por qué el abandono escolar se ha mantenido tan elevado en España en las últimas dos décadas? El papel de la Ley de Educación (LOGSE)." *Fedea*, 2013. https://documentos.fedea.net/pubs/ee/2013/02-2013.pdf.

¹¹The European Strategy set a target of 10% for 2020. For further details, see: European Comission. *Europe 2020: A European strategy for smart, sustainable and inclusive growth*. Brussels: European Commission, 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20 EN%20BARROSO%20%20%20007%20-%20Europe%202020%20 -%20EN%20version.pdf.

¹² The population aged 25-34 with a qualification higher than secondary education is defined as the percentage of people in this age range whose highest level of education is the second stage of secondary education (Bachillerato or Intermediate Level Vocational Training) or tertiary education (University or Higher Level Vocational Training). The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For Spain data are available for the year 1981 and from 1991 onwards (for the year 1981 and 1991 growth is assumed using the OECD database). For the EU-27, data start in 1998 (from 1998 to 2001 growth is assumed using the OECD database and EU-22 is used) and the EU-8 in 1996. The latest data available is from 2019. For further details, see: Eurostat. Population by educational attainment level, sex and age (%) - main indicators [edat_lfse_03]. https://ec.europa.eu/eurostat/ data/database; and OCDE. Educational attainment and labour-force status. https://stats.oecd.org/.

¹³ The *odds ratio* i.e. at equal mathematics and science proficiency, how many times higher is the probability of repeating an academic year for a student from a more disadvantaged background compared to a student with more resources. For example, a value of 4 means that, with equivalent skills in mathematics and science, a student with fewer resources (25% of students with fewer resources) is four times more likely to have repeated an academic year than a student from a more favourable background (25% of students with more resources). The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018 microdata. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The latest data available is from 2018. For further details, see: Ferrer, Álvaro. *Todo lo que debes saber de PISA 2018 sobre equidad*. Madrid: Save the Children, 2019. https://www.savethechildren.es/sites/default/ files/imce/dossier_pisa2018_espanadatos.pdf; and OECD. *PISA 2018*. https://www.oecd.org/pisa/.

¹⁴ The percentage of low-achieving 15-year-olds in PISA is defined as the percentage of students below level 2 (below 406 points). The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The figure corresponds to the average of 2015 and 2018. For further details, see: Department of Education and Vocational Training. *PISA 2018 Resultados de lectura en España*. Madrid, 2020. https://www.educacionyfp.gob.es/inee/ evaluaciones-internacionales/pisa/2018/pisa-2018/pisa-2018. html; and OECD. *PISA 2018 Results (Volume I): What Students Know and Can Do. Tables I.B1.7, I.B1.8, and I.B1.9*. Paris: OECD Publishing, 2019. https://doi.org/10.1787/5f07c754-en.

¹⁵ The percentage of high-achieving 15-year-olds in PISA is defined as the percentage of students at level 5 or above (over 625 points). The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries from PISA 2018. The EU-22 consists of the EU-27 member countries that are also members of the OECD, which excludes Bulgaria, Croatia, Cyprus, Malta and Romania. The figure corresponds to the average of 2015 and 2018. For further details, see: Department of Education and Vocational Training. *PISA 2018 Resultados de lectura en España*. Madrid, 2020. https://www.educacionyfp.gob. es/inee/evaluaciones-internacionales/pisa/pisa-2018/pisa-2018 informes-es.html; and OECD. *PISA 2018 Results (Volume I): What Students Know and Can Do. Tables I.B1.7, I.B1.8, and I.B1.9*. Paris: OECD Publishing, 2019. https://doi.org/10.1787/5f07c754-en.

¹⁶ Public expenditure on education includes both expenditure on pre-primary, primary and secondary education and expenditure on post-compulsory education (*Bachillerato*, vocational training and university). In 2018 (latest year available), pre-primary, primary and secondary education accounted for around 60% of total public spending on education in our country. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. Up to 1989, data are from UNESCO, while later data are from the Ministry of Education and Vocational Training. The latest available data for Spain is from 2018, while for the EU-8 and EU-27 it is from 2017. For further details, see: Department of Education and Vocational Training. Gasto Público en educación en relación al P.I.B. por cobertura económica, tipo de administración y periodo. http://www.educacionyfp.gob.es/ servicios-al-ciudadano/estadisticas/economicas/gasto.html; and UNESCO. Government expenditure on education as a percentage of GDP (%). http://data.uis.unesco.org/#.

¹⁷ Public expenditure on education of 5.5% of GDP is the result of increasing expenditure per student to current Danish levels and assuming a GDP evolution in line with the EU-8 convergence objective [see chapter 1]. The difference compared to the EU-8, which currently spends 6.1% of its GDP on education, is that the reduction in the number of students will be very sharp in the coming decades, allowing us to increase funding per student significantly without such a sharp increase as a percentage of GDP. ¹⁸ The STEM series is constructed from the data on *Natural sciences, mathematics and statistics, Information and Communication Technologies,* and *Engineering, manufacturing and construction.* The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2018. For further details, see: Eurostat. *Students enrolled in tertiary education by education level, programme orientation, sex and field of education [educ_uoe_enrt03].* https://ec.europa.eu/eurostat/data/database.

¹⁹ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2018. For further details, see: Eurostat. *Individuals who have basic or above basic overall digital skills by sex [TEPSR_SP410]*. https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I/default/table?lang=en.

²⁰ 2025 target of the *European Skills Agenda*. For further details, see: European Commission. "European Skills Agenda." European Commission, https://ec.europa.eu/social/main. jsp?catId=1223&langId=en.

²¹The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2016. For further details, see: Eurostat. *Number of foreign languages known* (*self-reported*) *by sex [edat_aes_l21]*. https://ec.europa.eu/eurostat/data/database.

²² Guided on-the-job training is excluded. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by CIRCABC. The latest data available is from 2016. For further details, see: CIRCABC. *Participation in education and training (excluding guided on-the-job training)*. https://circabc.europa.eu/ui/group/d14c857a-601d-438ab878-4b4cebd0e10f/library/ac6f3889-ab25-4f75-9c7a-de997f65e 2db?p=1&n=10&sort=modified_DESC%E2%80%A6.

²³2025 target of the *European Skills Agenda*. For further details, see: European Commission. "European Skills Agenda." European Commission, https://ec.europa.eu/social/main. jsp?catId=1223&langId=en.

²⁴ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2016. For further details, see: Eurostat. *Participation rate in education and training by labour status [trng_aes_103]*. https://ec.europa.eu/eurostat/data/database.

²⁵ Spending on active training policies includes the spending aimed at both the employed and unemployed population. The EU-8 and EU-22 are constructed as the simple average of the values of the individual countries when these are available. The latest data available is from 2018. For further details, see: OECD. *Public expenditure as a percentage of GDP. 20: Training.* https://stats.oecd.org/.

²⁶ Data only available for Spain. from 2005 onwards. For further details, see: FUNDAE. Formación en las empresas. Informe anual 2016. Madrid, 2017. https://www.fundae.es/docs/default-source/ publicaciones-y-evaluaciones/publicaciones-estad%C3%ADstica/ formaci%C3%B3n-en-las-empresas-2016.pdf; and FUNDAE. Formación para el empleo: Balance de la situación 2019. Madrid,

2019. https://www.fundae.es/docs/default-source/publicacionesy-evaluaciones/publicaciones-estad%C3%ADstica/balance-desituación-2019.pdf.

²⁷ The direct greenhouse gases estimated in the inventory are: carbon dioxide (CO), methane (CH), nitrous oxide (NO), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF). For further details, see: Department for Ecological Transition and Demographic Challenge *Inventario Nacional de Gases de Efecto Invernadero (GEI): Resumen Serie 1990-2018.* https://www.miteco. gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanolde-inventario-Sei-/Inventario-GEI.aspx.

²⁸ Target of 23% reduction from the 1990 level according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge Integrated National Energy and Climate Plan (PNIEC) 2021-2030 Madrid, 2020. https://www.miteco.gob.es/images/es/pnieccompleto_ tcm30-508410.pdf.

²⁹ Target of 90% reduction from the 1990 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge. *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109. pdf.

³⁰ Total annual demand for consumptive uses (water, once used, is not returned to the environment where it was abstracted or is not returned in the same way as it was abstracted): supply, agricultural use, industrial use and other consumptive uses. Data is only available for 1998, 2009 and 2013/2014 (latest available data). See: Department of the Environment. Libro Blanco del agua en España. 2000. http:// www.cedex.es/CEDEX/LANG_CASTELLANO/ORGANISMO/CENTYLAB/ CEH/Documentos_Descargas/LB_LibroBlancoAgua.htm; Department for Ecological Transition. Síntesis de los planes hidrológicos españoles. Segundo ciclo de la DMA (2015-2021). Madrid: Directorate General for Water. State Secretariat for the Environment, 2018. https:// www.miteco.gob.es/es/agua/temas/planificacion-hidrologica/ libro_sintesis_pphh_web_tcm30-482083.pdf; and Department for Ecological Transition and Demographic Challenge. Informe de seguimiento de Planes Hidrológicos y Recursos Hídricos en España. Año 2018. Madrid, 2019. https://www.miteco.gob.es/es/agua/temas/ planificacion-hidrologica/memoria_infoseg_2018_tcm30-482594. pdf.

³¹ To compensate for the reduction in average water resources availabilities estimated by CEDEX, an average reduction in water demand of 5% by 2030 would be necessary, and of and 15% by 2050. This would result in a decrease in demand of 1,000 hm³ for each planning cycle (6 years). See: Centro de Estudios y Experimentación de Obras Públicas. *Evaluación del impacto del cambio climático en los recursos hídricos y sequías en España*. Madrid: Centro de Estudios Hidrográficos, 2017. http://www.cedex.es/NR/rdonlyres/3B08CCC1-C252-4AC0-BAF7-1BC27266534B/145732/2017_07_424150001_ Evaluaci%C3%B3n_cambio_clim%C3%A1tico_recu.pdf.

³² Primary energy intensity is defined as the ratio between the energy consumption and the gross domestic product (equivalent kilogram oil / thousands of euros). The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual: Eurostat. *Energy intensity [nrg_ind_ei]. Energy intensity of GDP in chain linked volumes (2010).* https://ec.europa.eu/

eurostat/data/database.

³³ This figure corresponds to the year 2015 as reported in the ELP. For further details, see: Department for Ecological Transition and Demographic Challenge. *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/ documentoelp_tcm30-516109.pdf.

³⁴ Target of 37% reduction from the 2015 level according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge *Integrated National Energy and Climate Plan (PNIEC) 2021-2030* Madrid, 2020. https://www.miteco.gob.es/images/es/pnieccompleto_ tcm30-508410.pdf.

³⁵ Target of 63% reduction from the 2015 level according to the ELP. See: Department for Ecological Transition and Demographic Challenge. *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/prensa/documentoelp_tcm30-516109. pdf.

³⁶ This percentage is calculated in accordance with the rules set out in Directive 2009/28/EC. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. *Share of energy from renewable sources [NRG_IND_REN]. Renewable energy sources in electricity.* https://ec.europa.eu/eurostat/data/database.

³⁷ Target for 2030 according to the PNIEC. See: Department for Ecological Transition and Demographic Challenge *Integrated National Energy and Climate Plan (PNIEC) 2021-2030* Madrid, 2020. https:// www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf.

³⁸ Target for 2050 according to the ELP. See: Department for Ecological Transition and Demographic Challenge. *Estrategia de Descarbonización a Largo Plazo 2050*. Madrid, 2020. https://www.miteco.gob.es/es/ prensa/documentoelp_tcm30-516109.pdf.

³⁹ Environmental tax revenues include taxes on energy, transport, pollution and resource use. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. *Environmental Tax Revenues* [*env_ac_tax*]. *Percentage of gross domestic product (GDP)*. https://ec.europa.eu/eurostat/data/database.

⁴⁰ This level of environmental revenue collection was achieved by countries such as Denmark between 1996 and 2007. See: Eurostat. *Environmental Tax Revenues [env_ac_tax]. Percentage of gross domestic product (GDP).* https://ec.europa.eu/eurostat/data/database.

⁴¹ It is defined as the proportion of the total utilised agricultural area occupied by organic farming (includes existing organically farmed areas and areas under conversion). The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. The latest data available is from 2019. See: Eurostat. Area under organic farming [SDG_02_40]. Percentage of total utilised agricultural area. Utilised agricultural area excluding kitchen gardens. Total fully converted and under conversion to organic farming. https://ec.europa.eu/eurostat/ data/database.

⁴² Target for 2030 according to the European Commission. See: European Commission. *Farm to Fork Strategy: for a fair, healthy and environmentally-friendly food system*. Brussels, 2020. https://

ec.europa.eu/food/sites/food/files/safety/docs/f2f_action-plan_2020_ strategy-info_en.pdf.

⁴³ The value corresponds to the sum of hectares resulting from protective afforestation, productive afforestation and afforestation of agricultural land. The annual data of each of the Anuario de Estadística Forestal are collected, available on the website of the Ministry of Agriculture, Fisheries and Food. On this question, see: Department of Agriculture, Fisheries and Food. "Anuario de Estadística Forestal." Department of Agriculture, Fisheries and Food, https://www.mapa. gob.es/es/desarrollo-rural/estadisticas/forestal_anuarios_todos.aspx.

⁴⁴ The value corresponds to the sum of hectares resulting from protective afforestation, productive afforestation and afforestation of agricultural land Annual average over the decade 2009-2018. On this question, see: Department for Ecological Transition and Demographic Challenge Anuario de Estadística Forestal. Resultados Estadísticos Principales de 2018. https://www.miteco.gob.es/es/biodiversidad/ estadísticas/aef_2018_resumen_tcm30-521680.pdf.

⁴⁵ According to the ELP, the annual reforestation rate is set at 20,000 hectares per year. See: Department for Ecological Transition and Demographic Challenge *Long Term Decarbonisation Strategy 2050. Anexos.* Madrid, 2020. https://www.miteco.gob.es/es/prensa/ anexoelp2050_tcm30-516147.pdf.

⁴⁶ The activity rate is defined as the ratio between the active population in each of the represented age cohorts and the population in that age group. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. The latest data available is from 2019. For further details, see: OECD. *LFS by sex and age – indicators*. https://stats.oecd.org/.

⁴⁷ The health expenditure reported here does not include longterm care services. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. Data for the EU-8 and Spain are from the OECD and data for the EU-27, from Eurostat. The latest data available is from 2018. For further details, see: Eurostat. *Expenditure for selected health care functions by health care financing schemes [HLTH_SHA11_HCHF]*. https:// ec.europa.eu/eurostat/data/database; and OCDE. *Health expenditure and financing. Government/compulsory schemes. Long-term care (health) and long-term care (social)*. https://stats.oecd.org/Index. aspx?DataSetCode=SHA.

⁴⁸ Public expenditure on long-term care includes health and social care components. Social assistance expenditure data are not available for all countries EU-27 and EU-8 are constructed as the simple average of the available values for each country. Data for the EU-8 and Spain are from the OECD and data for the EU-27, from Eurostat. The observed figure is the average from 2015 to 2018. For further details, see: Eurostat. *Expenditure for selected health care functions by health care financing schemes [HLTH_SHA11_HCHF]*. https://ec.europa.eu/ eurostat/data/database; and OCDE. *Health expenditure and financing. Government/compulsory schemes. Current expenditure on health (all functions) and long-term care (health)*. https://stats.oecd.org/Index. aspx?DataSetCode=SHA. ⁴⁹ The numerator includes the beneficiaries of the System for Autonomy and Care for Dependency (SAAD) who, although they have the right to a benefit, are not receiving it. The denominator includes all the beneficiaries of the Sistema para la Autonomía y Atención a la Dependencia who have been recognised as entitled to a benefit. The data observed is the situation as of December 2020. For further details, see: Instituto de Mayores y Servicios Sociales. *Estadísticas. Sistema para la Autonomía y Atención a la Dependencia. Histórico. Informes publicados.* https://www.imserso.es/imserso_01/documentacion/ estadisticas/info_d/estadisticas/est_inf/inf_gp/2020/index.htm.

⁵⁰ It is defined as the percentage of population living in households where expenditure on housing represents at least 40% of total household disposable income. Data for the EU-27 and EU-8 are simple averages of the individual countries. Refer to: Eurostat. *European Union Statistics on Income and Living Conditions. Housing cost overburden rate by tenure status - EU-SILC survey [ilc_lvho07c]*. https://ec.europa.eu/eurostat/data/database.

⁵¹ Today, several European countries such as Ireland, Finland, Slovenia or Estonia have similar levels. Assuming a halving of the proportion of the Spanish population experiencing rent overburden, recent values of overburden in the case of home ownership and a progressive change in tenure status (greater importance of renting as opposed to owning), the aggregate overburden target of 4.5% of the population for 2050 is feasible

⁵² The proportion of dwellings refurbished per year is estimated by dividing the number of building management permits for the refurbishment and/or restoration of dwellings (Building management permits of the Technical Architects' Associations. Building work in progress) (average 2015-2019), by the total number of dwellings from the estimated housing stock (average 2015-2019). See: INE. *Censo de Población y Viviendas 1991*. https://www.ine.es/censo91/es/inicio. jsp; Department of Transport, Mobility and Urban Agenda. *Estimated housing stock Total de viviendas por comunidades autónomas y provincias*. https://apps.fomento.gob.es/BoletinOnline2/?nivel=2&o rden=33000000; and Department of Transport, Mobility and Urban Agenda. *Building management permits Obra nueva, ampliación y/o reforma de viviendas*. *Número de viviendas a reformar y/o restaurar*. https://www.fomento.gob.es/BE/?nivel=2&orden=09000000.

⁵³ The percentage of municipal waste sent to landfill has been calculated on the basis of the annual per capita kilograms of municipal waste sent to landfill and the annual per capita kilograms of municipal waste generated. The EU-27 is the aggregate indicator reported by Eurostat and the EU-8 is obtained as the simple average of the values of the individual countries. See: Eurostat. *Municipal waste by waste management operations [ENV_WASMUN]. Disposal - landfill and other (D1-D7, D12), Kilograms per capita. Waste generated, kilograms per capita.* https://ec.europa.eu/eurostat/data/database.

⁵⁴ Target for 2035 according to the European Parliament and the Council of the European Union. See: European Parliament and the Council of the European Union. *Directiva (UE) 2018/850 del Parlamento Europeo y del Consejo de 30 de mayo de 2018 por la que se modifica la Directiva 1999/31/CE relativa al vertido de residuos.* Brussels, 2018. https://eurlex.europa.eu/legal-content/es/TXT/?uri=CELEX%3A32018L0850.

⁵⁵ Percentage of population exposed to an annual average concentration of particulate matter (PM2.5) above 10 micrograms per cubic metre

(WHO recommended limit). The EU-27 and EU-8 are obtained as the simple average of the values of the individual countries. The observed data corresponds to the year 2018. In this regard: Agencia Europea de Medio Ambiente. "ECT/ATNI reports." European Topic Centre or Air Pollution, transport, noise and industrial pollution, https://www.eionet. europa.eu/etcs/etc-atni/products/etc-atni-reports; and WHO. Air quality guidelines for particulate matters, ozone, nitrogen dioxide and sulphur dioxide. Global update 2005. Geneva: World Health Organisation, 2005. http://www.who.int/phe/health_topics/outdoorair/outdoorair_aqg/en/ index.html.

⁵⁶ The objectives for years 2030-2050 are in line with the analyses included in the European Union's *Second Clean Air Outlook* presented in 2021. See: European Commission. *Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. The Second Clean Air Outlook.* Brussels, 2021. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2021%3A3%3AFIN.

⁵⁷ We establish this indicator to monitor fuel poverty although it is necessary to analyse the joint evolution of the four indicators established by the European Observatory on Fuel Poverty: 1) percentage of the population unable to maintain an adequate temperature at home; 2) percentage of the population in arrears with bill payments; 3) percentage of households whose energy expenditure is excessively low (hidden fuel poverty) and 4) percentage of households whose expenditure on energy supplies is disproportionate to the level of income. The EU-27 and EU-8 are obtained as the simple average of the values of the individual countries. See: Eurostat. Inability to keep home adequately warm - EU-SILC survey [ILC_MDES01]. Https://ec.europa.eu/ eurostat/data/database;; and Department for Ecological Transition and Demographic Challenge Actualización de indicadores de la Estrategia Nacional contra la Pobreza Energética. 2020. https://www.miteco.gob. es/es/prensa/20201106_actualizaciondeindicadores2020_final_ tcm30-516466.pdf.

⁵⁸ In line with the National Fuel Poverty Strategy, which aims to reduce to at least 6% the percentage of the population unable to keep their homes at an adequate temperature for 2025. For further details, see: Department for Ecological Transition and Demographic Challenge *National Fuel Poverty Strategy 2019-2024*. Madrid, 2019. https://www. miteco.gob.es/es/prensa/estrategianacionalcontralapobrezaenergeti ca2019-2024_tcm30-496282.pdf.

⁵⁹ In line with the European Committee of the Regions proposal. For further details, see: European Committee of the Regions. *Ruling: Multilevel governance and cross-sectoral cooperation to fight energy poverty*. Brussels: European Commission, 2019. https://cor.europa.eu/ ES/our-work/Pages/OpinionTimeline.aspx?opId=CDR-5877-2018.

⁶⁰ The unemployment rate is defined as the ratio of total unemployed persons to the active population. The EU-8 is constructed as the weighted average of the values of the individual countries, with active population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. *Active population by sex, age and citizenship (1 000) [lfsa_agan]; y Unemployment by sex, age and citizenship (1 000) [lfsa_ugan]*. https://ec.europa.eu/eurostat/data/database.

⁶¹ The female employment rate is defined as the ratio of total employed women to the population of women aged 16-64 The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 16-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. The series is constructed from Eurostat data except for historical data, usually prior to 1995, where growths from the OECD database are assumed (in the case of the EU-27, growths from the EU-22 are used). For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan]*. https://ec.europa.eu/eurostat/data/database; and OCDE. *Historical population y Annual Labour Force Statistics summary tables*. https://stats.oecd.org/.

⁶² The youth unemployment rate is defined as the ratio of unemployed persons aged 18-24 to active persons in the same age range. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 18-24 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. The series is constructed from Eurostat data except for historical data, usually prior to 1995, where growths from the OECD database are assumed (in the case of the EU-27, growths from the EU-22 are used). For further details, see: Eurostat. *Active population by sex, age and citizenship (1 000) [lfsa_agan]; and Unemployment by sex and age – annual data [une_rt_a]*. https://ec.europa.eu/eurostat/data/database; and OCDE. *Labour Force Statistics by sex and age.* https://stats.oecd.org/.

⁶³ The employment rate of those people aged 55-64 is defined as the ratio of employed persons to the population in that age range. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 55-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. The series is constructed from Eurostat data except for historical data, usually prior to 1995, where growths from the OECD database are assumed (in the case of the EU-27, growths from the EU-22 are used). For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; y Population on 1 January by age and sex [demo_pjan]*. https://ec.europa. eu/eurostat/data/database; and OCDE. *Historical population and Labour Force Statistics by sex and age*. https://stats.oecd.org/.

⁶⁴ The temporariness rate is defined as the ratio of employees with a temporary contract to the total number of employees aged 15-74. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 15-74 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. The series is constructed from Eurostat data except for historical data, usually prior to 1995, where growths from the OECD database are assumed (in the case of the EU-27, growths from the EU-28 are used). For further details, see: Eurostat. *Temporary employees by sex, age and educational attainment level* (1 000) [lfsa_etgaed]; y Employees by sex, age and educational attainment level (1 000) [lfsa_eegaed]. https://ec.europa.eu/eurostat/ data/database; and OCDE. Employment by permanency of the job. https://stats.oecd.org/.

⁶⁵ The involuntary part-time rate is defined as the ratio of the total number of involuntary part-time workers (15-74 years) to the total number of employees. The EU-8 is constructed as the weighted average of the values of the individual countries, with active population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. The series is constructed from Eurostat data except for historical data, usually prior to 1995, where growths from the OECD database are assumed (in the case of the EU-27, growths from the EU-28 are used). For further details, see: Eurostat. *Employment by sex, age and citizenship (1 000) [lfsa_egan]; Full-time and part-time employment by sex, age and educational attainment level (1 000) [lfsa_epgaed]; and Involuntary part-time employment as percentage of the total part-time employment, by sex and age (%) [lfsa_epgai]. https://ec.europa.eu/eurostat/data/database; and OCDE. Incidence of involuntary part time workers. https://stats.oecd.org/.*

⁶⁶ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The series is constructed from Eurostat data except for historical data, usually prior to 1995, where growths from the OECD database are assumed (in the case of the EU-27, growths from the EU-28 are used). For further details, see: Eurostat. Average number of usual weekly hours of work in main job, by sex, professional status, full-time/part-time and occupation (hours) [lfsa_ewhuis]. https://ec.europa.eu/eurostat/database; and OCDE. Average usual weekly hours worked on the main job. https://stats.oecd.org/.

⁶⁷ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2018. For further details, see: Eurostat. *Gender pay gap in unadjusted form [sdg_05_20]*. https://ec.europa.eu/eurostat/data/database.

⁶⁸ The proportion of people satisfied with their job is defined as the percentage of people who rate their job satisfaction as medium or high.The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. The latest data available is from 2018. For further details, see: Eurostat. *Percentage of the population rating their satisfaction as high, medium or low by domain, sex, age and educational attainment level [ilc_pw05]*. https://ec.europa.eu/eurostat/ data/database.

⁶⁹ The Gini Coefficient is a measure of inequality represented by a number between 1 and 100, where 1 corresponds to perfect equality (everyone has the same income) and the value 100 corresponds to perfect inequality (one person has all the income and the others, none). Therefore, the higher the coefficient, the greater the inequality. Data from 1980 to 1994 (2009 for EU-27) are from Solt and later data from Eurostat. The EU-8 is constructed as the simple average of the values of each of its countries and the EU-27 is the aggregate indicator reported by Eurostat (and simple average of each of its countries until 2009). For further details, see: Eurostat. *Gini coefficient of equivalised disposable income [ilc_di12]*. https://ec.europa.eu/eurostat/data/database; and Solt, Frederick. "The Standardized World Income Inequality Database, Versions 8-9." *Harvard Dataverse*, 2019. https://doi.org/10.7910/DVN/ LM40WF.

⁷⁰ Estimation based on the model of Rao *et al* consistent with the projections of growth, productivity improvement and education indicators proposed in chapters 1 and 2 of this Strategy. See: Rao, Narasimha D., Petra Sauer, Matthew Gidden, and Keywan Riahi. "Income inequality projections for the Shared Socioeconomic Pathways (SSPs)." *Futures* 105, 2018. https://doi.org/10.1016/j.futures.2018.07.001.

⁷¹ The poverty risk is calculated using the cut-off point of 60% of the median equivalent income after social transfers. Data of Italy and Ireland are of 2018. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Atrisk-of-poverty rate by poverty threshold [ilc_li02]*. https://ec.europa.eu/eurostat/data/database.

⁷² Tax revenue is the total revenue from taxes and compulsory social security contributions. The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. Data from 1980 to 1994 are from the OECD and later data from Eurostat. For further details, see: Eurostat. *Main national accounts tax aggregates [gov_10a_taxag]: Total receipts from taxes and compulsory social contributions after deduction of amounts assessed but unlikely to be collected.* https://ec.europa.eu/eurostat/data/database; and OCDE. *Revenue Statistics - OECD countries: Comparative tables. Tax revenue as % of GDP.* https://www.oecd-ilibrary.org/taxation/data/revenue-statistics/comparative-tables_data-00262-en.

⁷³ Social protection expenditure includes, among other items, public spending on pensions, unemployment benefits, active employment policies (including training and guidance policies) and other social assistance. The latest data available is from 2018. For further details, see: European Commission. *Manual on sources and methods for the compilation of COFOG statistics*. Luxembourg: Publications Office of the European Union, 2019. https://ec.europa.eu/eurostat/ documents/3859598/10142242/KS-GQ-19-010-EN-N.pdf/ ed64a194-81db-112b-074b-b7a9eb946c32?t=1569418084000; and Eurostat. *Total government expenditure on social protection* [gov_10a_exp]. https://ec.europa.eu/eurostat/data/database.

⁷⁴ The indicator has been constructed on the basis of the percentage of people who responded that they were i"*Very Satisfied*" and "*Fairly satisfied*" to the question "On the whole are you very satisfied, fairly satisfied, not satisfied or not at all satisfied with the life you lead?" The EU-8 is constructed as the simple average of the values of the individual countries and the EU-27 is the aggregate indicator reported by the European Commission. For further details, see: European Commission. *Eurobarometer surveys for each year*. https://ec.europa. eu/COMMFrontOffice/publicopinion/index.cfm/Chart/getChart/ themeKy/1/groupKy/1.

METHODOLOGICAL NOTES

¹GDP per capita is defined as the ratio of GDP (in constant 2015 dollars and adjusted for purchasing power differences) to total population. The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. The EU-27 is calculated on the basis of the aggregate indicators reported by Eurostat. Ireland and Luxembourg are not represented in the graph as they have abnormally high values (67,768 and 86,769 euros, respectively), although they are included in the EU-27 average. For further details, see: Eurostat. GDP and main components (output, expenditure and income) [nama_10_gdp]; Population on 1 January by age and sex [demo_pjan]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https:// ec.europa.eu/eurostat/data/database. GDP per capita is defined as the ratio of GDP (in constant 2015 dollars and adjusted for purchasing power differences) to total population. The EU-8 is constructed as the weighted average of the values of the individual countries, with population being the reference for the calculation of weights. The EU-27 is calculated on the basis of the aggregate indicators reported by Eurostat. Ireland and Luxembourg are not represented in the graph as they have abnormally high values (67,768 and 86,769 euros, respectively), although they are included in the EU-27 average. For further details, see: Eurostat. GDP and main components (output, expenditure and income) [nama 10 gdp]; Population on 1 January by age and sex [demo_pjan]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa.eu/eurostat/data/database.

² Labour productivity is defined as the ratio of GDP (in constant 2015 euros and adjusted for purchasing power differences) to total hours worked. The EU-8 is constructed as the weighted average of the values of the individual countries, with total hours worked being the reference for the calculation of weights. The EU-27 is calculated on the basis of the aggregate indicators reported by Eurostat. Ireland and Luxembourg are not represented in the graph as they have abnormally high values (82 and 76 euros per hour worked, respectively), although they are included in the EU-27 average. For further details, see: Eurostat. GDP and main components (output, expenditure and income) [nama_10_ gdp]; Employment by A*10 industry breakdowns [nama_10_a10_e]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc ppp ind]. https://ec.europa.eu/eurostat/ data/database. Labour productivity is defined as the ratio of GDP (in constant 2015 euros and corrected for purchasing power differences) to total hours worked. The EU-8 is constructed as the weighted average of the values of the individual countries, with total hours worked being the reference for the calculation of weights. The EU-27 is calculated on the basis of the aggregate indicators reported by Eurostat. Ireland and Luxembourg are not represented in the graph as they have abnormally high values (82 and 76 euros per hour worked, respectively), although they are included in the EU-27 average. For further details, see: Eurostat. GDP and main components (output, expenditure and income) [nama_10_gdp]; Employment by A*10 industry breakdowns [nama_10_ a10 e]; y Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates [prc_ppp_ind]. https://ec.europa. eu/eurostat/data/database.

³ The EU-8 is constructed as the simple average of the values of the individual countries, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. *Average number of usual*

weekly hours of work in main job, by sex, professional status, full-time/ part-time and occupation (hours) [lfsa_ewhuis] https://ec.europa.eu/ eurostat/data/database The EU-8 is constructed as the simple average of the individual country values, and the EU-27 is the aggregate indicator reported by Eurostat. For further details, see: Eurostat. Average number of usual weekly hours of work in main job, by sex, professional status, fulltime/part-time and occupation (hours) [lfsa_ewhuis]. https://ec.europa. eu/eurostat/data/database.

⁴ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. See: European Commission. *European Innovation Index scoreboard 2020*. https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. See: European Commission. European Innovation Index scoreboard 2020. https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en.

⁵ The total employment rate is defined as the ratio of total employed persons to the population aged 16-64. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 16-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. Employment by sex, age and citizenship (1 000) [lfsa egan]; y Population on 1 January by age and sex [demo pjan]. https://ec.europa.eu/eurostat/data/database. The total employment rate is defined as the ratio of total employed persons to the population aged 16-64. The EU-8 is constructed as the weighted average of the values of the individual countries, with working aged 16-64 population being the reference for the calculation of weights. The EU-27 is constructed from the aggregates reported by Eurostat. For further details, see: Eurostat. Employment by sex, age and citizenship (1 000) [lfsa_egan]; and Population on 1 January by age and sex [demo_pjan]. https://ec.europa. eu/eurostat/data/database.

⁶ The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Department of Education and Vocational Training. PISA 2018. Madrid, 2019. Https://sede.educacion.gob.es/publiventa/pisa-2018-programa-parala-evaluacion-internacional-de-los-estudiantes-informe-espanol/ evaluacion-examenes/23505;; and Ministry of Education and Vocational Training, PISA 2018 Resultados de lectura en España, Madrid, 2020. https://www.educacionyfp.gob.es/inee/evaluaciones-internacionales/ pisa/pisa-2018/pisa-2018-informes-es.html; and OECD. PISA 2018 Results (Volume I): What Students Know and Can Do. Annex B1 Results for countries and economies. Mean reading performance, 2003 through 2018. https://doi.org/10.1787/5f07c754-en. The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. For further details, see: Department of Education and Vocational Training. PISA 2018. Madrid, 2019. Https://sede.educacion.gob.es/ publiventa/pisa-2018-programa-para-la-evaluacion-internacional-delos-estudiantes-informe-espanol/evaluacion-examenes/23505; and Ministry of Education and Vocational Training. PISA 2018 Resultados de lectura en España. Madrid, 2020. https://www.educacionyfp.gob.es/inee/ evaluaciones-internacionales/pisa/pisa-2018/pisa-2018-informes-es. html; and OECD. PISA 2018 Results (Volume I): What Students Know and Can Do. Annex B1 Results for countries and economies. Mean reading performance, 2003 through 2018. https://doi.org/10.1787/5f07c754-en.

⁷ The Gini Coefficient is a measure of inequality represented by a number between 1 and 100, where 1 corresponds to perfect equality (everyone has the same income) and the value 100 corresponds to perfect inequality (one person has all the income and the others, none). Therefore, the higher the coefficient, the greater the inequality. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. See: Eurostat. Gini coefficient of equivalised disposable income [ilc di12]. Https://ec.europa.eu/eurostat/data/database.. The Gini Coefficient is a measure of inequality represented by a number between 1 and 100, where 1 corresponds to perfect equality (everyone has the same income) and the value 100 corresponds to perfect inequality (one person has all the income and the others, none). Therefore, the higher the coefficient, the greater the inequality. The EU-8 is constructed as the simple average of the values of the individual reported countries, and the EU-27 is the aggregate indicator reported by Eurostat. See: Eurostat. Gini coefficient of equivalised disposable income [ilc_di12]. https://ec.europa. eu/eurostat/data/database.

⁸Average of the indicators of corruption control, government effectiveness, accountability and compliance with the law The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. See: World Bank. *Worldwide Governance Indicators*. Https://databank.worldbank.org/source/worldwide-governance-indicators. Average of the indicators of corruption control, government effectiveness, accountability and compliance with the law The EU-8 and EU-27 are constructed as the simple average of the values of the individual countries. See: World Bank. Worldwide Governance Indicators. Average of the simple average of the values of the individual countries. See: World Bank. Worldwide Governance Indicators. https://databank.worldbank.org/source/worldwide-governance-indicators.

⁹The percentage of municipal waste sent to landfill has been calculated on the basis of the annual per capita kilograms of municipal waste sent to landfill and the annual per capita kilograms of municipal waste generated. Data for the year 2018 are represented. In this case, the EU-27 is the aggregate indicator reported by Eurostat. See: Eurostat. Municipal waste by waste management operations [ENV_WASMUN]. Disposal - landfill and other (D1-D7, D12), Kilograms per capita. Waste generated, kilograms per capita. https://ec.europa.eu/eurostat/data/database. The percentage of municipal waste sent to landfill has been calculated from the annual per capita kilograms of municipal waste sent to landfill and the annual per capita kilograms of municipal waste generated. Data for the year 2018 are represented. In this case, the EU-27 is the aggregate indicator reported by Eurostat. See: Eurostat. Municipal waste by waste management operations [ENV_WASMUN]. Disposal - landfill and other (D1-D7, D12), Kilograms per capita. Waste generated, kilograms per capita. https:// ec.europa.eu/eurostat/data/database.

¹⁰The nature of the COVID-19crisis (a simultaneous supply and demand shock, at global scale) and the response of the authorities (rapid and unprecedented in magnitude) suggest that a full recovery from the crisis is possible, i.e. a full return to the pre-pandemic path of economic growth. Unlike financial crises, crises of a real nature generally do not entail great systemic uncertainty and, if accompanied by strong stimulus measures to ensure medium-term growth, as has been the case, neither do they entail a credit crunch and a deterioration in financing conditions that would hamper the recovery of activity and employment in the medium term. On this question, see, among others: Crafts, Nicholas. "Long-Term Growth in Europe: What Difference Does the Crisis Make?" *National Institute Economic Review* 224, n.º 1, 2013. doi:10.1177/002795011322400102; Eichengreen, Barry J., and Peter Temin. "Fetters of Gold and Paper." In Nicholas Crafts and Peter Fearon (eds.). *The great depression of the 1930s: lessons for today*. Oxford: Oxford University Press, 2013. http://www.oxfordscholarship.com/view/10.1093/ acprof:oso/9780199663187.001.0001/acprof-9780199663187; Fatás, Antonio, and Lawrence H. Summers. "The permanent effects of fiscal consolidations" *Journal of International Economics* 112, 2018 https://doi.org/10.1016/j.jinteco.2017.11.007; Field, Alexander J. "Economic Growth and Recovery in the United States: 1919–1941." In Nicholas Crafts and Peter Fearon (eds.). *The great depression of the 1930s: lessons for today.* Oxford: Oxford University Press, 2013. 358-94. http://www.oxfordscholarship.com/view/10.1093/acprof:o so/9780199663187.001.0001/acprof-9780199663187Haltmaier, Jane. "Do recessions affect potential output? *FRB International Finance Discussion Paper*, No. 1066, 2013 http://papers.srn.com/sol3/papers. cfm?abstract_id=2251879and Tagkalakis, Athanasios. "The effects of financial crisis on fiscal positions" *European Journal of Political Economy* 29, 2013 https://doi.org/10.1016/j.ejpoleco.2012.11.002.

¹¹On this question, see, among others: Ayuso, Mercedes, Jorge Miguel Bravo, and Robert Holzmann. "Population Projections Revisited: Moving beyond convenient assumptions on fertility, mortality and migration." *Instituto BBVA de pensiones, Working Paper*, n.º 10, 2015. http://www. ub.edu/rfa/research/WP/10_Population%20Projections%20Revisted_ ING.pdf; Keilman, Nico. "Data quality and accuracy of United Nations population projections, 1950-95." *Population Studies* 55, n.º 2, 2001. https://doi.org/10.1080/00324720127686; Keilman, Nico. "Erroneous Population Forecasts." In T. Bengtsson and N. Keilman (eds.). *Old and New Perspectives on Mortality Forecasting*. Springer International Publishing, 2019. 95-111; and National Research Council. "Beyond six billion: Forecasting the world's population. Panel on population projections." In J. Bongaarts and R. Bulatao (eds.). *Committee on population, commission on behavioral and social sciences and education*. Washington, D.C.: National Academy Press. https://www.nap.edu/read/9828/chapter/1.

¹² For further details, see: AIReF. Actualización de previsiones demográficas y de gasto en pensiones. Documento Técnico, n.º 1/20. 2020. https://www.airef.es/wp-content/uploads/2020/09/ PREVIS-DEMOGRAFICAS/200928-Documento-Técnico-previsionesdemográficas-y-gasto-en-pensiones.pdf; Eurostat. Population on 1st January by age, sex and type of projection [proj_19np]. https://ec.europa. eu/eurostat/data/database; and INE. Proyecciones de población. https:// www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=12 54736176953&menu=resultados&idp=1254735572981.

¹³ De la Fuente, Ángel, Miguel Ángel García Díaz, and Alfonso R. Sánchez. "¿Hacia una contrarreforma de pensiones? Notas para el Pacto de Toledo." *Hacienda Pública Española / Review of Public Economics* 232, n.º 1, IEF, 2020 https://ideas.repec.org/a/hpe/journl/y2020v232i1p113-144.html

¹⁴ Note that for the historical period from 1990 to 2001 there are no figures available for emigration and, therefore, neither for net immigration; the latter is approximated by gross immigration or estimated immigration inflow into Spain. For further details, see: AIReF. *Datalab population figures*. https://www.airef.es/en/datalab-population-figures/; Eurostat. Immigration by age and sex[*migr_imm8*]; Emigration by age and sex[*migr_emi2*]; and Assumptions for net migration by age, sex and type of *projection* [*proj_19nanmig*]. https://ec.europa.eu/eurostat/data/database; and INE. *Migraciones exteriores*. *Saldo migratorio con el extranjero por provincia, año, sexo, grupo de edad y nacionalidad*. https://www.ine.es/ jaxiT3/Tabla.htm?t=24328; y *Proyección de la población de España*. 2020-2070. Inmigraciones procedentes del extranjero, por sexo, edad y *año*. *Emigraciones con destino al extranjero, por sexo, edad y año*. https:// www.ine.es/dynt3/inebase/es/index.htm?padre=6671. ¹⁶ The EU-8 is constructed as the weighted average of the values of the individual countries, with occupied population being the reference for the calculation of weights. The EU-28 is constructed from the aggregates reported by the OECD. For further details, see: OECD. Annual Labour Force Statistics summary tables. Employment; and Level of GDP per capita and productivity. Hours worked for total employment. https://stats.oecd. org/.

¹⁷ The EU-8 is constructed as the weighted average of the values of the individual countries, with active population being the reference for the calculation of weights. The EU-28 is constructed from the aggregates reported by the OECD. For further details, see: OECD. *Annual Labour Force Statistics summary tables. Unemployment and Labour Force*. https://stats.oecd.org/.

¹⁸ The EU-8 is constructed as the weighted average of the values of the individual countries, with working age population being the reference for the calculation of weights. The EU-28 is constructed from the aggregates reported by the OECD. For further details, see: OECD. *Historical population*. *15-64; and Annual Labour Force Statistics summary tables*. *Labour Force*. https://stats.oecd.org/.

¹⁹ The EU-8 is constructed as the weighted average of the values of the individual countries, with total population being the reference for the calculation of weights. The EU-28 is constructed from the aggregates reported by the OECD. For further details, see: OECD. *Historical population. Total and 15-64.* https://stats.oecd.org/.

²⁰ Aum, Sangmin, Dongya Koh, and Raül Santaeulàlia-Llopis. "Growth facts with intellectual property products: an exploration of 31 OECD new national accounts." *Barcelona GSE Working Paper Series*, n.º 1029, 2018. https://www.barcelonagse.eu/sites/default/files/working_paper_ pdfs/1029_0.pdf.

²¹Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer. "The Next Generation of the Penn World Table." *American Economic Review* 105, n.° 10, 2015. See also: Penn World Table, version 10.0. Human capital index, based on years of schooling and returns to education; and Average annual hours worked by persons engaged. www.ggdc.net/pwt.

²² Eurostat. Employment by sex, age and citizenship (1 000) [lfsa_egan]; Population on 1 January by age and sex [demo_pjan]; y Population on 1st January by age, sex and type of projection [proj_19np]. https://ec.europa. eu/eurostat/data/database.

²³ For further details, see: International Institute for Applied Systems Analysis. *Global population and human capital projections for Shared Socioeconomic Pathways - 2015 to 2100, Revision-2018.* https:// dare.iiasa.ac.at/105/; and Lutz, Wolfgang (eds.). *Demographic and human capital scenarios for the 21st century 2018 assessment for 201 countries.* Luxembourg: Publications Office of the European Union, 2018. https://ec.europa.eu/jrc/sites/jrcsh/files/lutz_et_al_2018_demographic_ and_human_capital.pdf.

²⁴ Specifically, it is assumed that for the population aged 16-24 in higher education, the ratio of those in universitary education (78%) to those not i(22%) remains constant at 2018 levels. For further details, see: Department of Education and Vocational Training. *Escolarización y entorno educativo. Escolarización y población. Escolarización y población de 0 a 29 años.* Madrid, 2020. https://www.educacionyfp.gob.es/inee/ indicadores/sistema-estatal/mapa-indicadores.html.

²⁵ In 2018, the enrolment rate for children under one year of age was 12%, for one-year-olds 40%, and for two-year-olds 60%. For further details, see: Department of Education and Vocational Training. *Escolarización y*

entorno educativo. Escolarización y población. Escolarización y población de 0 a 29 años. Madrid, 2020. https://www.educacionyfp.gob.es/inee/ indicadores/sistema-estatal/mapa-indicadores.html.

²⁶ Department of Education and Vocational Training *Escolarización y entorno educativo. Escolarización y población. Escolarización y población de 0 a 29 años.* Madrid, 2020. https://www.educacionyfp.gob.es/inee/indicadores/sistema-estatal/mapa-indicadores.html.

²⁷ In 2018, the highest enrolment rates were 19% for children under the age of one, 53% for one-year-olds and 93% for two-year-olds. For further details, see: Department of Education and Vocational Training. *Escolarización y entorno educativo. Escolarización y población. Escolarización y población de 0 a 29 años.* Madrid, 2020. https:// www.educacionyfp.gob.es/inee/indicadores/sistema-estatal/mapaindicadores.html.

²⁸ In 2019, in Spain, 5.3% of inactive people aged 16-24 were neither studying nor working, while this percentage fell to 4.6% on average in the EU-8. For further details, see: Eurostat. *Young people neither in employment nor in education and training by sex, age and labour status* (*NEET rates*) [edat_lfse_20]. https://ec.europa.eu/eurostat/data/database.

²⁹ In 2018, 4.3% of the population aged 16-24 years were in lower secondary education (students who had repeated a grade) and 1.6% were participating in Adult Secondary Education. In line with the reduction of the early school leaving and repetition rates targeted in the scoreboard in chapter 2, it is assumed that the combined share of both groups falls to 1% of the population in this age group by 2050. For further details, see: Department of Education and Vocational Training. *Escolarización y entorno educativo. Escolarización y población. Escolarización y población de 0 a 29 años.* Madrid, 2020. https://www.educacionyfp.gob.es/inee/indicadores/sistema-estatal/mapa-indicadores.html.

³⁰ Department of Education and Vocational Training *Escolarización y entorno educativo. Escolarización y población. Escolarización y población de 0 a 29 años.* Madrid, 2020. https://www.educacionyfp.gob.es/inee/ indicadores/sistema-estatal/mapa-indicadores.html.

³¹ For example, in the 2018-19 academic year, 84% of the 1.3 million students enrolled in University degree studies and 63% of the 220,000 students enrolled in an Official Master's were studying in public institutions. For more details, see: Department of Education and Vocational Training. *Las cifras de la educación en España. Curso 2018-19. D7. La educación universitaria.* Madrid, 2020. https://www.educacionyfp. gob.es/servicios-al-ciudadano/estadisticas/indicadores/cifras-educacion espana/2018-19.html.

³² For example, in the 2018-19 academic year, 19% of undergraduate students were over 25 years old. For further details, see: Department of Universities. *Datos y cifras del Sistema Universitario Español. Publicación* 2019-2020. Madrid, 2020. https://www.ciencia.gob.es/stfls/MICINN/ Universidades/Ficheros/Estadisticas/Informe_Datos_Cifras_Sistema_ Universitario_Espanol_2019-2020.pdf.

³³ Government of Spain. *Recovery, Transformation and Resilience Plan.* Madrid, 2021. https://www.lamoncloa.gob.es/presidente/actividades/ Documents/2021/130421-%20Plan%20de%20recuperacion%2C%20 Transformacion%20y%20Resiliencia.pdf.

³⁴Ibid.

- ³⁵Ibid.
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EXPERTS AND COLLABORATING INSTITUTIONS

CHALLENGE 1: BEING MORE PRODUCTIVE TO GROW BETTER

- Javier Andrés Professor of the Fundamentals of Economic Analysis at the University of Valencia
- Román Arjona Gracia Chief Economist of the Directorate General for Internal Market, Industry, Entrepreneurship and SMEs of the European Commission
- José Emilio Boscá Mares Professor of Fundamentals of Economic Analysis at the University of Valencia; Associated Researcher at FEDEA
- Aida Caldera Head of Division in the Economics Department of the OECD
- Emma Fernández Independent Expert on Technology and Innovation
- Javier Ferri Carreres Professor of Fundamentals of Economic Analysis at the University of Valencia; Associate Researcher at FEDEA
- Ángel de la Fuente Executive Director of FEDEA; Senior Scientist at IAE-CSIC
- Jordi García Brustenga Director of Operations and Strategy at ENISA
- Xabier Goenaga Beldarrain Head of the Finance, Innovation and Growth Unit of the European Commission's Joint Research Centre
- Mikel Landabaso Álvarez Director of Growth and Innovation at the European Commission's Joint Research Centre
- Andrés Rodríguez-Pose Princess of Asturias Professor and Professor of Economic Geography at the London School of Economics
- José Juan Ruiz President of the Real Instituto Elcano
- Raul Santaeulalia Llopis Beatriz de Galindo Senior Research Fellow in Fundamentals of Economic Analysis at the Autonomous University of Barcelona
- Carolina Villegas Sánchez Senior Lecturer in Economics, Finance and Accounting at ESADE

CHALLENGE 2: MOVE TO THE FOREFRONT OF EDUCATION

- Mariano Fernández Enguita Professor of Sociology at the Universidad Complutense de Madrid
- Álvaro Ferrer Blanco Education Equity Specialist at Save the Children
- Marc Fuster Rabella Analyst in the OECD Directorate for Education and Skills
- Lucas Gortazar Research Coordinator and Education Researcher at EsadeEcPol Centre for Economic Policy; Consultant Education Specialist at the World Bank

- Anton de Grauwe Senior Education Specialist at the IIEP-UNESCO
- Xavier Martínez-Celorrio CRIT Sociology Researcher at the Universidad de Barcelona; Collaborator with the Fundación Jaume Bofill
- Eva Flavia Martínez Orbegozo PhD student in Education Policy at Harvard University; Researcher at the Bloomberg Harvard City Leadership Initiative
- José Montalbán Castilla Professor of Economics at the Swedish Institute for Social Research, Stockholm University
- Juan Manuel Moreno Olmedilla Senior Education Specialist at the World Bank; Professor of Didactics and School Organisation at the Universidad Nacional de Educación a Distancia
- Carmen Pellicer Iborra President of the Fundación Trilema
- Ainara Zubillaga Director of Education and Training at the Fundación Cotec; Associate
 Professor of Education at the Universidad Complutense de Madrid

CHALLENGE 3: IMPROVE TRAINING AND REQUALIFICATION AMONG THE POPULATION

- Carmen Beviá Baeza Professor of Economics at the Universidad de Alicante
- Antonio Cabrales Professor of Economics at the Universidad Carlos III de Madrid
- J. Mariano Carballo Fernández Professor of Health Care Processes in Vocational Training Centres
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CHALLENGE 4: BECOMING A CARBON-NEUTRAL, SUSTAINABLE AND CLIMATE-RESILIENT SOCIETY

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CHALLENGE 5: GET OUR WELFARE STATE READY FOR A POPULATION THAT WILL LIVE LONGER

- Elena del Barrio Co-Director and Researcher at the Matia Institute
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CHALLENGE 6: PROMOTE A BALANCED, FAIR AND SUSTAINABLE DEVELOPMENT OF THE COUNTRY

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- Sonia de Gregorio Hurtado Professor of Urban Planning at the Universidad Politécnica de Madrid
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CHALLENGE 7: ADDRESS THE SHORTCOMINGS OF OUR LABOUR MARKET AND ADAPT IT TO NEW SOCIAL, ECONOMIC AND TECHNOLOGICAL REALITIES

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CHALLENGE 8: REDUCE POVERTY AND INEQUALITY AND REACTIVATE THE SOCIAL ELEVATOR

- Miguel Artola Blanco Professor in the Department of Social Sciences at the Universidad Carlos III de Madrid; Researcher at the World Inequality Database.
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CHALLENGE 9: BROADEN THE FOUNDATIONS OF OUR FUTURE WELL-BEING

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