Fundación MAPFRE

A GLOBAL PERSPECTIVE ON PENSION SYSTEMS

MAPFRE Economics

A global perspective on pension systems

Update of the international comparative analysis of retirement pension systems

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Presentation

Since Fundación MAPFRE published the report *Pension Systems: An International Comparative Survey*, prepared by MAPFRE Economics in 2017, structural reforms have taken place in some countries in their retirement systems in order to adapt them to future challenges and make them sustainable in the long-term. The importance of these changes and the interest generated in society by the debate on the future of pensions have contributed to the need for MAPFRE Economics to update the information contained in that study, revising the six reference models that were analyzed at that time (United States, Chile, Sweden, the United Kingdom, Netherlands and Spain) and adding five new models (Brazil, France, Germany, Japan and South Korea). In addition, for the first time, the "Indicator of pressure on pension systems" (IPPS), a synthetic index developed by MAPFRE Economics for a group of 45 countries, is presented in this edition. This helps to assess the pressure to which the various systems are exposed to undertake their reform.

As in the report published in 2017, this new paper conducts an international comparative analysis of retirement pension systems, following an approach based on pillars or coverage levels, and focused on the different risks to which they are exposed. Reforms implemented in the selected systems in recent decades are also analyzed, and major long-term demographic trends are reviewed. From the analysis of these reforms and the models studied, a set of conclusions has been drawn that help in understanding the parameters that are often used to underpin the sustainability of pensions, as well as the public control mechanisms introduced to redistribute the risks occurring in the operation of these systems. Finally, some elements of public policy are presented to provide sustainability and stability to pension systems in the medium- and long-term.

Fundación MAPFRE recommends reading this new study by MAPFRE Economics which, like those before it, maintains a rigorous style and brings the citizen closer to a topical issue that generates numerous debates in institutions and society. This Fundación MAPFRE publication is part of the objective of continuing to encourage society to expand its financial and insurance education, so that its current savings decisions help in creating a future of greater security.

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Introduction

In our 2017 benchmark report, *Pension Systems: An International Comparative Survey*, the question was raised of how societies in different parts of the world have been demonstrating a demographic pattern that tends to converge due to the increase of life expectancy and the reduction of fertility and mortality rates. This pattern has produced significant alterations in population pyramids, in the structure of the labor market and the growth in wages, and in the very configuration of social organization. Although this is a trend that cuts across all social life, one aspect that is particularly affected is that of retirement pension systems.

In addition, the pressures associated with population phenomena combine with other factors that contribute to making it more pressing to pay attention to the long-term sustainability of pension systems, such as moderation in the pace of economic activity caused both by previous economic crises and by the COVID-19 pandemic; the persistent low-interest-rate environment that has now spread practically throughout the world; and the rise in public debt levels that has raised the degree of vulnerability in many governments' finances, resulting in greater pressure being placed on the long-term financial sustainability of pension schemes. The result of the interaction of this group of factors has been a tendency for the technical and financial foundations of many pension systems to deteriorate, thus causing their medium- and long-term sustainability under their current parameters to be called into question.

In this context, the main objective of this report is to identify, on the basis of international experience, those elements of public policy which—while still considering the specifics of each country—could be considered part of the set of measures aimed at reforming pension systems and, to that extent, providing them with sustainability. More than a century after the first pension systems came into being, and after what have perhaps been the greatest transformations in the economic structure and population dynamics in the history of the world, it is essential to re-evaluate and redesign these systems if they are to remain a key part of the institutional infrastructure that makes coexistence in our societies cohesive.

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Executive summary

Factors that exert pressure on pension systems

There are many factors that exert a great influence on pension systems, some of them *endogenous* (inherent in the architecture of the system itself) and others *exogenous* (such as demographic, economic and financial factors), which are linked to the level of pressure on pension systems for reform, by affecting the determining factors of their sufficiency and sustainability.

In this regard, the dynamics of demographic evolution are one of the main factors directly affecting the workforce and the percentage of people who reach retirement age. This is a factor that points to a sustained increase in pressure on the sustainability of pension systems, especially in those where distribution elements have a greater weight, due to the progressive and marked reduction in the relative weight of the labor force in respect of people who reach the planned retirement age in the coming decades and up to the end of the century. This process will affect all countries and regions of the world without exception, although more immediately and more cogently in those countries with the highest level of relative development. The demographic trend is based on drastic declines in fertility rates combined with the widespread decrease in mortality rates, and the positive effect of this on life expectancy in the population reaching retirement age.

However, in assessing these demographic pressures, the situation caused by the COVID-19 pandemic reminds us that there are certain catastrophic events (low frequency and high severity) that can significantly alter the demographic trends described. In the case of the current pandemic, the current fatality rate of the SARS-CoV-2 virus (unless it sustains a mutation that significantly increases this) does not appear to be sufficient to alter the main conclusion regarding the sustained increase in longevity. Furthermore, the scientific advances made in the production of vaccines, and the uncertainty on the ability of science to extend human life beyond the limits we now envisage, can continue to work in favor of greater increases in longevity over the medium- and long-term. This suggests that this trend, combined with the potential materialization of other economic and financial risks that will affect pension spending, will entail the need for further progress in the adjustment and reform of the schemes that support them, to make them financially sustainable in the long-term.

As previously noted, demographic pressures combine with other factors (such as employment, income level or interest rate environment) that contribute to making it more pressing to pay attention to the long-term sustainability of pension systems. In this regard, the abrupt fall in economic activity caused by lockdown and social distancing measures implemented to deal with the health effects of the pandemic (estimated to have led to a fall in world GDP of around 3.5% in 2020) is coupled with the moderation in the pace of economic activity caused by the economic and financial crisis of 2008–2009, which, together with the presence of isolated events of volatility,

have all had important effects on employment, productivity and income levels in many societies. The low-interest-rate environment, which will last for several years in much of the major world economies, also has unintended consequences on the rate of accumulation in savings and pension funds, even though it is a monetary policy mechanism that is showing great value in stimulating the growth in economic activity and employment.

The reference models analyzed and the indicator of pressure on pension systems

In order to analyze how these factors exert pressure on retirement pension systems and assess the different strategies and measures taken at international level to tackle this phenomenon, 11 pension systems have been selected for this study. These are characterized by covering, at least in terms of their most salient features, a spectrum of the different schemes that exist today.

The selected models include retirement pension systems in the United States, Brazil, Chile, Sweden, the United Kingdom, Germany, the Netherlands, France, Spain, Japan and South Korea. This set of models provides a broad enough outlook to support general conclusions and to develop a comprehensive list of the main adjustment mechanisms and measures that have been influenced by the various reforms of pension systems, related to the specific configuration of the different systems, in order to reach an adequate balance between their adequacy, sustainability and the control of the risks to which they are exposed (mainly from factors classified as *exogenous*).

As a complement to the analysis of the 11 reference models used to perform a comparative international analysis, and in order to provide a more global perspective on the problems facing retirement pension systems worldwide, this report has included the results of a summary index developed by MAPFRE Economics for a group of 45 countries, which helps assess the pressure for reform to which their respective systems are exposed. The "Indicator of pressure on pension systems" (IPPS) is not intended to express a value judgment on the goodness or relevance of the design of the pension systems, as this would imply a high degree of subjective assessment. Instead, it aims to quantify objectively the pressure to which the various pension systems are subjected, taking into account a set of factors susceptible to measurement and that are indicative of potential problems of sufficiency or sustainability, and which consequently increase the pressure for their reform.

The results of the IPPS show that the areas with the greatest pressure are Europe, Japan and South Korea, with the systems of Eastern Europe and Greece at the top of the list, followed by countries like Italy, France, Portugal and Spain where there are high levels of pressure for reform, in these latter countries mainly due to changing demographics and other indicators related to sustainability, coupled with an asset shortage in retirement plans. In Latin America, the systems in Chile and Mexico show a moderate level of pressure, arising from pension inadequacy indicators for low and medium incomes. In Brazil, pressure for reform is somewhat higher (although moderate, partly because some reform has been underway in recent years), and stems from factors related to budgetary and financial sustainability, as well as from insufficient assets in retirement plans.

A risk-based framework

A conceptual framework based on pillars or levels of coverage and an approach based on the different risks to which such systems are exposed has been followed in the reference model analysis on retirement pension systems. While the analysis has focused on the first (compulsory and contributory) and second (occupational) pillars, the zero (non-poverty) and third (individual and voluntary savings) pillars

have also been considered, in line with the previous edition of this study.

This conceptual framework considers that there are generally four main types of risks related to pension systems, which, with varying levels of frequency and severity, can materialize and affect their efficiency and sustainability. First, *financial risks* (specifically linked to market and credit risks and risks involved in matching assets to liabilities in the management of funds intended to cover the payment of pensions); second, *demographic risks* (associated, on the one hand, with survival rates and, on the other, with the change in the population structure); third, *inflation risk* (which entails the potential reduction of the effective replacement rate resulting from the difference between criteria for revising pension amounts and the increase in prices in the economy overall), and finally *unemployment risk* (associated with the economic cycle, entailing an increase in the actual dependency rate (the ratio of the population collecting pensions and the actively working population), especially for allocation schemes). Each of these risks has a different effect, depending on the structure and operation of the pension system in question (i.e. the relative weight of Pillars 1, 2 or 3 within each system), and involves a process of transferring these that is different in each case.

Public policies and pension systems

Unlike the aforementioned *exogenous* factors, in which government intervention is exerted through economic policy (fiscal and monetary) with a more general and indeterminate impact on retirement pension systems, government intervention measures on *endogenous* factors (related to the system's inherent architecture and parameters) are indeed of a conclusive nature, and are the factors on which the reforms focus. The above-mentioned demographic pressure caused by the widespread improvement in life expectancy, accompanied by a significant fall in fertility rates, has resulted in virtually all of the reforms carried out in recent decades being aimed at broadly underpinning their medium- and long-term stability and sustainability, and attempting to decide on mechanisms that may somehow offset the effect these reforms may have on pension adequacy.

The most relevant measures and mechanisms that stand out in the reforms of the systems analyzed are: (i) maintenance of a basic social support scheme; (ii) increase in the retirement age, disincentives for early retirement and incentives for deferment and active aging; (iii) adjustment of contribution rates; (iv) adjustment of budgetary transfers for the payment of pensions; (v) adjustment of replacement rates (parametric reforms, trends to balance public contributions to the system with individual contributions); (vi) creation of incentives for businesses to create and manage supplementary pension plans; (vii) establishment of tax incentives for voluntary medium- and long-term individual savings also to supplement pensions; and (viii) greater transparency for workers regarding the pension they will be able to receive.

Main elements of public policy arising from the reference model analysis

There are numerous parameters that determine contributory pensions in systems with distribution components in their first pillar, which are often adjusted in parametric reforms of retirement pension systems (in addition to contribution rates and the regular retirement age). The following are the most common parameters from the analysis of pension system reforms carried out in this study:

- *Revised average contribution bases or regulatory bases* (pensionable salary). The number of years considered in the calculation of the average is a parameter that can greatly influence the final amount of the pension and is always subject to review in the various reforms we have analyzed, in those systems that use it. The salary revision mechanism to

correct the effect of inflation is also very significant. Finally, some systems consider only part of pensionable salaries when averaging, usually the higher salaries in order to reduce early retirement incentives. The regulatory bases are related to the contribution bases, which depend on the salary as well as on the maximum and minimum limits applicable to the contribution bases at each moment.

- *Direct application of replacement rates to regulatory bases*. This is performed in some pension systems that use different percentages for different tranches, as is the case in the US system, or by applying them in part to the average salary of all workers to calculate the pension, as is the case in South Korea. This gives it a redistributive character.

- *Incomplete working careers*. In relation to working life, other important parameters are the years of contributions necessary to access the contributory pension and the years necessary to accrue the entire pension corresponding to the regulatory base, as well as the percentage of penalty for each year of contributions not made in order to reach the minimum (pension in incomplete working careers = regulatory base * percentage of penalty).

- *Pension limits*. Use of maximums and/or minimums (and supplement to minimums) and indicators used for periodic updating.

- *Parameters that are involved when the ordinary retirement age is altered*. These parameters affect the pension amount in cases of early and/or deferred retirement and pension compatibility with active work. The penalty percentages in the case of early retirements, as well as the percentages of incentives for deferred retirement or of compatibility with active work (and the obligation to continue or not continue contributing in that period) are also relevant parameters when propounding reforms.

- *Revaluation of pensions*. The parameters commonly used are the Consumer Price Index (CPI) and, to a lesser extent, other parameters such as salary developments, GDP growth and, in some cases, indicators related to the sustainability of the system (*e.g.* social security income and expenditure), among others.

- *Life expectancy*. Adjustment mechanisms for increases in life expectancy for people who reach retirement age that may affect – if introduced – only new pensioners or the entire universe of retired people.

- *Point systems*. Parameters for calculating the purchase price and the value of the accumulated points for retirement (as is the case with pension systems in Germany and France).

- *Parameters related to notional accounts*. This is an instrument for adapting the amount of benefits under the first pillar to contributions made during working life (as is the case with the Swedish system), in particular the parameters related to the annual revaluation applied to the amounts credited to notional accounts, as well as the revaluation percentages, interest rates and biometric tables used to calculate the portion of the pension from notional accounts.

- *Breakdown of the first pillar*. Breaking down the first pillar of pension systems into elements to which different calculation and revaluation parameters apply (as is the case with pension systems in the United Kingdom or Japan). The first element is often referred to as a flat rate benefit, applying different revision mechanisms (e.g. the triple lock in the UK).

Moreover, as highlighted in the previous version of this study, it is worth noting that in the most

stable pension systems, in the absence of the need for later reforms, the strengthening of Pillar 2 (supplementary pension schemes in the employment system) and Pillar 3 (incentives for individual and voluntary savings in financial products to supplement the pension) always play a relevant role. However, in order to achieve the greatest stability resulting from a better balance between pillars (and, consequently, between risks), significant contribution percentages have been necessary over long periods of time. The Netherlands pension system is typical in this respect, with a percentage of assets in retirement plans relative to their GDP close to 200%. But other systems, such as the United States and the United Kingdom, also have a high percentage (above 150% and 120%, respectively), which is an important feature of pensions and relieves pressure for the reform of their systems for lack of sufficiency.

However, it must be clarified that in-depth reforms that have pursued a substantial change in the weight of the various pillars—where the contributory element of capitalization plays a significant role—have only worked when they are carried out well in advance, as they must be accompanied by lengthy and substantial contributions from companies and workers. Such is the case with the Netherlands system, which can be taken as representative in this regard and whose reform dates back to the 1950s. At that time, contributions through the second pillar supplementary pension systems enabled an aggregate fund to accumulate, which is one of the largest in the world today.

It should also be noted that all of the recent reforms analyzed have taken additional measures to redistribute the risks inherent in the functioning of their systems, to a greater or lesser extent, among the different participants. Public control mechanisms have been introduced in order to prevent the mismanagement of risks—due to the inadequate functioning of the system—from resulting in situations where people who reach retirement suffer the consequences, in the form of lower replacement rates.

The development of these mechanisms is important, and the latest reforms tend to involve more public institutions, which are given greater supervisory powers. The measures analyzed include, but are not limited to:

- The creation of public compensation mechanisms for workers who have suffered a loss in their vesting rights because of the irregular functioning of agents involved in the system, as is the case in the United States.
- Outsourcing requirements of funds for the coverage of pension commitments by companies to their workers, such as in the Dutch and Spanish systems. However, this is not a widespread practice, as there are still systems in which the funds supporting the commitments are allowed to be kept within the company's balance sheet, such as in Japan, South Korea, the United States, among others, unless their outsourcing is agreed, usually through collective bargaining.
- The assumption by public institutions of some of the elements of the greatest risk and that could have greater impact on retired persons (such as life annuities), so that the coverage of demographic risks, both idiosyncratic and aggregate or systematic, rests on a public company, as in the Swedish system.
- Public control over competition and commissions charged by private entities managing capitalization funds, by creating public entities participating in the system, as in the cases of the United Kingdom, Sweden and Chile.
- Reforms aimed at eliminating or reducing the existence of special regimes for manifestly justified cases for particularly difficult activities (e.g. mining), which introduce complexity into the system; difficulties related to their control and management; and the coexistence of different pensioners' groups with high, socially disruptive dispersion in their replacement rates.

- Measures aimed at improving collection mechanisms, fraud control and management bodies (collection and benefits), with a view to reducing the levels of misuse of protection and non-compliance with the obligation to contribute.

Furthermore, the results of case studies of mechanisms to protect people who reach retirement age from losses in their purchasing power as a result of inflationary processes are diverse, although all the systems analyzed introduce review mechanisms at least annually and even more frequently. There is a tendency to introduce adjustment mechanisms in which indexing to indicators that measure the loss of purchasing power (the consumer price index, the wage trend index or a combination of both) is combined with other indicators related to the sustainability of the system. Although it is not a general practice, it is not performed automatically and sometimes leaves a part of the pension considered a vital minimum, usually linked to wage developments to a greater or lesser extent, out of the adjustment.

An important aspect that should be mentioned concerns the percentages of contribution to the compulsory system. Of the 11 reference models analyzed, 6 have aggregate contributions for the first pillar above the Organization for Economic Co-operation and Development (OECD) average of around 18.4%. The lowest contribution system is South Korea, with a percentage of 9%. Below average are also the systems of the United States, Chile, Brazil and Japan, notwithstanding differences in the contributions and accumulated assets of these latter systems in the second and third pillars, which are significantly higher in the case of the United States.

It should also be noted that tax incentives in all cases have a great influence on pension systems, especially with regard to the individual and voluntary savings elements found in Pillars 2 and 3. Favorable taxation has a dual function: an incentive to contributions, but also a disincentive to the early withdrawal of funds before retirement (which requires the corresponding tax adjustment). In this regard, and depending on the reference models analyzed, tax incentives related to direct tax (income tax) are explicitly considered to stimulate medium- and long-term savings when made in company supplementary pension schemes, or (in the forms under Pillar 3) when it is channeled to financial products intended to supplement the pensions to be received under the schemes of Pillars 1 and 2. Such contributions are, in general, deductible at the time they are made, being taxed upon receiving benefits resulting from them during retirement and subject to lower marginal rates, with certain limits on annual deductible contributions, and in other cases through deductions on returns.

More sustainable and fairer pension systems

Based on the international comparative analysis of the reference models included in this report, it can be concluded that, given the pressure of demographic, economic and financial risks that every pension system across the globe is facing to varying degrees, the path to reform that provides the best possibilities for bringing sustainability and stability in the medium-/long-term is through creating a *better balance between the different pillars*, as a way to redistribute the risks to which these systems are exposed and, ultimately, to better absorb the impact should such risks materialize. This is true insofar as the effect of the materialization of these risks does not affect each pillar in the same way, and therefore a better combination of the relative weight of the different pillars moderates the impact of these risks on the pension system as a whole.

From an instrumental point of view, the objective of forming a better balance between pillars (and consequently, between risks) can only be achieved in a medium- and long-term implementation scenario, and can be summarized in the following general principles:

- Maintenance and strengthening of a basic social support scheme (Pillar 0), i.e. minimum non-contribution-based social support aimed at those workers with incomplete careers who are therefore unable to qualify for a contribution-based pension.

- Streamlining of a first contribution-based pillar that combines inter-generational solidarity with individual savings, thus bringing the benefits of the system in line with the individual contributions to that system. In this process, measures such as adjusting the retirement age (shown to be the measure most likely to achieve this objective), together with adjusting contribution rates, are the two essential tools.

- The generation of incentives for companies to create and manage (directly or indirectly through professional fund managers) supplementary contributory pension plans (especially defined contributions) to complement Pillar 1 contributory pensions.

- Implementation of incentives for medium- and long-term voluntary individual saving, which workers can channel through professional managers with financial products designed to generate an income during retirement, thus supplementing the pensions from Pillars 1 and 2.

The issue of pensions is, without a doubt, one of the greatest challenges for the future of our societies. It is therefore still necessary for governments to create space to consider the implementation of measures that will make them viable, which must be carried out on structural bases that will only mature in the medium- and long-term. Therefore, it is imperative that pension systems be reformed as soon as possible so that they are provided with sustainability and stability in the long-term (and, consequently, greater equity). There must also be a better balance between pension system pillars in order to limit and mitigate the impact should risks inherent in their operation materialize.

1. Conceptual framework

1.1. A conceptual framework for the analysis of pension systems

As stated in our 2017 benchmark report, *Pension Systems*[1], since the post-war period, societies in different parts of the world have been presenting, with varying degrees of intensity, a demographic pattern that tends to converge globally and is characterized by increased life expectancy and reduced fertility and mortality rates. This situation has resulted in significant disruptions in its population pyramids, which have generally shifted from expansive pyramids at the beginning of the 20th century to constrictive pyramids from the end of this century. This gives a glimpse (according to most demographic projections) of a common trend toward convergence toward stationary pyramids, starting from the second half of the 21st century.

Thus, increased longevity (whether under the parameters envisaged by traditional demographic approaches or by more disruptive approaches that predict significant increases in longevity in the near future) will have profound implications for societies in most parts of the globe. However, while there is a high level of uncertainty as to what levels the increase in longevity may reach in this century, there is no doubt that greater life expectancy will have an impact on virtually all areas of social life. On one hand, from an economic point of view, the greater life expectancy will have an effect on the structure of the labor market and salary growth, especially in light of its convergence with the technological revolution associated with the digital age applied to the productive processes in the economy. And on the other hand, from a social perspective, greater longevity will mean substantial changes in patterns of organization and living arrangements.

Although this is a trend that cuts across social life, one aspect that it particularly affects, and regarding which it is necessary to anticipate its effects, is that of pension systems. Longevity, together with the potential materialization of other associated economic and financial risks, will clearly affect pension expenses, entailing the need to continue work to adapt these systems to make them sustainable in the long-term.

In addition to the demographic pressures associated with population phenomena (a permanent structural factor), other elements contribute to making it more pressing to address the long-term sustainability of pension systems. Three of these would appear to be particularly relevant. Firstly, the moderation in the pace of economic activity, caused initially by the economic and financial crisis of 2008–2009, and then by the abrupt and profound crisis into which the world has been plunged as a result of lockdown and social distancing measures implemented to contain the health effects of the COVID-19 pandemic, which have had significant cumulative effects on employment and income levels in virtually all societies worldwide. Secondly, the persistent low-interest-rate environment that has been ongoing for several years in much of the major economies (and that now has become almost universal as one of the economic policy responses to the crisis caused by the coronavirus pandemic); while it has been a monetary policy mechanism that has proved useful in stimulating growth in economic activity and employment it has had (and will continue to have) unintended consequences on the rate of accumulation of savings and pension funds. And thirdly, the rise in public debt levels (which has been the other economic policy response to the pandemic) has raised the level of vulnerability of the finances of many governments, and with it

placed greater pressure on the long-term sustainability of pension schemes, especially those whose first pillar is based on public distribution and co-financing systems. The result of the interplay between this group of factors has been a tendency for the technical and financial foundations of pension systems to deteriorate, thus in many cases, and given their current parameters, their medium- and long-term sustainability may be called into question.

As in our 2017 benchmark report, the scope of this study has been limited to retirement pensions, following a conceptual framework based on pillars or levels of coverage. It emphasizes the different risks to which each of them is subject, as well as the mechanisms used for their management or transfer, deter-mining whether they are ultimately supported by the State, by private management entities involved in the process, by active workers or by pensioners. Of the five coverage levels conceptually defined in the next section of this chapter, the analysis has focused primarily on Pillar 1 (compulsory and contributory) and Pillar 2 (occupational); however, reference is also included to Pillar 0 (basic support against poverty situations) and Pillar 3 (individual and voluntary).

Taking into account the main demographic trends and the characteristics of different pension systems across the world, for the purposes of the analysis of this study, the original sample of our 2017 study has been expanded from six (Chile, the United States, Spain, the United Kingdom, Sweden, the Netherlands) to eleven pension systems (adding pension systems of Brazil, South Korea, Germany, France and Japan), while retaining the criterion of selecting reference models that are characterized by covering, at least in terms of their most salient features, a spectrum of the different schemes that exist today, which seeks to have a broad enough outlook to sustain the general conclusions.

In this regard, as in our previous report, these reference models consider: systems with a strong weight of the first pillar of public retirement pensions based on an allocation system, in which contributions are intended for the payment of pensions in progress and without a clear link between the levels of contributions and the benefits received; systems whose first pillar is based entirely on the system of individual capitalization accounts and without incorporating any allocation element; systems with a first pillar essentially of allocation but with mechanisms that allow the benefits received to be adapted to the contributions made throughout the active life of workers and a greater weight of the capitalization funds to supplement the public pension; and systems in which the second pillar of pension commitments undertaken by companies with their workers play a key role.

Thus, based on the analysis of the demographic trends present in each of these 11 countries, the characteristics of their pension systems and the reforms implemented to adjust them in the recent past, and based on the conceptual framework of pillars or levels of coverage and the risks to which they are exposed, the study seeks to identify the adjustment mechanisms and measures that have had the best results in the reform of the pension systems analyzed, and that could be taken as a general reference in the implementation of future reforms at international level.

1.2 Pillar scheme for the analysis of pension systems

Similar to what was stated in our 2017 report, for the purposes of the classification and analysis of pension systems, this study considers a pillar scheme. This is composed of five elements which, together, aim to characterize the different sources of income that an individual can receive during their retirement (see Chart 1.2).

Pillar 0
Basic non-contributory public schemes

Firstly, the *Pillar 0* scheme refers to the basic public policy support for the social protection of non-contributory basic income or pensions. The main objective of the benefits received at this level of protection is to try to prevent older people who were unable to complete a working career from falling into poverty at the time of their retirement, so that they are able to cover their basic needs.

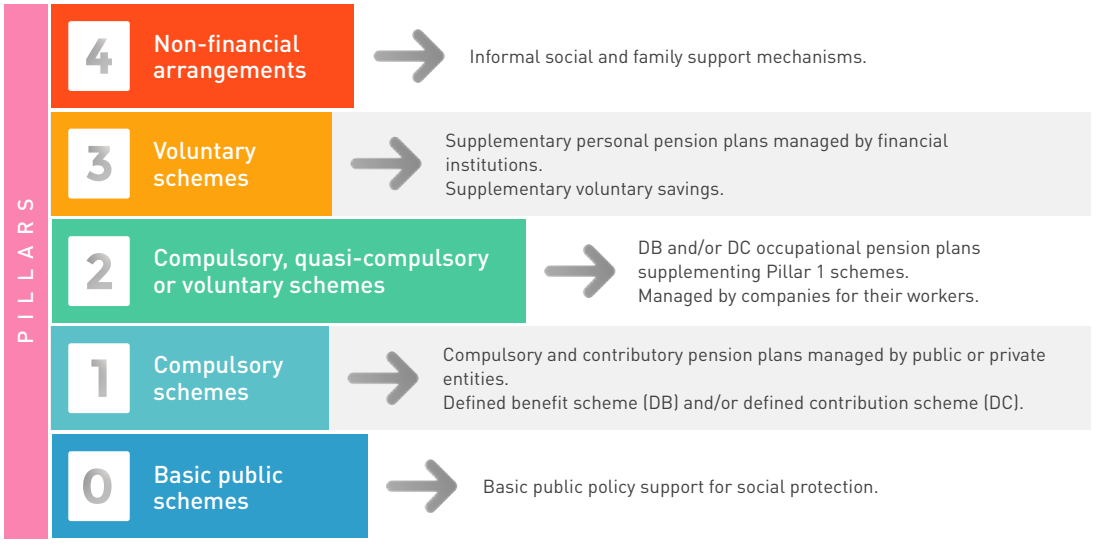
Normally, the amount is similar for all who receive it and does not depend on the amount that they might have contributed into social security, regardless of whether it is based on the contributions currently being made by active workers or on the government budgets of the country. In some cases, this support is paid when the amount contributed by the payee is not sufficient to achieve a minimum benefit, and is usually linked to their assets and certain minimum requirements for residence in the granting country.

Pillar 1
Compulsory contributory schemes

Pillar 1 includes compulsory contributory pension plans that are managed by public or private entities, usually linked to social security systems. This first pillar considers both *defined benefit* and *defined contribution* pension plans. Its main objective is to ensure the maintenance of a certain level of well-being for people who reach retirement age, measured in relation to the income they were receiving as active workers (*replacement* or *substitution rate*).

These schemes are characterized by their compulsory and contributory nature, and by involvement of and audit by the public authorities. It should however be noted that the degree of public involvement may be total, or the participation of private financial institutions may be allowed in varying degrees (most notably in defined contribution schemes), depending on the specific design concerned. Thus, this pillar would include traditional allocation systems, notional account-managed allocation systems,

Chart 1.2
Conceptual scheme: pillars
for the analysis of the pension systems



Source: MAPFRE Economics

individual capitalization systems, and mixed allocation and capitalization systems.

Pillar 2
Occupational schemes

Pillar 2 refers to contributory occupational pension plans that may be compulsory, quasi-compulsory or voluntary, which are promoted by companies in favor of their workers, and which may be both *defined benefit* and *defined contribution* plans. Thus, this level of protection is associated with contractual and civil service labor relations.

Normally, these are compulsory plans for sponsoring companies, either by law, under collective bargaining or as a result of individually negotiated clauses in labor contracts. Within the limits set by regulation, their design depends on the negotiations of companies with their workers or the representative associations of their workers, and they are subject to different levels of audit by the public authorities.

Pillar 3
Voluntary schemes

Pillar 3 groups individual and voluntary pension and savings plans that are usually managed by private financial institutions and in which, therefore, the participants decide what contributions they make.

Compared with the previous pillars, the intervention by authorities is less and generally at the same level as in other savings-related financial products. This intervention exists in the form of the regulation concerning investment funds and their management entities, financial institutions or insurance companies, and may be both prudential (concerned with solvency levels) and related to market conduct (consumer protection of these financial products).

Pillar 4
Non-financial arrangements

Finally, *Pillar 4* corresponds to the set of informal social and family support arrangements that people receive during their retirement period. This last pillar includes those basic support mechanisms that come from both non-governmental organizations and one's own family network, and so are different from those defined in *Pillar 0* as part of public policies for social protection.

1.3 Public policy area on pensions

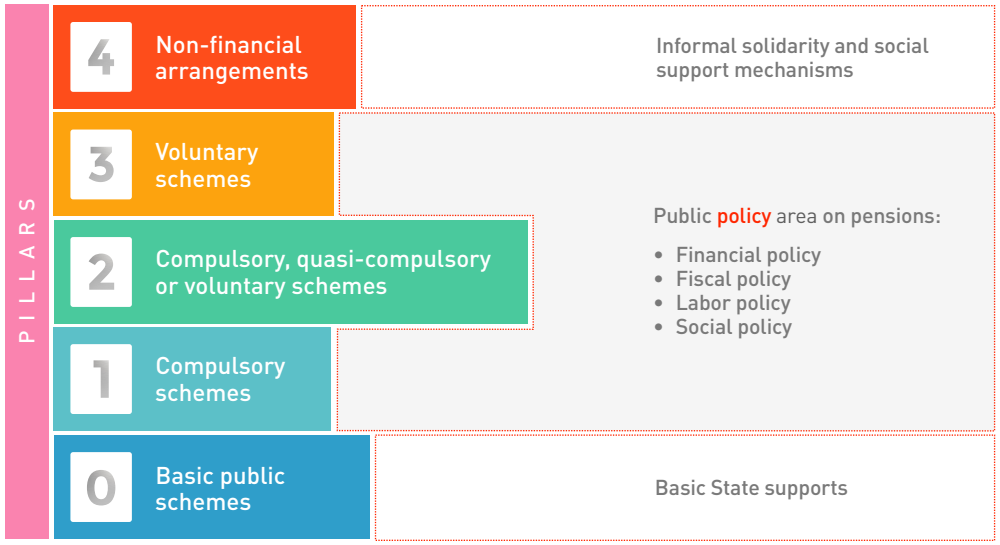
Furthermore, for the purposes of this conceptual framework, Pillars 0 and 4 are mechanisms of a non-contributory nature and so are not included in the public policy area for pensions as duly defined. They are recorded (specifically in the case of Pillar 0) under budget-type programs that are implemented with certain margins of discretion by governments (see Chart 1.3).

The first case (Pillar 0) refers to the application of budgetary public policies providing basic support to the population, so that certain groups of society (usually the most vulnerable) can access a minimum income in old age, regardless of their work history or contribution to social security schemes.

And the second case (Pillar 4) concerns informal mechanisms in society (non-governmental organizations, community support and family arrangements) whereby individuals of retirement age can receive financial support that is independent from support from formal pension systems and from the state's basic support.

In view of the above, this study focuses on the analysis of Pillars 1, 2 and 3, which are located in the public policy area on pensions, involving the design and implementation of financial, fiscal, labor and social policy measures that seek to

Chart 1.3
Conceptual scheme: pillars for the analysis of pension systems and public policy space



Source: MAPFRE Economics

influence the equity, efficiency, stability and long-term financial sustainability of pension systems.

1.4 A risk-based approach

As noted above, and similar to what was done in our 2017 benchmark report, the use of a *risk-based conceptual approach* as the axis for the analysis of the different pension systems has been maintained for the purposes of this study. Thus, it is considered that in general terms there are four main risks related to pension systems, which, with varying levels of frequency and severity, can occur and affect their efficiency and sustainability (see Chart 1.4-a):

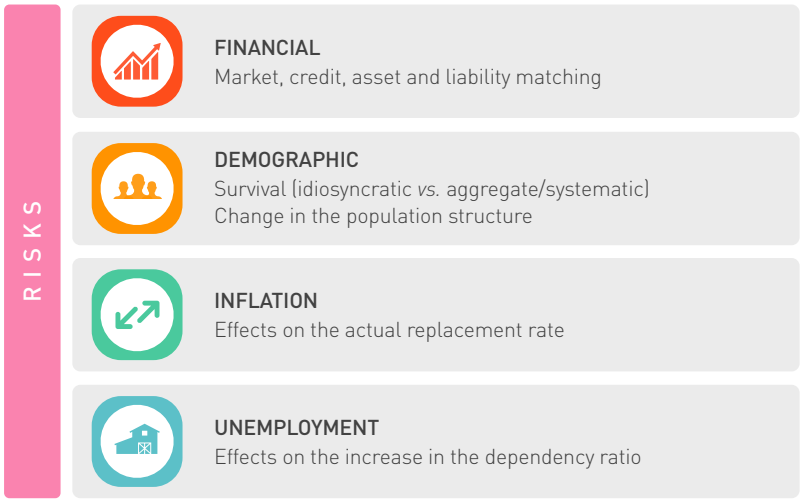
1) *Risks of a financial nature*, specifically linked to market, credit and asset and liability matching risks in the management of funds intended to cover the payment of pensions.

2) *Demographic risks* associated with both survival and the change in population structure. In the first case, survival risk has two dimensions: (i) that of *idiosyncratic risk*, which involves the probability that some members of the covered group survive longer than others and that, to that extent, can be offset under an independent risk group; and (ii) that of *aggregate or systematic risk*, namely the possibility that the covered group will jointly achieve greater longevity as a result of the application of health and medical improvements, which involves a risk that cannot be offset under conventional idiosyncratic parameters.

3) The *risk of inflation* associated with the potential reduction of the effective replacement rate, as a result of the difference between the criteria for updating the pension amount and the growth of the general price level in the economy.

4) The *risk of unemployment* associated with the economic cycle and which, especially in allocation schemes, implies an increase in the rate of actual dependence (relationship between the pensioned population and the labor force).

Chart 1.4-a
Conceptual scheme: main risks
for the analysis of pension systems



Source: MAPFRE Economics

Each of these risks has a different effect depending on the structure and operation of the pension system in question (i.e. the relative weight of Pillars 1, 2 or 3 within each), and it involves a different process for transferring them in each case. In this regard, this effect is analyzed below under three conceptual models: (i) *defined benefit* schemes (Pillars 1 and 2); (ii) *defined contribution* schemes (Pillars 1 and 2); and (iii) *voluntary* schemes (Pillar 3).

a) Risks in defined benefit schemes (Pillars 1 and 2)

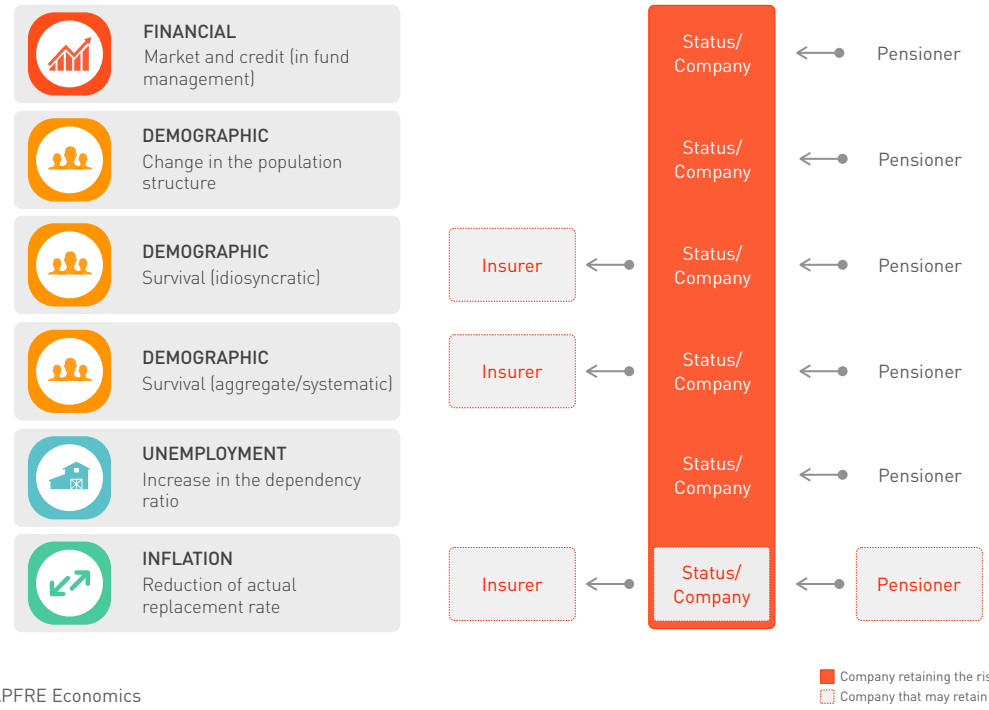
With regard to *defined benefit* schemes found in both Pillar 1 (under state supervision) and Pillar 2 (managed by the companies on behalf of their workers), Chart 1.4-b illustrates the main associated risks, as well as the traditional manner in which the transfer of these risks would be directed.

As can be seen from this analysis, the four risks indicated above have direct influence in the case of *defined benefit* pension systems, which are generally transferred from the pensioner to the state (in the case of *defined benefit* schemes included under Pillar 1) or to the sponsoring company (in the case of such systems covered under Pillar 2).

First, regardless of the nature of the allocation, there is the influence of *financial risks* (market and credit) on the management of funds received from active workers and even in how they are redistributed on behalf of pensioners. While this is a risk that is limited by the short duration of assets and liabilities (funds collected are normally used to cover obligations for the same period), financial volatility and potential delinquency by a counterparty could lead to losses for fund managers, which would not affect pensioners when the benefit to be covered is defined.

Second, there are *demographic risks*. The first risk is related to the possibility of a correct compensation of *idiosyncratic risk*. In the case of Pillar 1 systems, this risk normally has no significant implications, given the broad universe that they normally cover, which allows such compensation to be carried out appropriately. This is not true, however, in cases

Chart 1.4-b
Conceptual scheme: risks associated with defined benefit schemes (Pillars 1 and 2)



Source: MAPFRE Economics

of *defined benefit* pension plans under Pillar 2, when the covered group is not large enough to achieve adequate risk compensation. The second is *aggregate (or systematic) survival risk*, which implies greater life expectancy in general among the retiree population, increasing the amount of funds needed for the payment of pensions. And third is the risk associated with *changes in the population structure* (aging of the population), which implies a reduction in the base of the population pyramid and a growth of the upper part of the pyramid. This means a greater effort on the part of the active population to contribute to the allocation in favor of the pensioned population; namely, an increase in the dependency ratio.

Thirdly, and also involving a potential increase in the dependency ratio, there is *unemployment risk*, closely linked to development in the level of activity and economic performance in general. In this sense, a higher unemployment rate in the economy, all other things being equal including the rest of the risks and the benefit to cover pensioners, would mean an increase in the dependency ratio; in other words, the contribution necessary from active workers to finance the payment of pensions for pensioners.

Finally, there is *inflation risk*. It is not unusual that in the defined benefit schemes under Pillar 1 (and possibly those under Pillar 2), a guarantee of the maintenance in real terms of the value of the pensions is provided through the indexation mechanisms for the pensions. In such schemes grouped under Pillar 2, these warranties do not necessarily exist. In the first case, the potential risk of a reduction in the real value of the pension involves a risk to the state, whereas in the second case the risk remains with the pensioners, who will see the real value of their pensions reduced in the event of an increase in inflation. Thus, in the case of *defined benefit* systems, the effects of the materialization of these risks result in financial consequences for whoever has assumed them (mainly the State or

the sponsoring companies, accordingly), with implications in terms of pension expenditure and, in a more structural sense, of the long-term sustainability of these schemes[2].

When these risks occur under *defined benefit* schemes, the maintenance of the pension value will mean that the funds for the payment of pensions need to be increased, without it necessarily being possible to modify certain key variables: the number of active workers contributing to the payment of pensions (dependency ratio), the percentage of income for that purpose (contribution rates) and the time starting from which pensioners receive pensions (retirement age).

Finally, it should be noted that, on occasion, some of the financial and demographic risks associated with this type of scheme (especially those managed by private companies on behalf of their workers) are transferred from the sponsoring company to an insurance company.

b) Risks in defined contribution schemes (Pillars 1 and 2)

In the case of *defined contribution* systems associated with both Pillar 1 (under state supervision, or managed by public entities or private companies) and Pillar 2 (under the supervision of companies), Chart 1.4-c provides an overall illustration of the main risks to which such schemes are exposed, as well as the options for their transfer.

One of the essential differences observed in *defined contribution* versus *defined benefit* systems is the absence of implicit cross-subsidy mechanisms (inter- and intra-generational solidarity) that characterize their allocation systems. This means that, in the absence of a defined benefit, pensions are exclusively the result of the savings of individuals, the efficiency of the management of the funds saved and the efficiency in the management of the life annuities acquired by the funds.

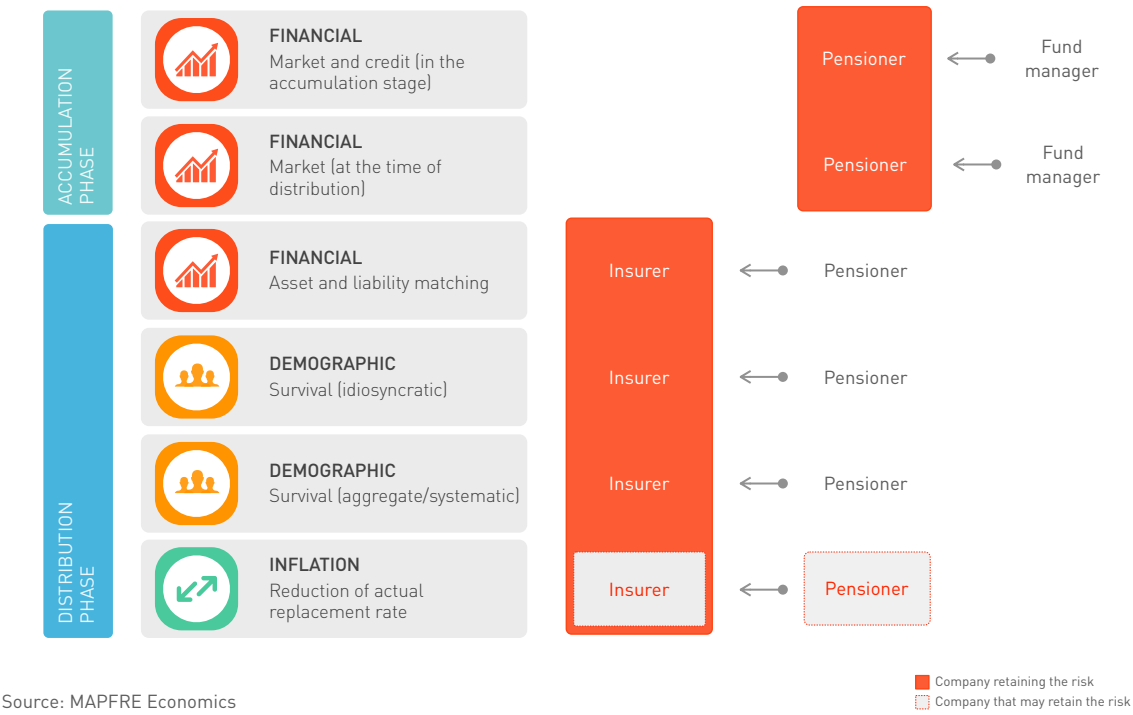
In general terms, *defined contribution* schemes consist of two phases. First, an *accumulation phase* that corresponds to the working life of the worker, and which is the stage where the savings are accumulated that will serve as the basis for paying the pension. In this first phase, the risks remain on the side of the future pensioner, insofar as the fund manager (who charges a commission for this work) does not assume any possible cost arising from the materialization of any financial risks (credit or market) associated with fund management. In any case, the effect of these risks remains with the worker, who will have a smaller amount of funds for the acquisition of the life annuity through which they shall receive the corresponding pension.

Second, there is the *distribution phase*, in which such savings are used for the payment of the pension, usually through the purchase of a life annuity under their various forms. So at this stage the associated risks that may affect the worker's pension amount are transferred in their entirety from the pensioner to an insurance company.

During the *accumulation phase*, by focusing on the management of the investment of the future pensioner's savings, the risks encountered are essentially financial in nature. On one side, there are conventional *market and credit risks* associated with investment management, and on the other the *frictional market risk* that occurs at the start of retirement when investments for the acquisition of a life annuity must be made liquid and the start of payment of the pension.

Meanwhile, the *distribution phase* entails a series of risks that are concentrated on the side of the insurance companies in charge of paying the pension through a life annuity. First of all, the *financial risk* (market and credit) arising from the management of the funds that have been received as a premium for the purchase of the life annuity, and the management risk linked to the interrelation between the duration of the assets and liabilities (*reinvestment risk*). Second,

Chart 1.4-c
Conceptual scheme: risks associated with defined contribution schemes (Pillars 1 and 2)



Source: MAPFRE Economics

the *demographic risks* associated with the survival of the covered group of pensioners: both idiosyncratic (compensable through the pooling of risks) and aggregate or systematic (which by its nature is not compensable through conventional idiosyncratic pooling mechanisms). And finally there's *inflation risk*, which may or may not be transferred to the insurance company at the time of contracting the life annuity by applying an indexing mechanism to the amount of pensions, based on the general behavior of prices in the economy.

In general, it can be established that in *defined contribution* systems, while in the accumulation phase the risks associated with the management of the saved funds remain on the side of the future pensioner, during the distribution phase these are transferred to an insurance company practically in their entirety. Thus, while the materialization of the financial risks that characterize the accumulation phase may affect a smaller amount of resources to be channeled into the purchase of a life annuity, after the end of this first phase, the amount of the pension that the pensioner will receive is guaranteed by the insurance company[3].

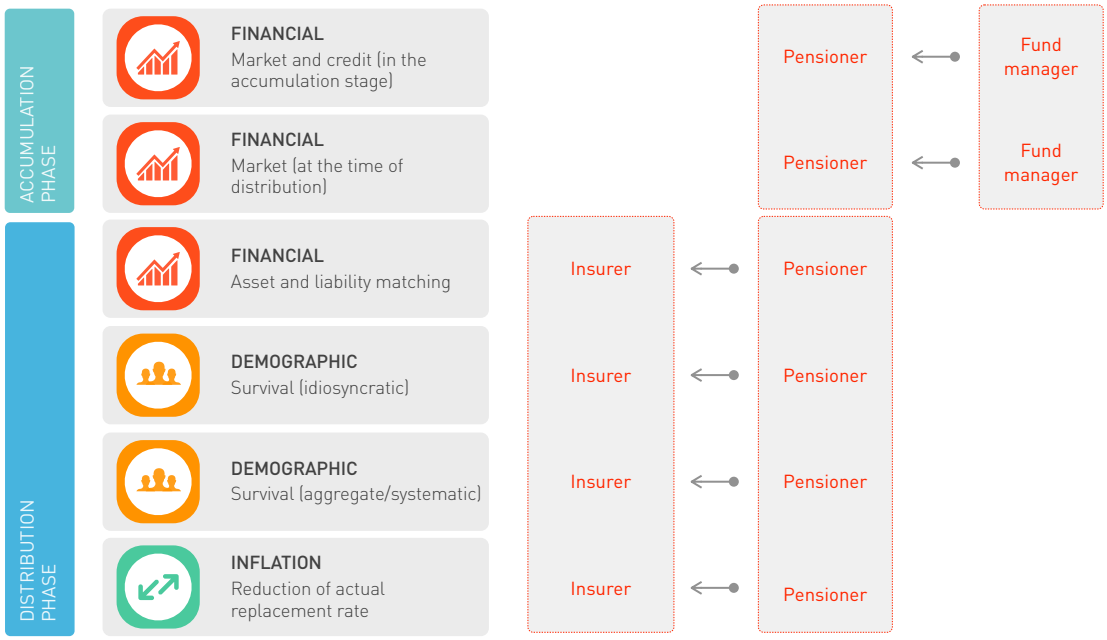
c) Risks in voluntary schemes (Pillar 3)

Voluntary schemes involve the decision of individuals to channel an additional part of their income into savings mechanisms that allow them to supplement the pension they will generate through any of the schemes considered in Pillars 1 and 2, both defined benefit and defined contribution.

As illustrated in Chart 1.4-d, voluntary schemes are, by their nature, subject to the same risks as those covered under *defined contribution* schemes grouped under Pillars 1 and 2.

In the accumulation phase, the risks (essentially financial) rest on the worker who, directly or

Chart 1.4-d
Conceptual scheme: risks associated with voluntary schemes (Pillar 3)



Source: MAPFRE Economics

Company that may retain the risk

through a specialized company, manages their savings. In the distribution phase, the individual may in turn decide to directly manage the pension by assuming the potential effects on the amount of the pension resulting from the materialization of financial, demographic and inflation risks, or to transfer all or part of them to an insurance company through the purchase of some type of life annuity.

1.5. Selection criteria for reference models

In the selection of the reference models considered in this report, efforts have been made to cover large regions at global level, taking into account the weight of the different pillars in the chosen systems (as set out in the conceptual framework described in the initial part of this chapter), the challenges that these pension systems face and the existence of reforms that have more or less inspired reforms in other countries with similar challenges, so as to provide a very general overview of the problems facing pension systems around the world.

Under these criteria, retirement pension systems from Brazil, Germany, France, Japan and South Korea have been incorporated in addition to the six reference pension models selected in the 2017 edition of this study (Chile, Spain, Sweden, the Netherlands, the United Kingdom and the United States). The main aspects that justify the selection of these pension systems are presented throughout this section. In addition, Table 1.5-a shows a selection of indicators that give an idea of the specific characteristics of each of the 11 systems analyzed, to provide a reference to identify the main problems they will face in the coming decades.

Table 1.5-a
Selected indicators of the pension systems analyzed

Indicator	Japan	France	Spain	South Korea	Germany	Brazil	Chile	Swe-den	United King-dom	United States	Nether-lands
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	1.8	2.4	2.7	3.2	2.5	5.4	4.2	2.6	2.9	3.1	2.6
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	1.2	1.8	1.3	1.2	1.7	2.2	2.0	2.1	2.0	2.4	1.8
Support ratio (20–64/65+) - Annual average variation 2020–2050	-2.2%	-1.9%	-4.3%	-5.8%	-2.3%	-4.6%	-4.0%	-1.2%	-1.9%	-1.7%	-2.2%
Percentage of people over 65 years of age 2020	28.4%	20.8%	20.0%	15.8%	21.7%	9.6%	12.2%	20.3%	18.7%	16.6%	20.0%
Percentage of people over 65 years of age 2050	37.7%	27.8%	36.8%	38.1%	30.0%	22.7%	24.9%	24.6%	25.3%	22.4%	28.0%
Life expectancy at 65 years 2020 (years)	22.9	21.9	21.8	21.3	20.2	19.0	20.2	21.0	20.3	19.9	20.5
Life expectancy at 65 years 2050 (years)	25.5	24.5	24.4	24.3	23.1	21.7	23.3	23.7	23.1	23.0	23.3
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.6	2.6	2.6	2.9	2.9	2.7	3.1	2.7	2.9	3.1	2.7
Life expectancy at 70 years 2020 (years)	18.7	17.8	17.7	17.1	16.3	15.5	16.4	16.9	16.3	16.2	16.5
Life expectancy at 70 years 2050 (years)	21.1	20.2	20.0	19.8	18.9	17.8	19.1	19.3	18.8	19.0	18.9
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.4	2.4	2.3	2.7	2.6	2.2	2.7	2.4	2.5	2.8	2.4
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.2	4.1	4.2	4.2	4.0	3.4	3.8	4.1	4.0	3.7	4.1
Gross replacement rate for low incomes 2019 (50% median income)	66.2%	60.2%	72.3%	55.6%	52.2%	92.1%	36.2%	54.1%	72.6%	81.0%	73.5%
Gross replacement rate for medium incomes 2019	55.8%	60.1%	72.3%	37.3%	52.2%	58.9%	31.2%	54.1%	50.9%	70.3%	70.9%
Gross replacement rate for high incomes 2019 (150% median income)	52.3%	54.0%	72.3%	27.0%	52.2%	58.9%	31.2%	65.3%	37.4%	64.0%	70.1%
Total assets of retirement savings plans 2019 (% GDP)	28.6%	10.6%	13.0%	28.2%	7.5%	26.2%	80.8%	99.9%	123.2%	150.3%	194.4%
Public spending on pensions relative to GDP (2019 or earlier)	10.2%	13.9%	11.0%	2.9%	10.1%	n/a	2.9%	7.2%	6.2%	7.1%	5.4%
Public debt to GDP ratio 2020 (gross debt)	243%	160%	140%	50%	67%	89%	36%	51%	104%	162%	69%
Oxford Economics country risk credit rating index (20=AAA)	15.7	18.0	14.0	17.7	20.0	8.3	15.6	20.0	17.6	19.7	20.0
Demographic pressure (sustainability) (maximum = 100)	100.0	73.9	82.3	77.6	75.3	55.8	58.9	66.9	65.4	58.3	71.0
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	41.1	69.6	86.6	47.9	46.3	83.9	2.0	45.6	31.8	49.0	42.4
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	79.4	52.5	60.4	34.4	30.8	64.4	35.6	28.9	42.7	49.7	32.5
Pressure from low income insufficiency (sufficiency) (max = 100)	56.3	63.6	49.2	69.0	73.0	25.7	92.0	70.8	48.8	38.9	47.7
Pressure from medium income insufficiency (sufficiency) (max = 100)	46.2	39.1	18.7	77.1	52.2	41.0	87.3	49.0	54.5	21.9	20.9
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	87.4	95.6	94.4	87.6	97.0	88.5	63.6	54.9	44.3	32.0	11.9
Summary indicator of pressure for reform of pension system (IPPS)	68.4	65.7	65.3	65.6	62.4	59.9	56.6	52.7	47.9	41.6	37.7

Source: MAPFRE Economics (with UN, OECD[4] and OEF/Haver data)

United States

The United States pension system is one of the most important at international level, both because of the relative weight of its economy in the international context and the structure of the pension scheme itself, which is characterized by a high percentage of assets in retirement savings plans compared to GDP (around 150% in 2019). One of its main distinctive elements is that, while the role of the first pillar is markedly redistributive and of little relevance for middle and high incomes, its second pillar is among the world's largest. The system achieves replacement rates above the average of the countries of the OECD, with public pension spending relative to moderate GDP (see Table 1.5-b). In addition, it has differences and particularities regarding the obligatory nature of the second pillar with respect to similar systems (e.g. the United Kingdom).

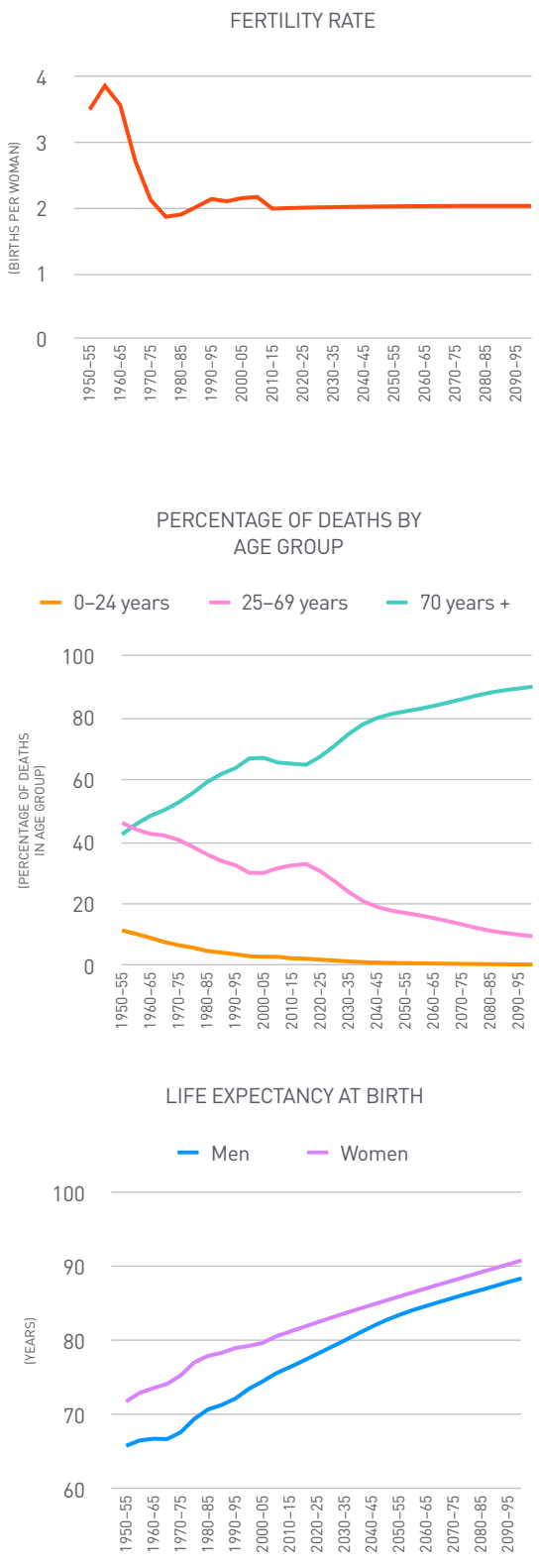
In terms of population trend, the population pyramid of the United States was perhaps one of the first to manifest a constrictive behavior since the middle of the last century, with the emergence of the first generation of baby boomers, and will also be one of the first to adopt a stationary form almost by the third quarter of this century (on the shape of the population pyramids, see Box 2.1 in the next

Table 1.5-b
United States: selected indicators of the retirement pension system

Indicator	United States
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	3.1
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	2.4
Support ratio (20–64/65+) - Annual average variation 2020–2050	-1.7%
Percentage of people over 65 years of age 2020	16.6%
Percentage of people over 65 years of age 2050	22.4%
Life expectancy at 65 years 2020 (years)	19.9
Life expectancy at 65 years 2050 (years)	23.0
Expected increase in life expectancy at 65 years 2020–2050 (years)	3.1
Life expectancy at 70 years 2020 (years)	16.2
Life expectancy at 70 years 2050 (years)	19.0
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.8
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	3.7
Gross replacement rate for low incomes 2019 (50% median income)	81.0%
Gross replacement rate for medium incomes 2019	70.3%
Gross replacement rate for high incomes 2019 (150% median income)	64.0%
Total assets of retirement savings plans 2019 (% GDP)	150.3%
Public spending on pensions relative to GDP (2019 or earlier)	7.1%
Public debt to GDP ratio 2020 (gross debt)	162%
Oxford Economics country risk credit rating index (20=AAA)	19.7
Demographic pressure (sustainability) (maximum = 100)	58.3
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	49.0
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	49.7
Pressure from low income insufficiency (sufficiency) (max = 100)	38.9
Pressure from medium income insufficiency (sufficiency) (max = 100)	21.9
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	32.0
Summary indicator of pressure for reform of pension system (IPPS)	41.6

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

Chart 1.5-a
United States: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

chapter of this study). As a mature society, this behavior is directly associated with fertility and mortality trends and their impact on life expectancy (see Chart 1.5-a).

Brazil

The Brazilian pension system has recently been thoroughly reformed in order to alleviate the problem affecting its financial sustainability, as this is one of the main reasons why Brazil's fiscal deficit and public debt are growing to limits that prevent the country from achieving investment grade in the rating of its debt, regardless of the cyclical situation caused by the pandemic. This reform touches on several elements, both parametric (mainly retirement age) and those related to its complexity, improvements in database infrastructure and fragmentation of the system with a large number of special systems in place.

It should be noted that Brazil currently has a labor force ratio per retiree (support ratio) better than that of the more developed countries, because a higher percentage of the population is young. However, this ratio will suffer a significant deterioration over the next three decades, according to United Nations population estimates, from 5.4 people of working age (between 20 and 64 years) per person over 65 years of age in 2020 to 2.2 in 2050 (See Table 1.5-c). This population and labor market dynamic is associated with fertility and mortality trends and their impact on the life expectancy of the Brazilian population (see Chart 1.5-b).

Chile

The Chilean pension system underwent a comprehensive reform in the early 1980s, moving from a public-sector pension system to a system of individual capitalization using defined contributions. This is a reform that is of interest in Latin America and other regions of the world, since it has since been seen as a model to follow

Table 1.5-c
Brazil: selected indicators of the retirement pension system

Indicator	Brazil
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	5.4
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	2.2
Support ratio (20–64/65+) - Annual average variation 2020–2050	-4.6%
Percentage of people over 65 years of age 2020	9.6%
Percentage of people over 65 years of age 2050	22.7%
Life expectancy at 65 years 2020 (years)	19.0
Life expectancy at 65 years 2050 (years)	21.7
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.7
Life expectancy at 70 years 2020 (years)	15.5
Life expectancy at 70 years 2050 (years)	17.8
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.2
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	3.4
Gross replacement rate for low incomes 2019 (50% median income)	92.1%
Gross replacement rate for medium incomes 2019	58.9%
Gross replacement rate for high incomes 2019 (150% median income)	58.9%
Total assets of retirement savings plans 2019 (% GDP)	26.2%
Public spending on pensions relative to GDP (2019 or earlier)	n/a
Public debt to GDP ratio 2020 (gross debt)	89%
Oxford Economics country risk credit rating index (20=AAA)	8.3
Demographic pressure (sustainability) (maximum = 100)	55.8
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	83.9
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	64.4
Pressure from low income insufficiency (sufficiency) (max = 100)	25.7
Pressure from medium income insufficiency (sufficiency) (max = 100)	41.0
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	88.5
Summary indicator of pressure for reform of pension system (IPPS)	59.9

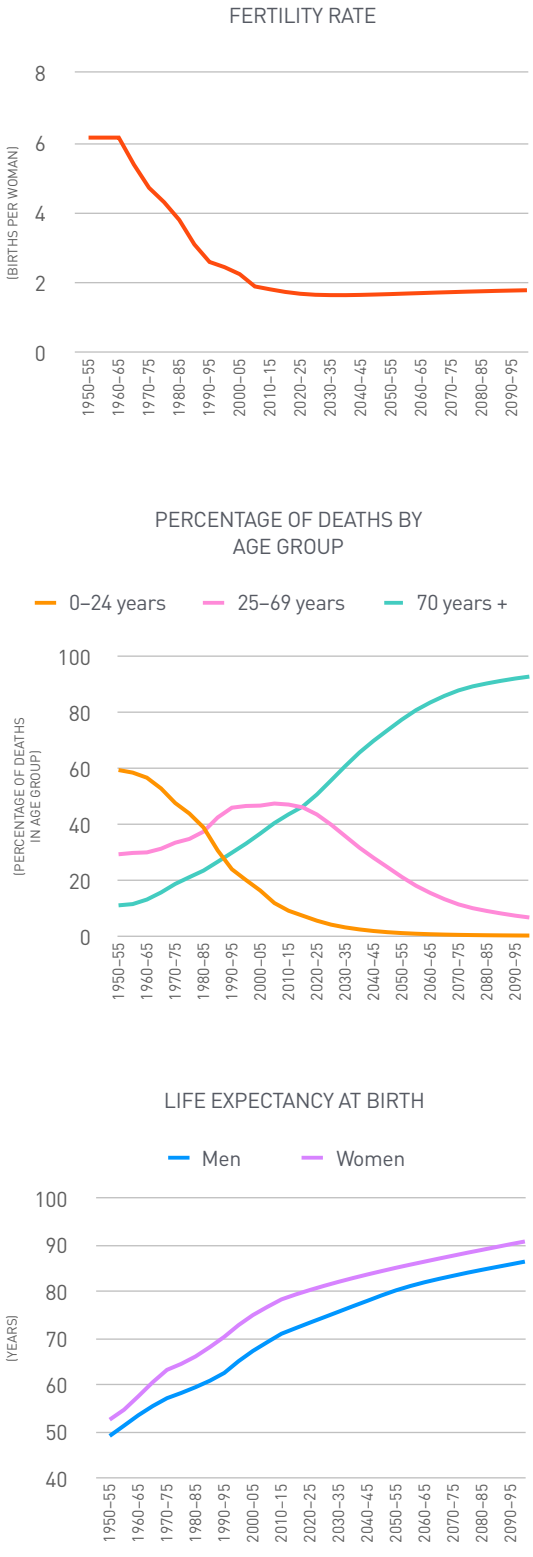
Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

in terms of the generation of bases to provide it with long-term financial sustainability. However, at present it is the subject of debate to the extent that replacement rates have been lower than expected, leading to the proposal of various reforms (see Table 1.5-d).

In the early 1990s, several Latin American countries such as Peru (1993), Argentina[5] and Colombia (1994), Uruguay (1995), Mexico and Bolivia (1997), El Salvador and Venezuela (1998), Costa Rica and Nicaragua (2000), Ecuador and the Dominican Republic (2001) followed the path blazed by Chile, introducing individual capitalization systems in whole or in part. In the late 1990s, other countries outside of Latin America (Hungary, Poland, Kazakhstan) also adopted such reforms in their pension systems.

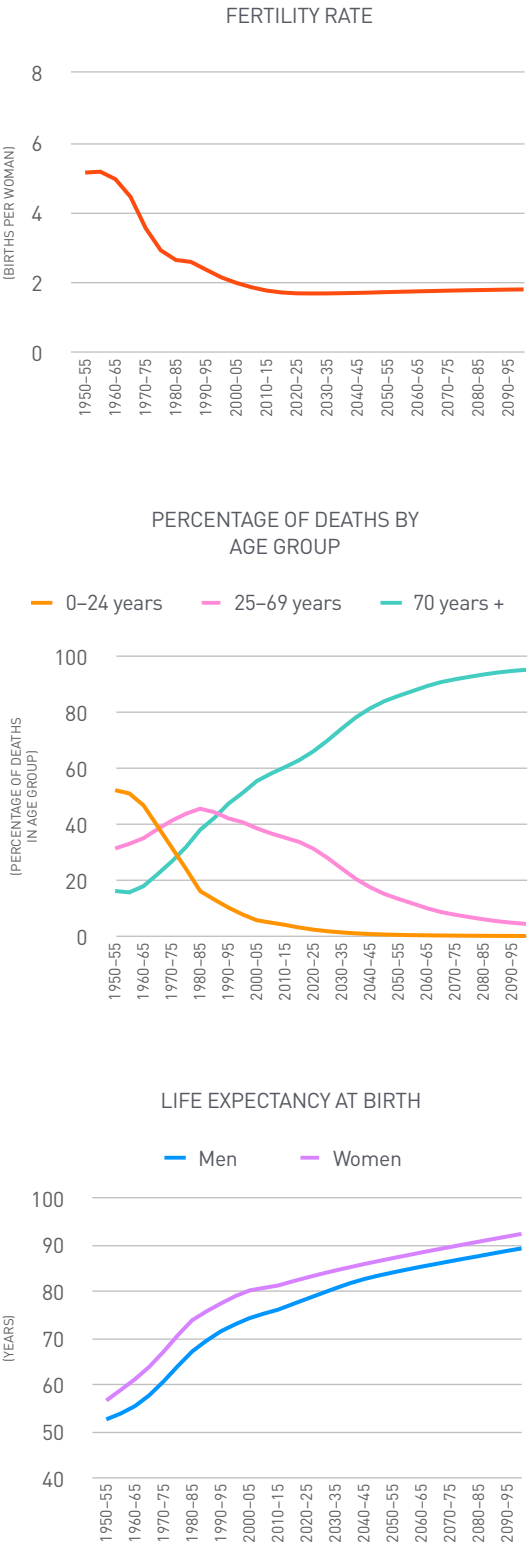
In terms of the dynamic and population trends of Chile, the country's population shares a population pattern with that of the most advanced regions of the world, having evolved from an expansive pyramid in 1950 to what will become a stationary pyramid by 2100. It is passing through a period of population aging characterized by a

Chart 1.5-b
Brazil: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

Chart 1.5-c
Chile: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

Table 1.5-d
Chile: selected indicators of the retirement pension system

Indicator	Chile
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	4.2
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	2.0
Support ratio (20–64/65+) - Annual average variation 2020–2050	-4.0%
Percentage of people over 65 years of age 2020	12.2%
Percentage of people over 65 years of age 2050	24.9%
Life expectancy at 65 years 2020 (years)	20.2
Life expectancy at 65 years 2050 (years)	23.3
Expected increase in life expectancy at 65 years 2020–2050 (years)	3.1
Life expectancy at 70 years 2020 (years)	16.4
Life expectancy at 70 years 2050 (years)	19.1
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.7
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	3.8
Gross replacement rate for low incomes 2019 (50% median income)	36.2%
Gross replacement rate for medium incomes 2019	31.2%
Gross replacement rate for high incomes 2019 (150% median income)	31.2%
Total assets of retirement savings plans 2019 (% GDP)	80.8%
Public spending on pensions relative to GDP (2019 or earlier)	2.9%
Public debt to GDP ratio 2020 (gross debt)	36%
Oxford Economics country risk credit rating index (20=AAA)	15.6
Demographic pressure (sustainability) (maximum = 100)	58.9
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	2.0
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	35.6
Pressure from low income insufficiency (sufficiency) (max = 100)	92.0
Pressure from medium income insufficiency (sufficiency) (max = 100)	87.3
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	63.6
Summary indicator of pressure for reform of pension system (IPPS)	56.6

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

constrictive pyramid over a time frame begun at the end of the last century and which will extend until almost the end of this century. It is noteworthy that the population behavior described above relates to the trend manifested in that period by fertility and mortality rates, as well as the growth of life expectancy in Chile (see Chart 1.5-c).

Sweden

The case of Sweden has been included in the selected reference models. This system was the subject of a comprehensive reform in the 1990s, introducing a system of *notional accounts* that has been adopted as a model by other countries, and which seeks to combine the traditional effects of the allocation systems (first pillar) with the benefits of savings incentives in terms of a supplementary pension (second pillar); a reform that has provided the system with strength and sustainability (see Table 1.5-e).

In terms of its population dynamic, as early as 1950 the Swedish population pyramid showed a clearly constrictive pattern (which has continued),

Table 1.5-e
Sweden: selected indicators of the retirement pension system

Indicator	Sweden
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	2.6
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	2.1
Support ratio (20–64/65+) - Annual average variation 2020–2050	-1.2%
Percentage of people over 65 years of age 2020	20.3%
Percentage of people over 65 years of age 2050	24.6%
Life expectancy at 65 years 2020 (years)	21.0
Life expectancy at 65 years 2050 (years)	23.7
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.7
Life expectancy at 70 years 2020 (years)	16.9
Life expectancy at 70 years 2050 (years)	19.3
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.4
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.1
Gross replacement rate for low incomes 2019 (50% median income)	54.1%
Gross replacement rate for medium incomes 2019	54.1%
Gross replacement rate for high incomes 2019 (150% median income)	65.3%
Total assets of retirement savings plans 2019 (% GDP)	99.9%
Public spending on pensions relative to GDP (2019 or earlier)	7.2%
Public debt to GDP ratio 2020 (gross debt)	51%
Oxford Economics country risk credit rating index (20=AAA)	20.0
Demographic pressure (sustainability) (maximum = 100)	66.9
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	45.6
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	28.9
Pressure from low income insufficiency (sufficiency) (max = 100)	70.8
Pressure from medium income insufficiency (sufficiency) (max = 100)	49.0
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	54.9
Summary indicator of pressure for reform of pension system (IPPS)	52.7

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

and which is expected to disappear to give rise to a stationary pyramid toward the end of the century. This population behavior concerns the trend manifested in that period by fertility rates, mortality rates and their effect on the growth of life expectancy in the country (see Chart 1.5-d).

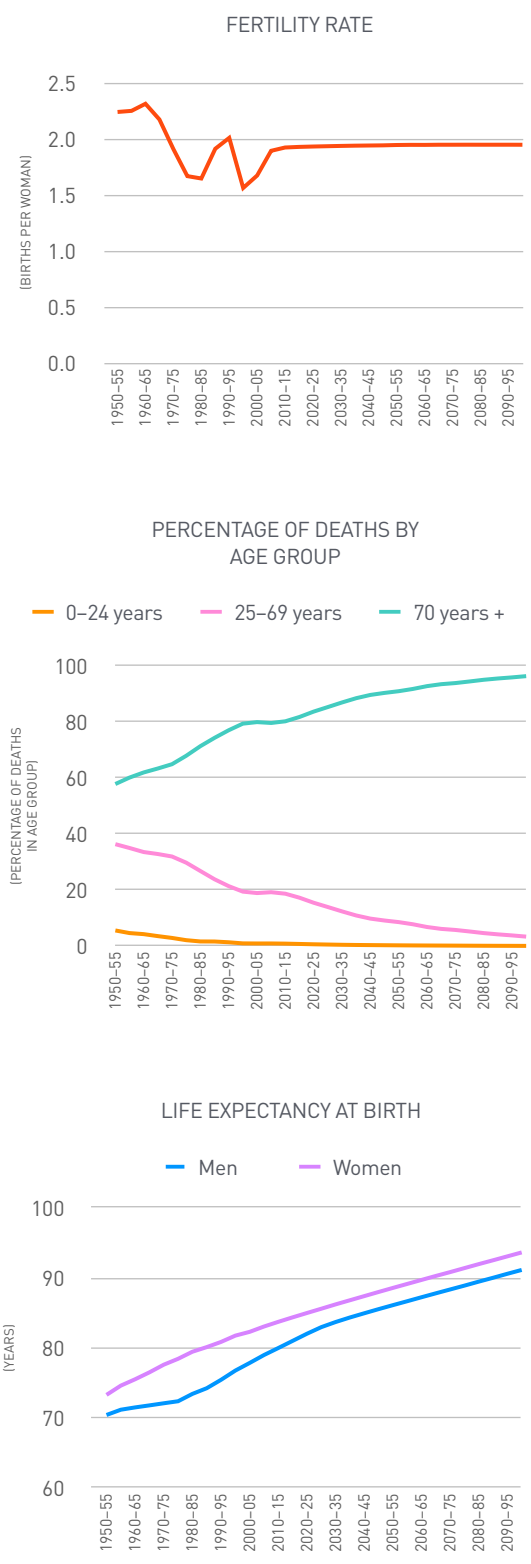
In this case, it should be noted that the fertility rate was already relatively low in the 1950s and, after a period of reduction, it is expected to stabilize around the convergence values of the most developed regions of the world.

United Kingdom

The United Kingdom is a system strongly based on the second pillar, with an almost residual role for the first pillar for high incomes and of little significance for middle incomes.

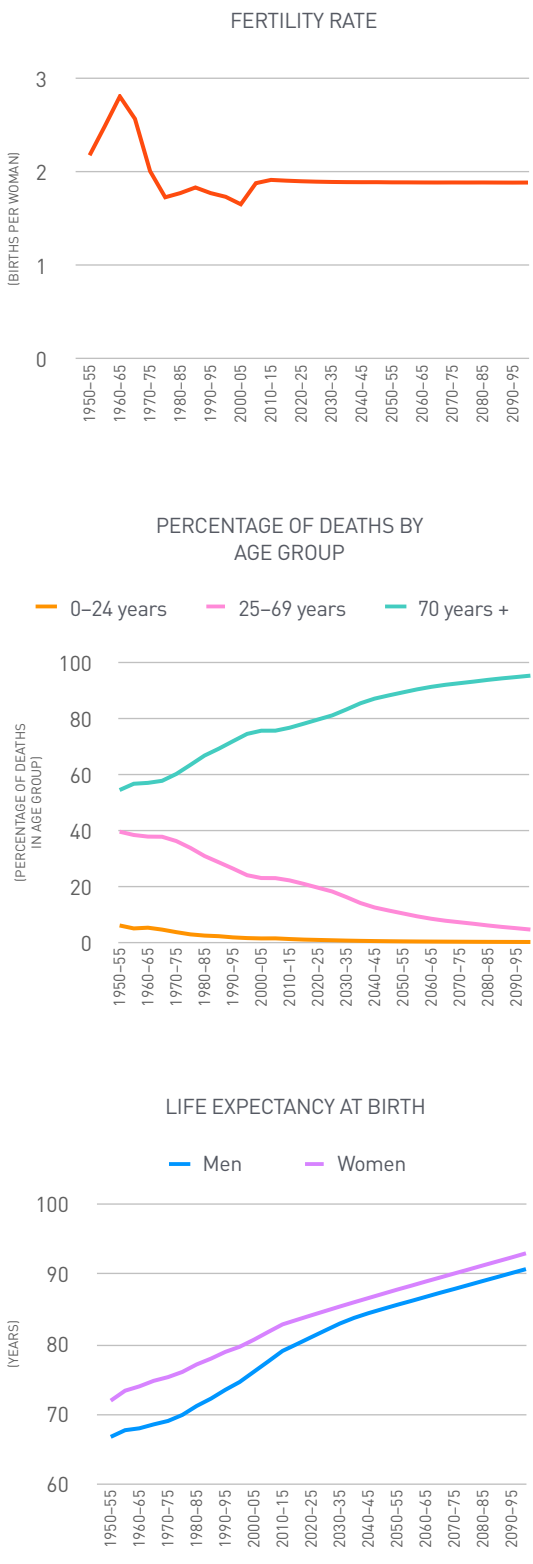
This system (the main parameters of which are illustrated in Table 1.5-f) presents the unusual feature that a reform of progressive implementation was approved in 2014 to start in 2016, seeking to simplify the public pension system with a single pension whose amount is revised annually, and by introducing a quasi-compulsory second pillar of compulsory contributions for companies and

Chart 1.5-d
Sweden: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

Chart 1.5-e
United Kingdom: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

with the option for the worker to waive such contributions.

Furthermore, population dynamics in the United Kingdom departed from a constrictive pyramid toward the middle of the previous century, which will have evolved (like the Dutch and unlike the Spanish) to start stabilizing in a stationary pyramid by the middle of this century. This population behavior relates to the trend manifested in that period by fertility rates, mortality rates and their effect on the growth of life expectancy in the UK, which are all shown in Chart 1.5-e. The fertility rate, although adjusted downward from 1960s to the beginning of this century, is expected to stabilize in the remainder of the period analyzed.

Germany

The German scheme has a distinctive feature for calculating the first pillar pension of the retirement pension system, incorporating a points system wherein the valuation mechanism affects both active workers and ongoing pensions. This system was not studied in the 2017 report,

Table 1.5-f
United Kingdom: selected indicators of the retirement pension system

Indicator	United Kingdom
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	2.9
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	2.0
Support ratio (20–64/65+) - Annual average variation 2020–2050	-1.9%
Percentage of people over 65 years of age 2020	18.7%
Percentage of people over 65 years of age 2050	25.3%
Life expectancy at 65 years 2020 (years)	20.3
Life expectancy at 65 years 2050 (years)	23.1
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.9
Life expectancy at 70 years 2020 (years)	16.3
Life expectancy at 70 years 2050 (years)	18.8
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.5
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.0
Gross replacement rate for low incomes 2019 (50% median income)	72.6%
Gross replacement rate for medium incomes 2019	50.9%
Gross replacement rate for high incomes 2019 (150% median income)	37.4%
Total assets of retirement savings plans 2019 (% GDP)	123.2%
Public spending on pensions relative to GDP (2019 or earlier)	6.2%
Public debt to GDP ratio 2020 (gross debt)	104%
Oxford Economics country risk credit rating index (20=AAA)	17.6
Demographic pressure (sustainability) (maximum = 100)	65.4
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	31.8
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	42.7
Pressure from low income insufficiency (sufficiency) (max = 100)	48.8
Pressure from medium income insufficiency (sufficiency) (max = 100)	54.5
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	44.3
Summary indicator of pressure for reform of pension system (IPPS)	47.9

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

so it has therefore been considered appropriate to incorporate it in this report.

Germany currently has one of the lowest labor force ratios per older person (support ratio) in the world, and it will continue to suffer a significant deterioration in the next three decades according to United Nations population estimates, from 2.5 people of working age (between 20 and 64 years) per person over 65 years in 2020 to 1.7 in 2050. Furthermore, the pension system has lower replacement rates than those of other surrounding countries, below the OECD average for low and medium incomes (see Table 1.5-g).

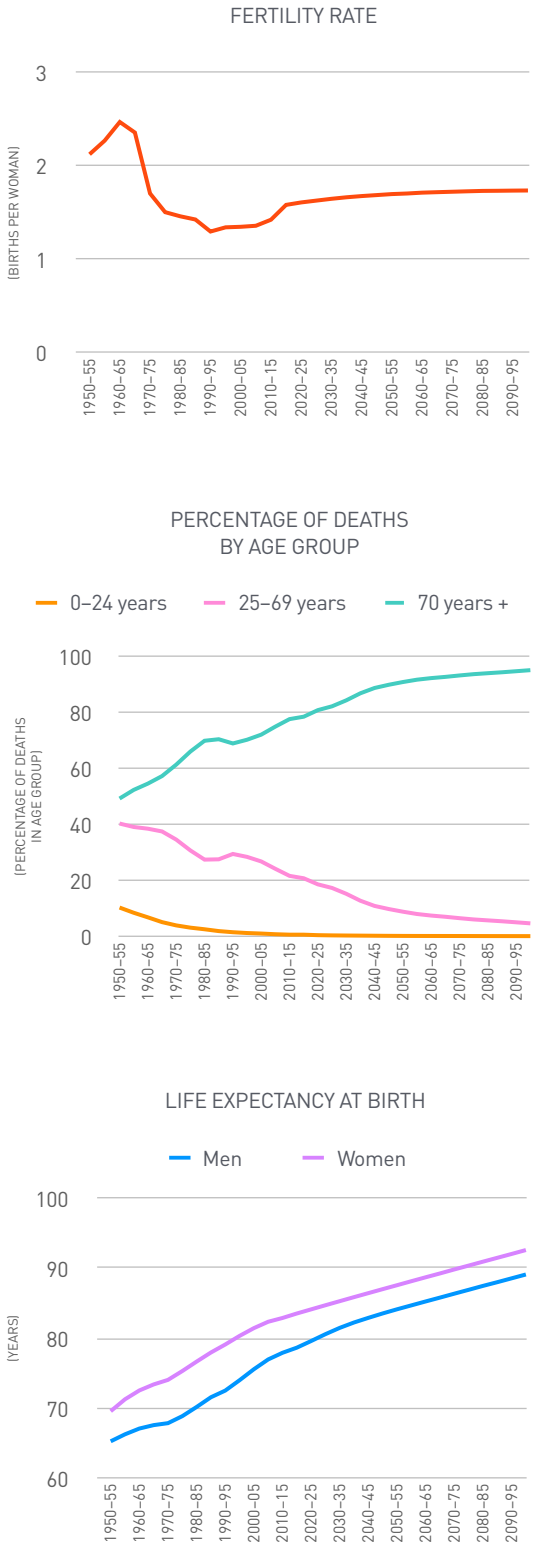
And furthermore, the German population pyramid now presents a markedly constrictive form, predicting the problem of population aging in the coming years due to the influx of the baby boom generation reaching retirement age, and according to UN forecasts will only reach a stationary pyramid by the end of this century. This population behavior is linked to the evolution of fertility and mortality rates and their effect on the growth of life expectancy in Germany, which are all shown in Chart 1.5-f.

Table 1.5-g
Germany: selected indicators of the retirement pension system

Indicator	Germany
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	2.5
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	1.7
Support ratio (20–64/65+) - Annual average variation 2020–2050	-2.3%
Percentage of people over 65 years of age 2020	21.7%
Percentage of people over 65 years of age 2050	30.0%
Life expectancy at 65 years 2020 (years)	20.2
Life expectancy at 65 years 2050 (years)	23.1
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.9
Life expectancy at 70 years 2020 (years)	16.3
Life expectancy at 70 years 2050 (years)	18.9
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.6
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.0
Gross replacement rate for low incomes 2019 (50% median income)	52.2%
Gross replacement rate for medium incomes 2019	52.2%
Gross replacement rate for high incomes 2019 (150% median income)	52.2%
Total assets of retirement savings plans 2019 (% GDP)	7.5%
Public spending on pensions relative to GDP (2019 or earlier)	10.1%
Public debt to GDP ratio 2020 (gross debt)	67%
Oxford Economics country risk credit rating index (20=AAA)	20.0
Demographic pressure (sustainability) (maximum = 100)	75.3
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	46.3
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	30.8
Pressure from low income insufficiency (sufficiency) (max = 100)	73.0
Pressure from medium income insufficiency (sufficiency) (max = 100)	52.2
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	97.0
Summary indicator of pressure for reform of pension system (IPPS)	62.4

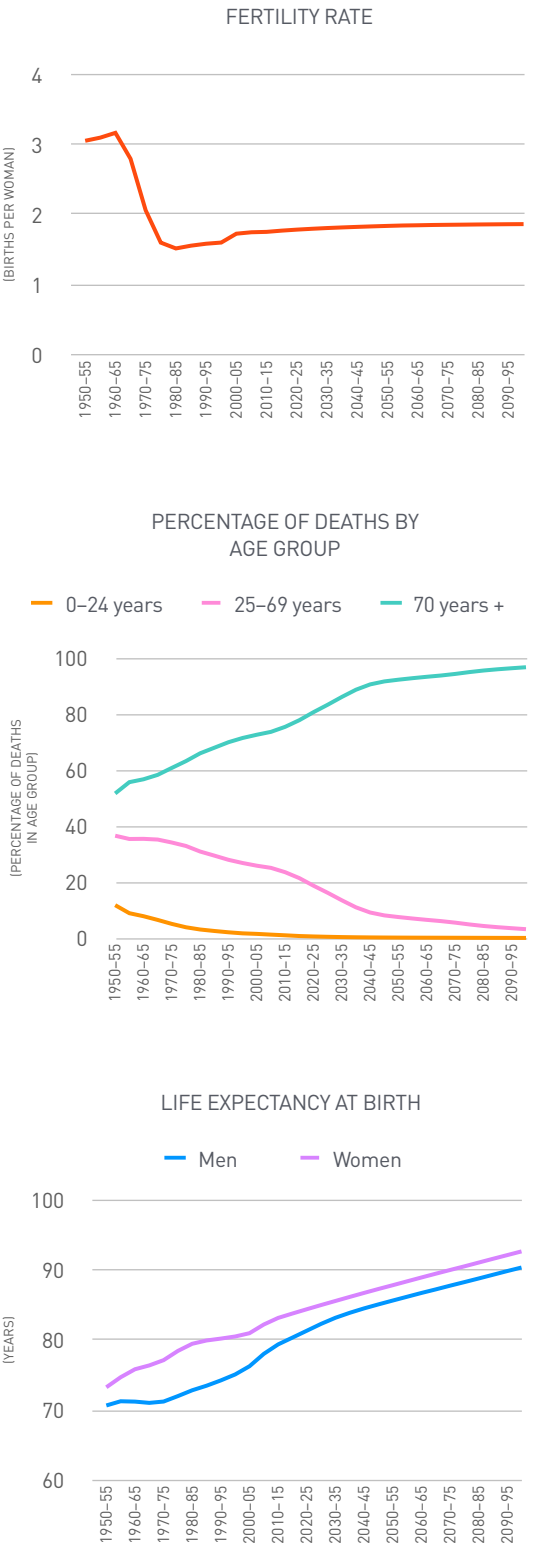
Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

Chart 1.5-f
Germany: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

Chart 1.5-g
Netherlands: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

Netherlands

In the case of the Netherlands, the retirement pension system is characterized by the important role of both the first pillar (increasing as income decreases) and the supplement of the second pillar (increasing for higher incomes), widely established in this country, which is usually compulsory in nature by means of collective bargaining. At present, this system is attaining the highest replacement rates in developed countries, with an aging population and at a very moderate cost to the State in proportion to GDP (see Table 1.5-h).

As has happened in many developed countries, the population of the Netherlands started with a still expansive pyramid in 1950, evolving into a constrictive pyramid that is expected to disappear by the middle of this century, to form a stationary pyramid. This population behavior is affected by the evolution of fertility and mortality rates and their effect on the growth in life expectancy in the country, which are illustrated in Chart 1.5-g. Unlike the Spanish or German

Table 1.5-h
Netherlands: selected indicators of the retirement pension system

Indicator	Netherlands
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	2.6
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	1.8
Support ratio (20–64/65+) - Annual average variation 2020–2050	-2.2%
Percentage of people over 65 years of age 2020	20.0%
Percentage of people over 65 years of age 2050	28.0%
Life expectancy at 65 years 2020 (years)	20.5
Life expectancy at 65 years 2050 (years)	23.3
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.7
Life expectancy at 70 years 2020 (years)	16.5
Life expectancy at 70 years 2050 (years)	18.9
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.4
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.1
Gross replacement rate for low incomes 2019 (50% median income)	73.5%
Gross replacement rate for medium incomes 2019	70.9%
Gross replacement rate for high incomes 2019 (150% median income)	70.1%
Total assets of retirement savings plans 2019 (% GDP)	194.4%
Public spending on pensions relative to GDP (2019 or earlier)	5.4%
Public debt to GDP ratio 2020 (gross debt)	69%
Oxford Economics country risk credit rating index (20=AAA)	20.0
Demographic pressure (sustainability) (maximum = 100)	71.0
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	42.4
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	32.5
Pressure from low income insufficiency (sufficiency) (max = 100)	47.7
Pressure from medium income insufficiency (sufficiency) (max = 100)	20.9
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	11.9
Summary indicator of pressure for reform of pension system (IPPS)	37.7

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

case, the Netherlands sees a more stable population dynamic, resulting from a lower drop in the fertility rate.

France

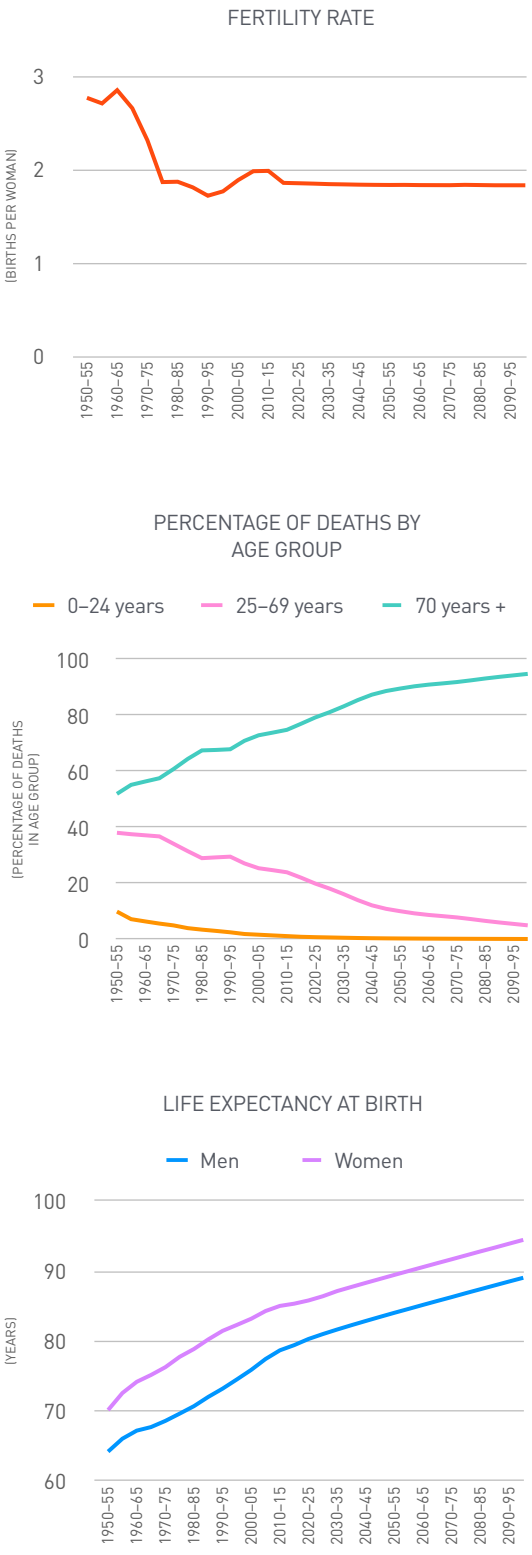
The French pension system also has a distinctive feature in the calculation of the first pillar pension by incorporating a points system when determining the pension. The valuation mechanism of this system affects both active workers and ongoing pensions. However, unlike the German pension system, this points system does not apply to all the benefits received in the first pillar but only to a part, the rest being calculated according to a conventional parametric system, with the characteristics analyzed in section 3.8 of this study. The French pension system is also characterized by the high number of special schemes that still remain today, unlike in other developed economies. Similarly, it is characterized by high public spending on pensions, which in 2019 accounted for 13.9% of GDP.

Table 1.5-i
France: selected indicators of the retirement pension system

Indicator	France
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	2.4
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	1.8
Support ratio (20–64/65+) - Annual average variation 2020–2050	-1.9%
Percentage of people over 65 years of age 2020	20.8%
Percentage of people over 65 years of age 2050	27.8%
Life expectancy at 65 years 2020 (years)	21.9
Life expectancy at 65 years 2050 (years)	24.5
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.6
Life expectancy at 70 years 2020 (years)	17.8
Life expectancy at 70 years 2050 (years)	20.2
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.4
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.1
Gross replacement rate for low incomes 2019 (50% median income)	60.2%
Gross replacement rate for medium incomes 2019	60.1%
Gross replacement rate for high incomes 2019 (150% median income)	54.0%
Total assets of retirement savings plans 2019 (% GDP)	10.6%
Public spending on pensions relative to GDP (2019 or earlier)	13.9%
Public debt to GDP ratio 2020 (gross debt)	160%
Oxford Economics country risk credit rating index (20=AAA)	18.0
Demographic pressure (sustainability) (maximum = 100)	73.9
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	69.6
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	52.5
Pressure from low income insufficiency (sufficiency) (max = 100)	63.6
Pressure from medium income insufficiency (sufficiency) (max = 100)	39.1
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	95.6
Summary indicator of pressure for reform of pension system (IPPS)	65.7

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

Chart 1.5-h
France: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

As in other developed countries, the population structure in France has a constrictive pyramid and one of the lowest labor force to elderly ratios (support ratio) in the world. This will continue to sustain significant deterioration over the next three decades according to United Nations population estimates, from 2.4 people of working age (between 20 and 64 years) per person over 65 years of age in 2020 to 1.8 in 2050 (See Table 1.5-i).

This population behavior is affected by the trend manifested in that period by the fertility and mortality rates and their effect on the growth of life expectancy in that country, which are shown in Chart 1.5-h.

Spain

The pension system in Spain is an allocation model, which therefore relies heavily on a first pillar of defined benefits. Given the characteristics of its structure, and given the dynamics and population trends discussed below, current public spending on pensions as a proportion of GDP is now high compared to other developed economies, reaching 11% in 2019. Moreover, it is expected that this cost will continue to increase, pointing to tensions in the sustain-ability of current replacement rates. This is due to the aging of the population and the expected reduction of the labor force per elderly ratio (support ratio), which will sustain a significant deterioration in the next three decades, from 2.7 persons of working age (between 20 and 64 years) per person over 65 years in 2020 to 1.3 in 2050 (see Table 1.5-j).

In this regard, the Spanish population pyramid (with the characteristics of a developed economy) anticipates a progressive worsening of the problem resulting from population aging in the next 20 years, due to the influx of the baby boom generation reaching retirement age. The Spanish population pyramid already betrayed the presence of this phenomenon at the middle of the last century, with population dynamics

Table 1.5-j
Spain: selected indicators of the retirement pension system

Indicator	Spain
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	2.7
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	1.3
Support ratio (20–64/65+) - Annual average variation 2020–2050	-4.3%
Percentage of people over 65 years of age 2020	20.0%
Percentage of people over 65 years of age 2050	36.8%
Life expectancy at 65 years 2020 (years)	21.8
Life expectancy at 65 years 2050 (years)	24.4
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.6
Life expectancy at 70 years 2020 (years)	17.7
Life expectancy at 70 years 2050 (years)	20.0
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.3
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.2
Gross replacement rate for low incomes 2019 (50% median income)	72.3%
Gross replacement rate for medium incomes 2019	72.3%
Gross replacement rate for high incomes 2019 (150% median income)	72.3%
Total assets of retirement savings plans 2019 (% GDP)	13.0%
Public spending on pensions relative to GDP (2019 or earlier)	11.0%
Public debt to GDP ratio 2020 (gross debt)	140%
Oxford Economics country risk credit rating index (20=AAA)	14.0
Demographic pressure (sustainability) (maximum = 100)	82.3
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	86.6
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	60.4
Pressure from low income insufficiency (sufficiency) (max = 100)	49.2
Pressure from medium income insufficiency (sufficiency) (max = 100)	18.7
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	94.4
Summary indicator of pressure for reform of pension system (IPPS)	65.3

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

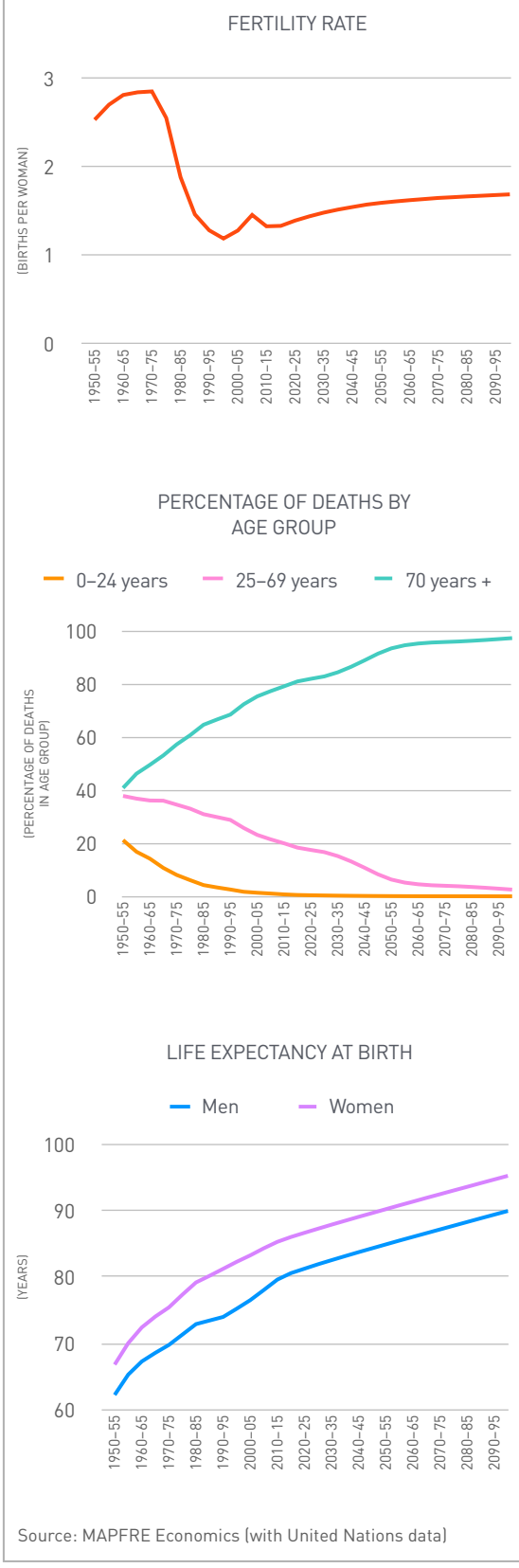
that induced a constrictive effect (because of population aging) considerably greater than that of other developed countries and which, according to the forecasts of the UN, will only lead to a stationary pyramid toward the end of this century.

This population behavior plays a very important part in explaining the dynamics of mortality rates and fertility rate, which has had a sharp decline in recent decades, and only throughout the remainder of this century is it expected to be able to approach the global levels of convergence. In addition, life expectancy at birth has been steadily rising since 1950 and is expected to remain on that path for the remainder of the century (see Chart 1.5-i).

Japan

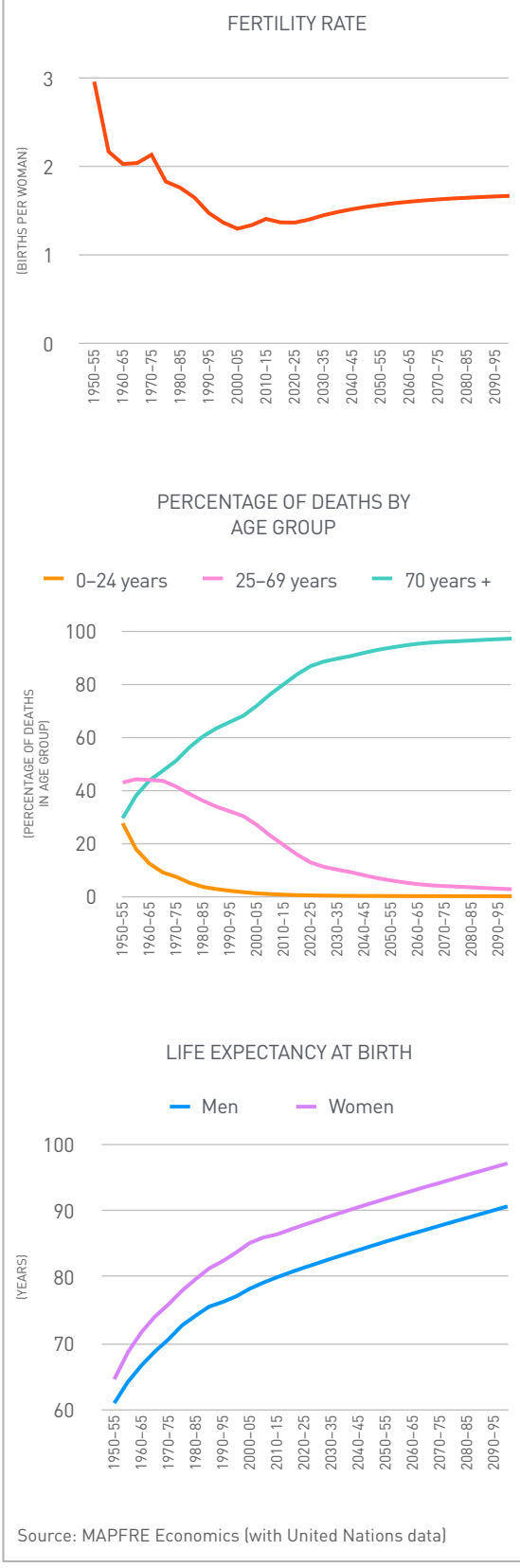
The Japanese retirement pension system has been selected in the Asian region, not only because of its size, but also because it is the most advanced country in the world in the process of population aging, currently presenting the lowest workforce-to-elderly ratio

Chart 1.5-i
Spain: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

Chart 1.5-j
Japan: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

(support ratio) worldwide. This indicator will continue to deteriorate over the next three decades, according to United Nations population estimates, from 1.8 people of working age (between 20 and 64 years) per person over 65 years in 2020 to 1.2 in 2050 (see Table 1.5-k).

The Japanese population pyramid now has a strongly constrictive shape, and according to UN forecasts, it will only reach a stationary pyramid by the end of this century. This population behavior is linked to the evolution of fertility and mortality rates and their effect on the growth of life expectancy in that country, which are all illustrated in Chart 1.5-j. As can be seen from this information, the decline in birth rates, both historical and projected to the end of the century, are particularly significant.

South Korea

Finally, South Korea's pension system has been selected in light of its peculiarities, basically in two respects. First, by using a salary parameter for the calculation of the pension based on the average wage, related not only to the wages

Table 1.5-k
Japan: selected indicators of the retirement pension system

Indicator	Japan
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	1.8
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	1.2
Support ratio (20–64/65+) - Annual average variation 2020–2050	-2.2%
Percentage of people over 65 years of age 2020	28.4%
Percentage of people over 65 years of age 2050	37.7%
Life expectancy at 65 years 2020 (years)	22.9
Life expectancy at 65 years 2050 (years)	25.5
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.6
Life expectancy at 70 years 2020 (years)	18.7
Life expectancy at 70 years 2050 (years)	21.1
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.4
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.2
Gross replacement rate for low incomes 2019 (50% median income)	66.2%
Gross replacement rate for medium incomes 2019	55.8%
Gross replacement rate for high incomes 2019 (150% median income)	52.3%
Total assets of retirement savings plans 2019 (% GDP)	28.6%
Public spending on pensions relative to GDP (2019 or earlier)	10.2%
Public debt to GDP ratio 2020 (gross debt)	243%
Oxford Economics country risk credit rating index (20=AAA)	15.7
Demographic pressure (sustainability) (maximum = 100)	100.0
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	41.1
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	79.4
Pressure from low income insufficiency (sufficiency) (max = 100)	56.3
Pressure from medium income insufficiency (sufficiency) (max = 100)	46.2
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	87.4
Summary indicator of pressure for reform of pension system (IPPS)	68.4

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

received during the working life of the pensioner but also to the average wages of the sum of all people covered in the country. And second, because of the obligation that employers allocate an amount of approximately 8.3% of their salary to meet the employers' obligation in that country, for an amount equivalent to one month's salary per year worked to be paid to employees at the time of retirement.

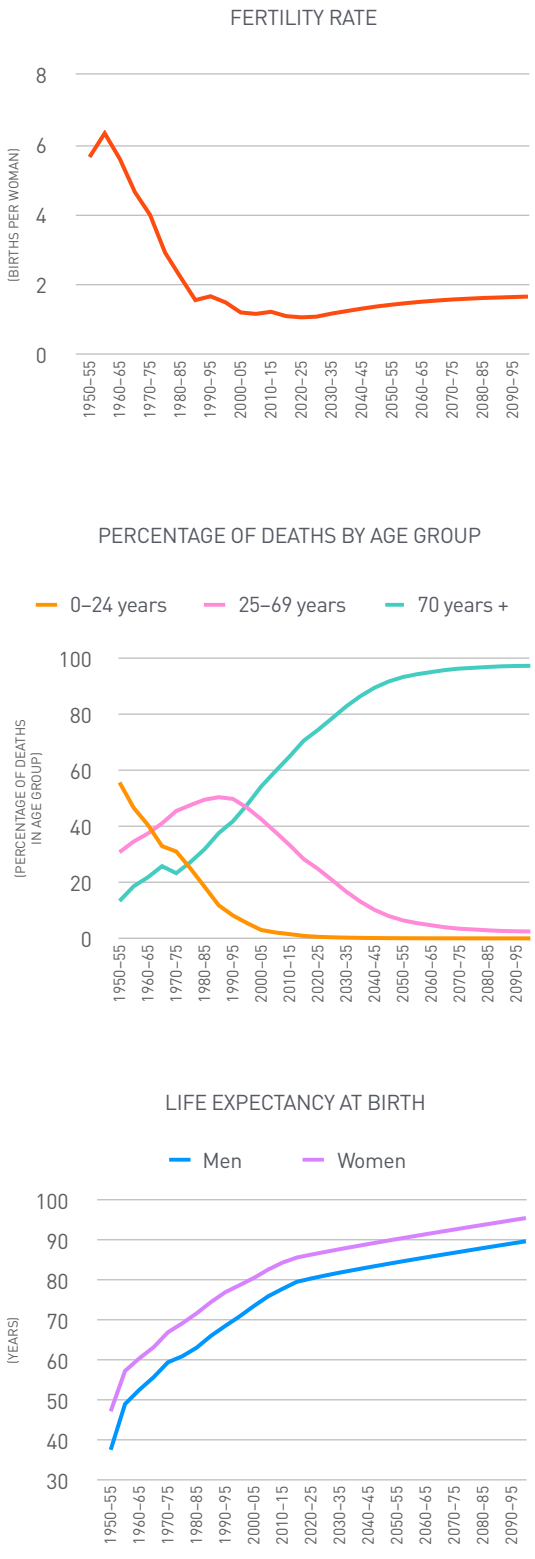
The ratio of labor force to older people (support ratio) is also characterized in South Korea by the marked deterioration expected in the next three decades, which will go from 3.2 people of working age (between 20 and 64 years) for every person over 65 in 2020, to 1.2 in 2050, which places it as one of the world's lowest, along with Japan (see Table 1.5-l). This population and labor market dynamic is associated with fertility and mortality trends and the impact on life expectancy for the South Korean population (see Chart 1.5-k). As can be seen from this

Table 1.5-l
South Korea: selected indicators of the retirement pension system

Indicator	South Korea
Support ratio 2020 (20–64/65+) (ratio of work force to retirees)	3.2
Support ratio 2050 (20–64/65+) (ratio of work force to retirees)	1.2
Support ratio (20–64/65+) - Annual average variation 2020–2050	-5.8%
Percentage of people over 65 years of age 2020	15.8%
Percentage of people over 65 years of age 2050	38.1%
Life expectancy at 65 years 2020 (years)	21.3
Life expectancy at 65 years 2050 (years)	24.3
Expected increase in life expectancy at 65 years 2020–2050 (years)	2.9
Life expectancy at 70 years 2020 (years)	17.1
Life expectancy at 70 years 2050 (years)	19.8
Expected increase in life expectancy at 70 years 2020–2050 (years)	2.7
Savings in years of pension by prolonging the age of retirement from 65 to 70 (2020)	4.2
Gross replacement rate for low incomes 2019 (50% median income)	55.6%
Gross replacement rate for medium incomes 2019	37.3%
Gross replacement rate for high incomes 2019 (150% median income)	27.0%
Total assets of retirement savings plans 2019 (% GDP)	28.2%
Public spending on pensions relative to GDP (2019 or earlier)	2.9%
Public debt to GDP ratio 2020 (gross debt)	50%
Oxford Economics country risk credit rating index (20=AAA)	17.7
Demographic pressure (sustainability) (maximum = 100)	77.6
Pressure from high replacement rates for public pensions (sustainability) (max = 100)	47.9
Pressure from ratio of public debt to GDP and rating (sustainability) (max = 100)	34.4
Pressure from low income insufficiency (sufficiency) (max = 100)	69.0
Pressure from medium income insufficiency (sufficiency) (max = 100)	77.1
Pressure from asset shortage in retirement plans (sufficiency) (max = 100)	87.6
Summary indicator of pressure for reform of pension system (IPPS)	65.6

Source: MAPFRE Economics (with UN, OECD and OEF/Haver data)

Chart 1.5-k
South Korea: selected demographic trends, 1950–2100



Source: MAPFRE Economics (with United Nations data)

information, the trend of the fertility rate in recent decades, which has a very sharp decline and slightly higher absolute values, close to 1:1 to place the indicator among the world's lowest, is particularly striking.

2. Review of the main demographic trends

2.1 Long-term demographic trends

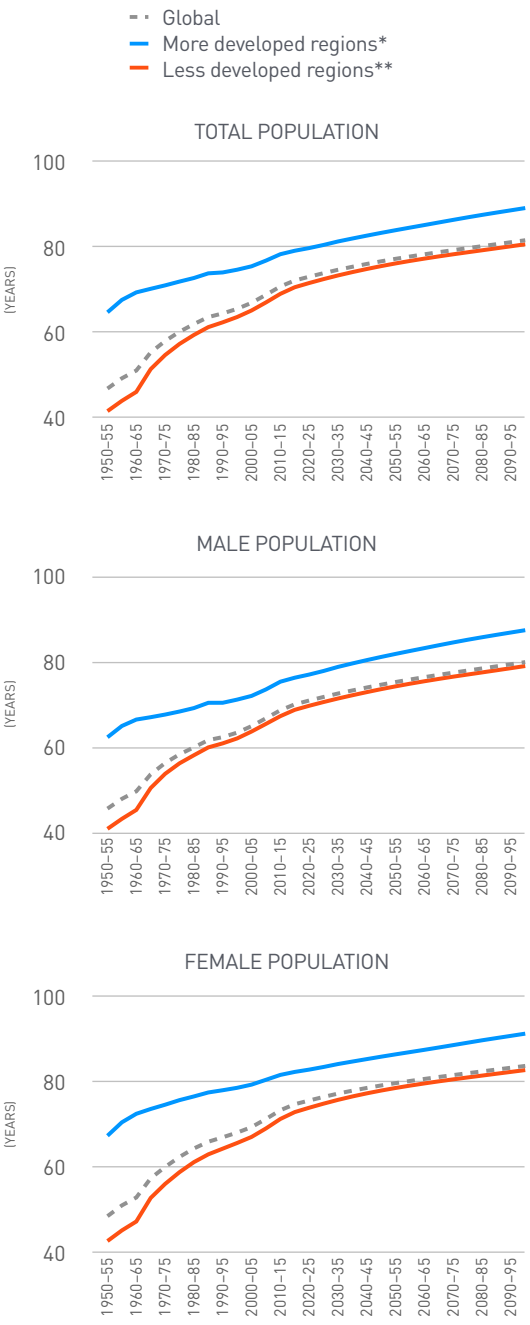
Life expectancy

Based on the most recent estimates by the United Nations (UN)[6], life expectancy at birth at the global level has been growing steadily since 1950. In that year, world average life expectancy at birth was 47 years, while in 2020 it was 73 years. Thus, a person born in 2020 could expect a lifetime 56% longer than the average of those born in 1950.

However, while it is true that life expectancy has higher rates in the more developed regions of the world, the trend toward increasing population survival is a global phenomenon. In this regard, between 1950 and 2020, life expectancy at birth for the population of the more advanced regions[7] increased from 65 to 80 years, which meant a 15-year gain, equivalent to a survival rate of 23% higher than in 1950. For its part, the index for regions with the lowest level of relative development[8] moved from 42 to 72 years, with a gain of 30 years, i.e. a survival rate 72% greater than that of 1950.

UN estimates indicate that the trend toward greater longevity will continue throughout the remainder of this century. According to these forecasts, which do not yet incorporate the effect of the higher mortality caused by the COVID-19 pandemic, the average global life expectancy will reach 82 years by the year 2100, with an indicator of 89 years for more developed regions and 81 years for less developed regions. If these survival levels are reached, people born in 2100 will experience a life expectancy 12% higher than those born in 2020. The same will be true for the inhabitants of the more developed regions as well as for the less developed regions of the world; in which case, the greatest survival at the end of the century will represent a survival gain of 12% and 13% respectively compared to

Chart 2.1-a
Selected regions: life expectancy at birth, 1950–2100



Source: MAPFRE Economics (with United Nations data)

* Includes Europe, North America, Australia, New Zealand and Japan.
** Includes all regions of Africa, Asia (except Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

individuals born in 2020. These trends are replicated when the world's male and female populations are analyzed separately, with a clear tendency for women to live longer than men (see Chart 2.1-A).

Along with the increase in life expectancy, it is observed that an increasing number of people reach extreme ages. This is confirmed by estimates of deaths by age range in different regions of the world. In this regard, while in 1950, the population over 70 years of age equaled only 16.7% of the deaths worldwide (49.5% was in the population aged 0 to 24), by 2020 that percentage had risen to 50.8%, and it is estimated that by 2100 it will reach 81.5%. As is the case with life expectancy, this trend is influenced by dynamics in the less developed regions of the world, in which the index was 11.8% in 1950 and 44.6% in 2020, and estimated to reach 80.1% in 2100. As for the more developed regions, while the starting point is higher than the world average, a similar trend is observed: the percentage of deaths of people over 70 years of age was 40.1% in 1950, rising to 72.8% in 2020 and estimated to reach 92.3% in 2100 (see Chart 2.1-b).

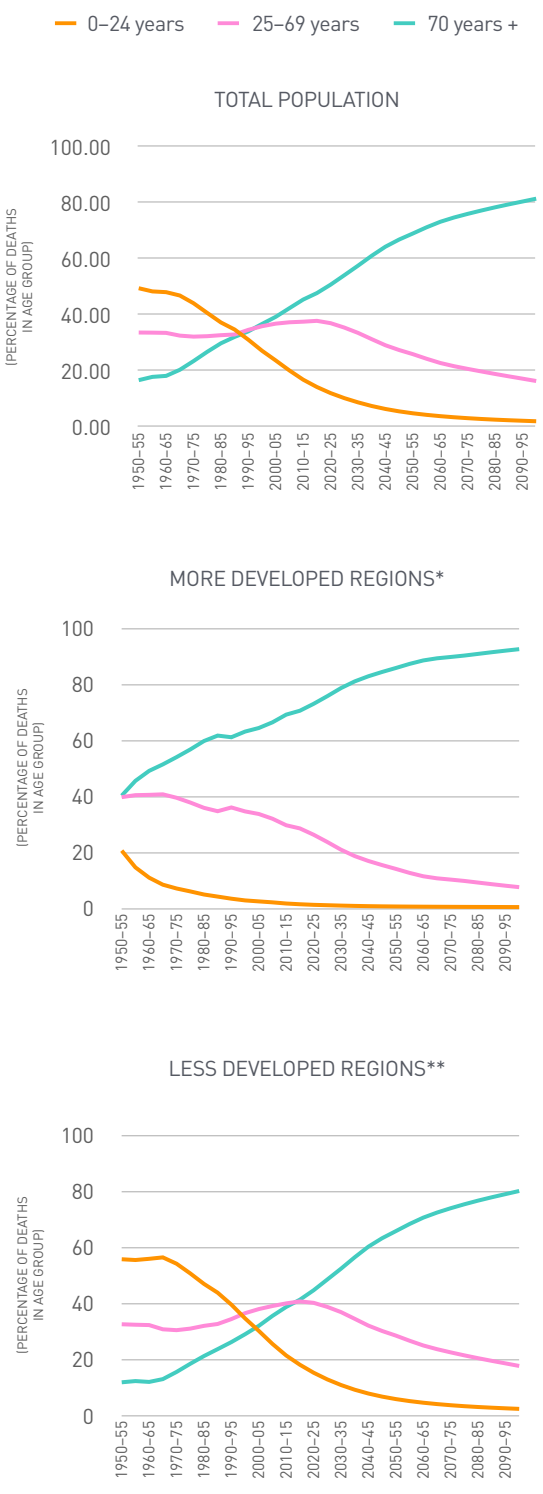
Mortality

The other dimension of the trend toward increasing life expectancy refers to the behavior of mortality rates, which have shown a decreasing trend since 1950. As shown in Chart 2.1-c, all age ranges analyzed show on one hand a tendency to reduced mortality rates, while on the other a process of long-term convergence leading to mortality rates that reach very similar values around the world by 2100.

Fertility

Finally, these demographic trends are complemented by the behavior of the fertility rate, namely the number of births per woman. In this regard, Chart 2.1-d illustrates how the world recorded a significant reduction in the indicator over the period 1950–2020. Thus, while the world's average fertility rate in 1950 was 4.97, by 2020 the indicator had halved (2.47), with an estimated 1.94 for 2100. In the case of the more

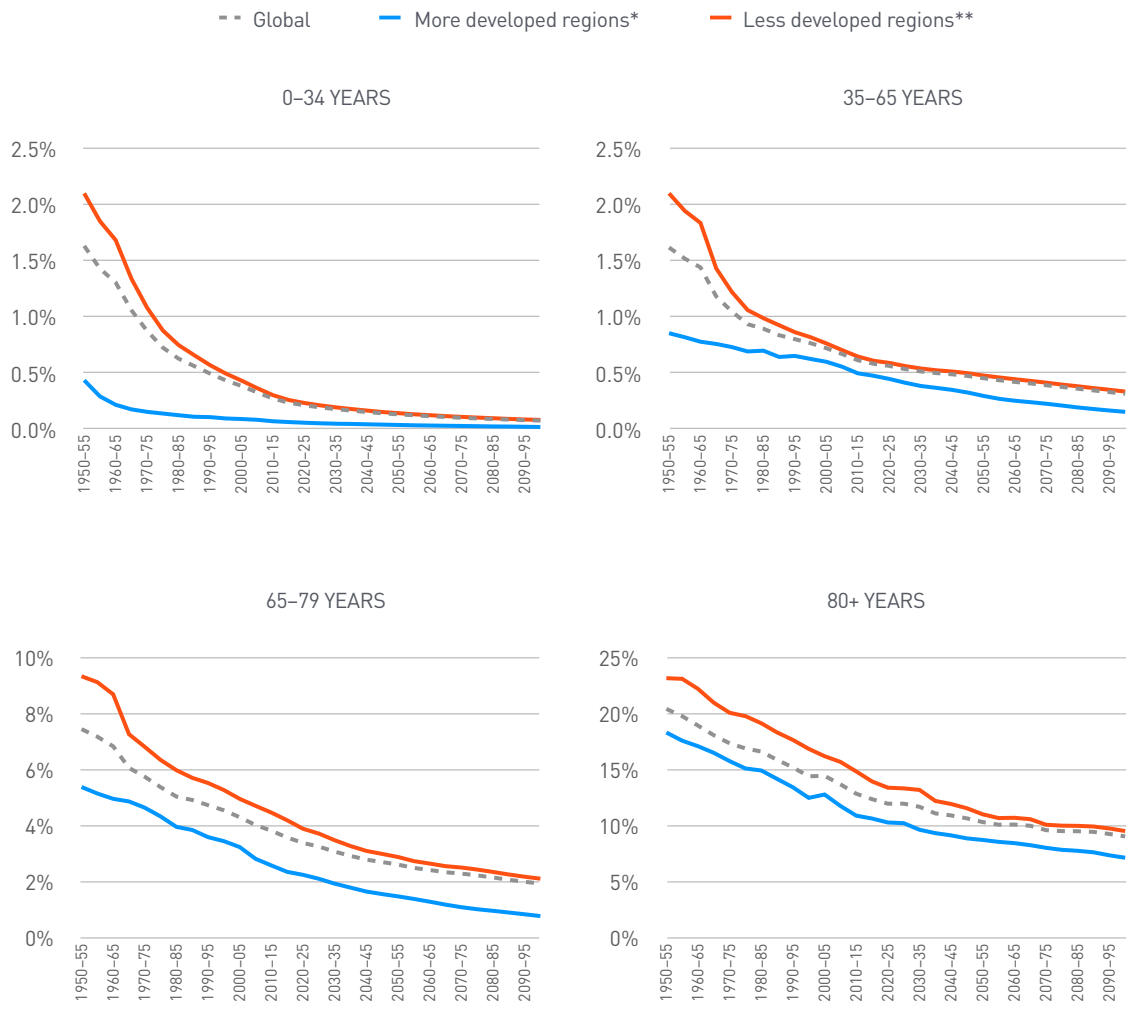
Chart 2.1-b
Selected regions:
percentage of deaths by age group, 1950–2100



Source: MAPFRE Economics (with United Nations data)

* Includes Europe, North America, Australia, New Zealand and Japan.
** Includes all regions of Africa, Asia (except Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

Chart 2.1-c
Selected regions: mortality rates by age group, 1950–2100



Source: MAPFRE Economics (with United Nations data)
* Includes Europe, North America, Australia, New Zealand and Japan.
** Includes all regions of Africa, Asia (except Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

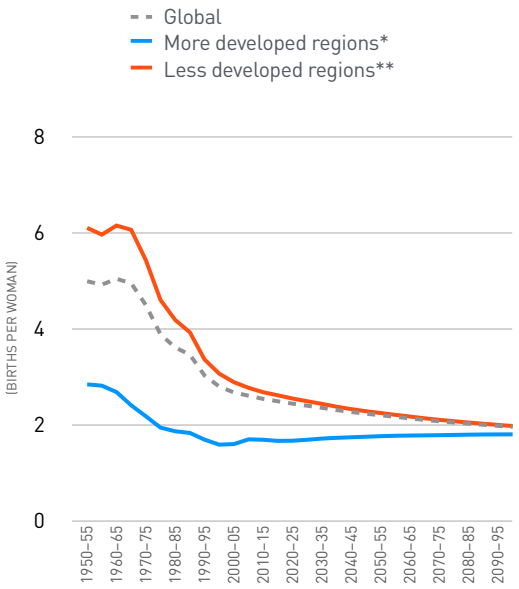
developed regions, the indicator has shown an equally decreasing trend from 2.82 in 1950 to 1.64 in 2020, while in the regions with relatively less development the ratio has decreased from 6.1 to 2.6 in the same period.

As noted in our 2017 report, an interesting feature of fertility rate behavior concerns the trend toward convergence shown by all regions of the world by 2100 (1.78 in regions with the highest relative development and 1.95 in the least developed). Although dependent on the behavior of mortality rates and the male/female ratio that the world population reaches in the future, by the end of the century these fertility rates would tend to approach what is known as *zero population growth rate*, which corresponds to the level at which the population growth of the planet would stabilize.

Population pyramids

The pattern of population development worldwide for the remainder of the century will be defined by the group of demographic dynamics and trends described above. In this

Chart 2.1-d
Selected regions: fertility rate, 1950–2100



Source: MAPFRE Economics (with United Nations data)

* Includes Europe, North America, Australia, New Zealand and Japan.
** Includes all regions of Africa, Asia (except Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

regard, the general structure of this evolution can be simplified using *population pyramids* (see Box 2.1).

Because of their relative weight in the world population, there is no doubt that the dynamics of the less developed regions will define the population pattern globally over the next few decades. In this regard, in Charts 2.1-e and 2.1-f we can see how in both cases the population pyramids from 1950 to those projected for 2100 will have evolved from a typical expansive to a stationary pyramid, without proper transit through a constrictive pyramid. This is in spite of the fact that certain specific regions of the subset of the least developed countries (e.g. Latin America around 2030) may have done so.

Meanwhile, as shown in Chart 2.1-g, the population pyramid of the most developed regions throughout the period 1950–2100 clearly shows them also passing through an expansive pyramid in the middle of the last century, until reaching a stationary pyramid in 2100. However, in this process of evolution, the population of the regions of greatest relative development will have passed through a period in which the pyramid was constrictive (with the passage of the baby boomer generation), which begins in the 1960s and will extend to the middle of this century.

However, it is important to note that demographic forecasts appear to coincide globally in a convergence toward stationary-type population pyramids by the end of this century. This trend is explained on the one hand by the reduction of fertility rates and their convergence over the 21st century to a zero growth rate of the world population (Chart 2.1-d), and on the other by the sustained pattern of reduction in mortality (Chart 2.1-c). Despite this, beyond the great trends and dynamics foreseen in orthodox views of demography, advances in research for the treatment of diseases such as cancer, the development of new vaccines and antivirals and many other factors indicate that improvements in life expectancy will continue and could exceed expectations based on population inertia.

Actuarial biometric tables are currently being developed with limits that are usually set at a maximum age of 120. However, there is ongoing scientific research that could bring the survival of the world's populations beyond that parameter. For more than a decade, for example, it has been possible to read the sequence of people's genetic code, and the cost of this analysis continues to reduce drastically. The personal genetic map makes it possible to make increasingly accurate estimates of diseases of genetic origin that, with a certain probability, we may experience during our lives. In this way, it may be possible to prolong life through preventive treatments of these diseases and healthy life habits, as well as through genetic therapies. Furthermore, a great deal of research is currently under way to try to differentiate chronological age from biological age and to measure life expectancy in a more individualized way through genetic tests, analysis of immuno-logical and metabolic profiles, and even the measurement of chromosomes' telomere length.

Box 2.1
Type of population pyramids

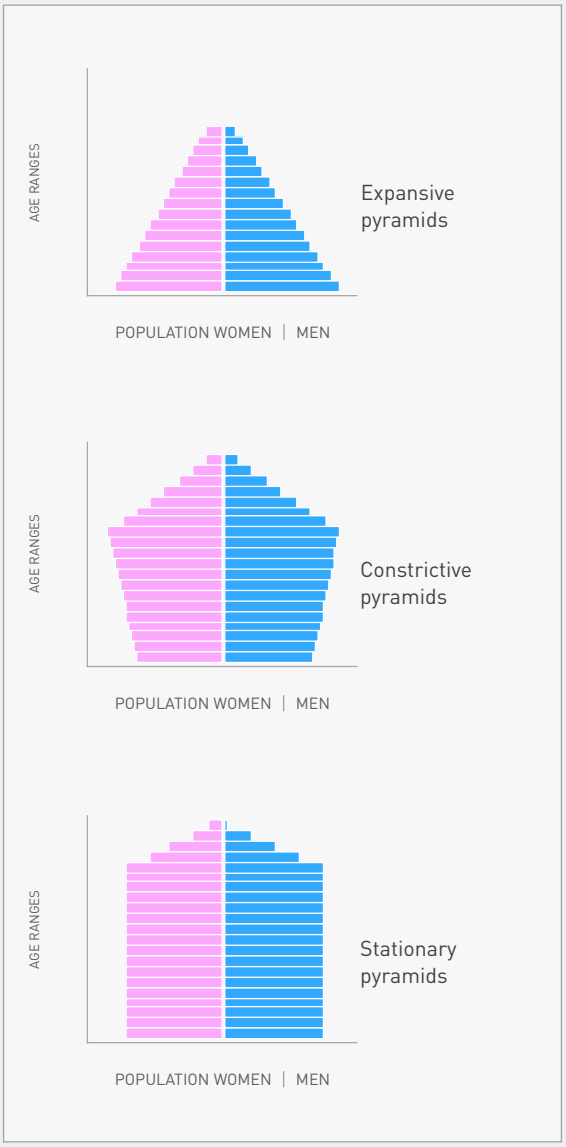
Population pyramids illustrate the age and gender structure of a population. By presenting the number of men and women in each age range, they simplify the analysis of the essential characteristics of a population. Thus, population pyramids reflect the main demographic dynamics and trends, such as fertility and mortality.

In general terms, there are three types of population pyramids: expansive, constrictive and stationary.

Expansive pyramids show a broad base and a narrow peak, placing a significant part of the population in the younger age groups. This type of pyramid usually characterizes populations with high fertility and mortality rates.

Constrictive (or regressive) pyramids have a narrower base than their center, which usually illustrates populations with a rapid decline in fertility rate.

Stationary pyramids, which are characterized by their rectangular shape, present a population with a similar demographic structure along most of the age ranges, until reaching the most advanced ages in which the percentages of the population decrease rapidly. They illustrate the case of mature populations with low fertility and mortality rates.



Source: MAPFRE Economics

The areas of research open in the field of genetics and biotechnology could lead to a disruptive change that prolongs human life beyond the current conceivable limits, reaching what biogerontologists call "longevity escape velocity."[9] In relation to this, genetic modifications are being tested on animals, and they have been able to extend life significantly relative to non-manipulated animals. Experiments with non-viable human embryos also have already been carried out using the CRISPR technique (clustered regularly inter-spaced short palindromic repeats).

Thus, in summary, this grouping of technical and scientific advances raises an enormous expectation with regard to the life possibilities of future societies, and also opens up a great margin of uncertainty with regard to the extent of longevity in the near future.

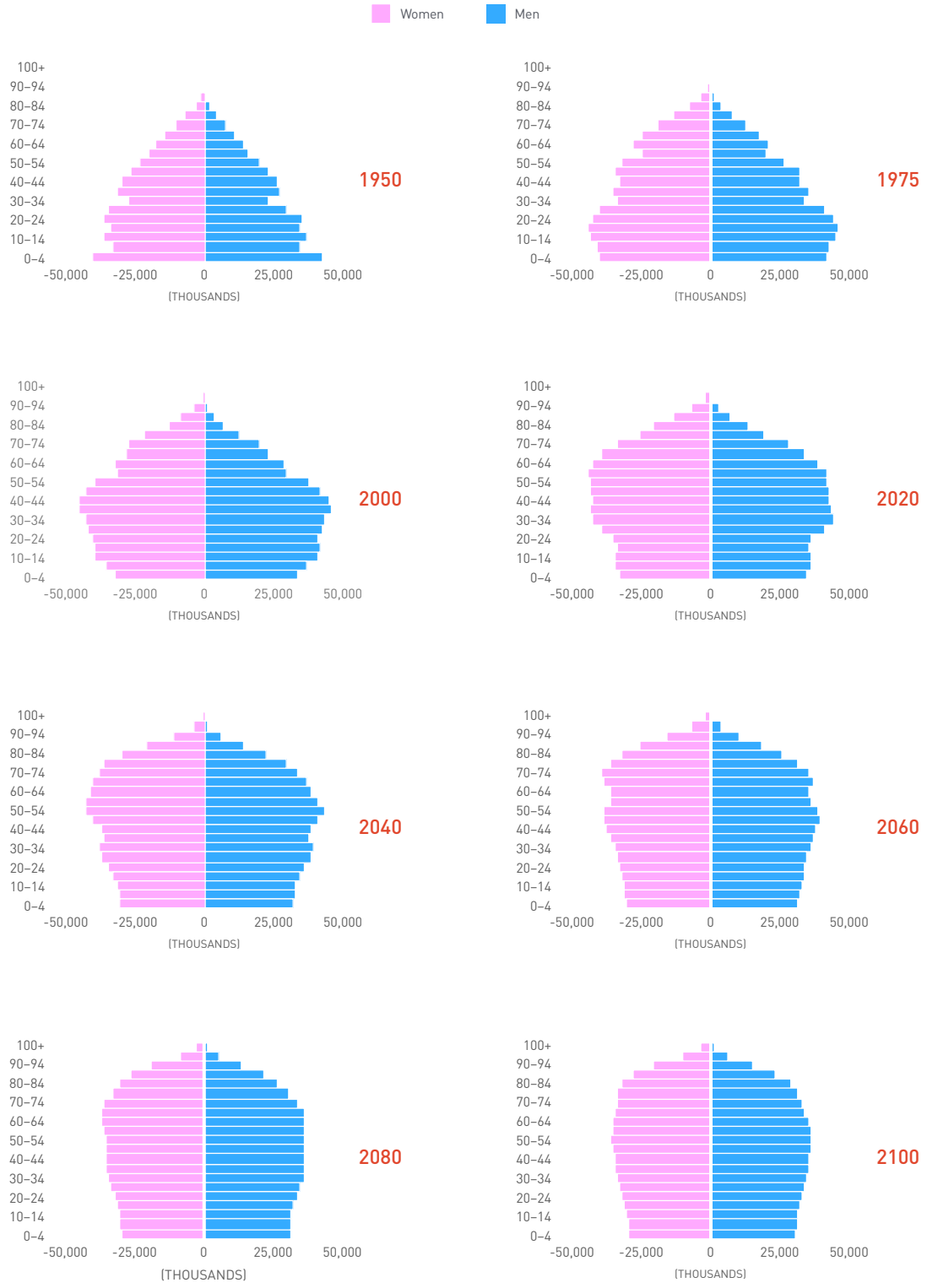
Chart 2.1-e
Evolution of the population pyramid: population of the world, 1950–2100

Source: MAPFRE Economics (with UN data)

Chart 2.1-f
Evolution of the population pyramid: population of less developed countries*, 1950–2100

Source: MAPFRE Economics (with UN data)
* Includes all regions of Africa, Asia (except Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

Chart 2.1-g
Evolution of the population pyramid: population of more developed countries*, 1950–2100



Source: MAPFRE Economics (with UN data)
* Includes Europe, North America, Australia, New Zealand and Japan.

Longevity and pension systems

As already indicated in our 2017 study, the increase in longevity, whether under the parameters set out by a population inertia approach or under what the most disruptive approaches predict, will have profound implications for societies. While it is true that there is a high level of uncertainty as to the extent that longevity may reach in this century, as well as on changes in the population structure (to which the uncertainty caused by the COVID-19 pandemic has been added in the opposite direction), there seems to be a consensus that it will be possible to continue to see success in the process of extending people's lives.

Although difficult to predict in its specific aspects, the greater longevity will impact all spheres of society. In terms of economics, it will have an impact on consumption and savings, as well as on the structure of the labor market and wage growth, especially in light of its convergence with the process of technological revolution applied to productive processes in the economy. And from a social perspective, it will involve substantial changes in the patterns of social organization and coexistence and in the foundations of family relations.

However, one area where it is possible to foresee, with a high degree of certainty, the effects of the greater survival of populations is in pension systems. Together with the potential occurrence of other risks (financial, inflation, unemployment), longevity will undoubtedly affect pension expenditure, implying the need to continue to progress with its adjustment to make pensions stable and sustainable in the long-term. We know that the first pension systems were created in the late 19th century and became widespread in the first half of the 20th century. A first wave of long-term sustainability-oriented adjustments took place in the last decade of the last century. However, the reason for this public policy reaction (namely the widening gap between the retirement age and the survival limit) has not disappeared; on the contrary, it has been reinforced since then based on the higher life expectancy of the population worldwide (see Chart 2.1-h).

The main objective of this study is to continue the analysis of different pension models in international experience, in order to identify experiences and best practices that will enable further progress in the indispensable reassessment of these schemes so that they meet their original intended social purpose and that, at the same time, they do so on a basis that allows them to maintain their financial sustainability over the long-term.

2.2 Demographic pressure on pension systems

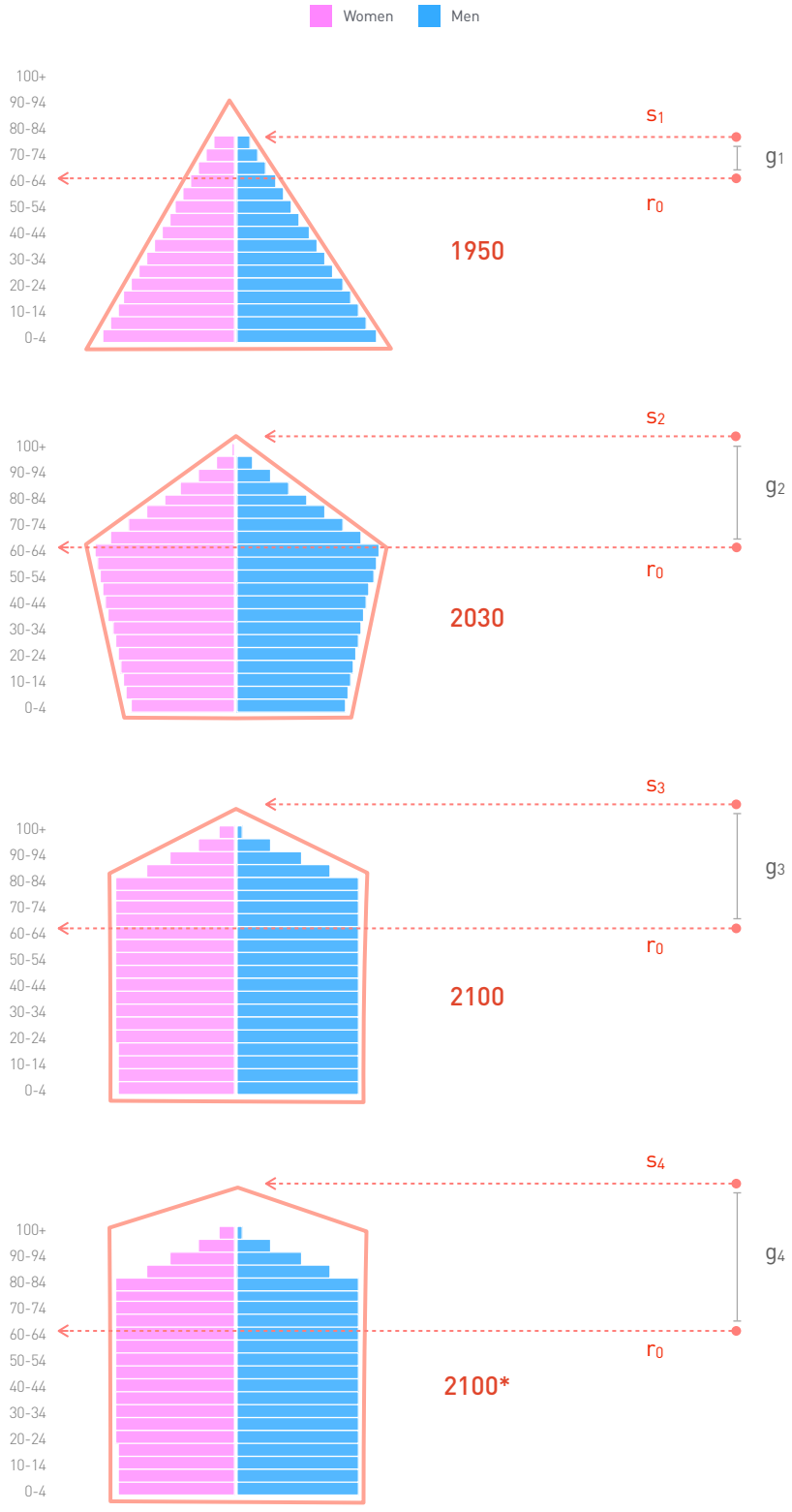
As can be seen from the analysis carried out for the selection of reference models and from the study of the major reforms that the selected systems have undergone over time, experience shows that pension systems are always under great pressure for reform.

The various factors that influence the pressure on public authorities to reform their pension systems can be grouped into two large blocks: the first would encompass those factors that are caused by system deficiencies related to pension *inadequacy* (to maintain a certain standard of living after retirement), and the second group would include those that are caused by medium- and long-term *sustainability* problems.

The block of factors related to *sustainability* includes *demographics*, especially for those systems in which the allocation elements have a greater weight. Other factors that can reduce this pressure on pension reform are added to this demographic factor, and are studied in depth in the fourth section of this study.

A key indicator for assessing the degree of pressure that population dynamics in particular exert on retirement pension systems is known as the *support ratio* and which, for the purposes of this study, we have called the "*ratio of the labor force for each retiree*." This indicator measures the number of people of working age for each person who has reached retirement age. It combines the set of demographic elements that affect retirement pensions, as its dynamics are linked to the evolution of the work

Chart 2.1-h
Evolution of the gap (g_1) between retirement age (r_0) and survival limit (s_1)



Source: MAPFRE Economics

*Considering disruptive increases in longevity

force, the life expectancy of people who reach retirement age and the proportion of these people in the population as a whole.

Because of its construction, the support ratio is an indicator that allows for various metrics, the most used being the *labor force* of the population between the ages of 20 and 65 years, as these are the average ages in which people in a position to work join and leave the labor market (support ratio 20–64/65+)[10].

The United Nations population databases provide population estimates and predictions by age group from 1950 to 2100 for a total of 201 countries. On the basis of these, we have created an *index of demographic pressure on retirement pension systems* by considering two elements:

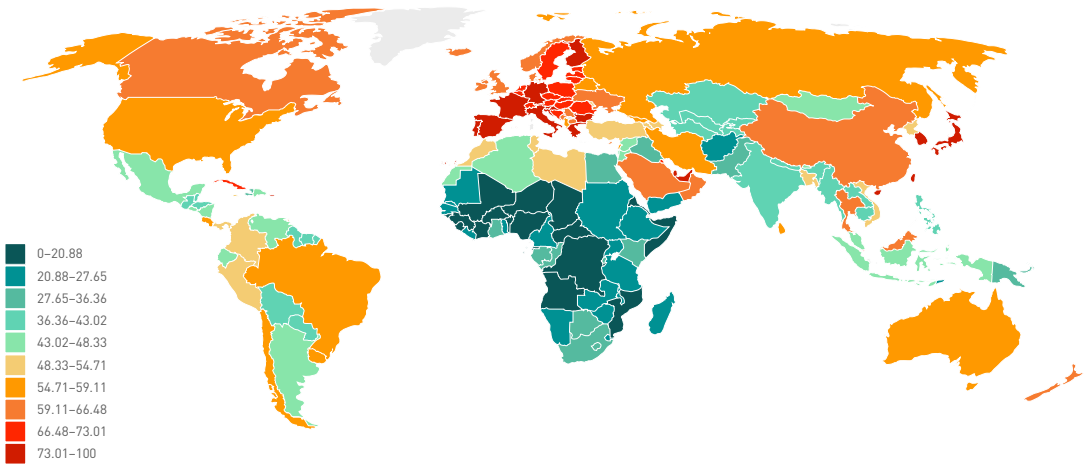
- The situation of the labor force with respect to the population over 65 years of age in 2020 (support ratio 20–64/65+).
- The average annual percentage of expected decline over the next 30 years of this indicator (2020–2050).

It should be noted that in the construction of the aforementioned demographic pressure index, both elements have been weighted with the same weight; in other words, an equivalent importance has been given both to the current situation of the ratio of the labor force for each retiree, and the speed with which the ratio is expected to deteriorate in the coming years. Furthermore, the demographic pressure index has been scaled so that a value equal to 100 is equivalent to the maximum pressure produced by this factor (see Chart 2.2 and Table 2.2).

Chart 2.2 shows the geography of demographic pressure resulting from the calculation of the index. As can be seen, the Southern European region and Western Europe in general are showing the greatest demographic pressure on their retirement pension systems, mainly because the ratio of the labor force for each retiree is one of the lowest in the world—around three people of working age per person over 65 years of age, on average. According to the latest United Nations forecasts, this ratio will continue to deteriorate in the coming decades to fall below two in 2050 and around 1.5 by the end of the century.

It should be noted that, at present, these forecasts still don't take into account the effect of the mortality caused by the COVID-19 pandemic; however, given the virus fatality rates observed to date, it is not expected that there will be deviations that will significantly alleviate the demographic pressure on pension

Chart 2.2
Demographic pressure index



Source: MAPFRE Economics

Table 2.2
Demographic pressure index and elements

Country	Demographic pressure index	Index elements		
		Support ratio 2020 (20–64/65+)	Support ratio 2050 (20–64/65+)	Annual average variation 2020–2050
Japan	100.0	1.9	1.2	-1.5%
United Arab Emirates	88.4	63.3	4.0	-8.8%
Italy	85.6	2.5	1.3	-2.1%
Greece	84.4	2.6	1.3	-2.3%
Portugal	83.5	2.6	1.4	-2.0%
Martinique	82.1	2.6	1.5	-1.9%
Spain	82.1	3.0	1.3	-2.9%
Puerto Rico	77.6	2.7	1.6	-1.8%
Slovenia	77.5	2.9	1.5	-2.1%
South Korea	77.3	4.2	1.3	-3.9%
Hong Kong	75.6	3.6	1.4	-3.1%
Virgin Islands	75.6	2.6	1.8	-1.3%
Croatia	75.3	2.8	1.7	-1.7%
Germany	75.2	2.7	1.7	-1.5%
Malta	74.6	2.8	1.7	-1.6%
Guadeloupe	74.3	2.8	1.7	-1.6%
Finland	74.2	2.5	1.9	-0.8%
Taiwan	74.0	4.2	1.4	-3.6%
Qatar	73.9	48.0	5.0	-7.2%
France	73.8	2.7	1.8	-1.3%
Bulgaria	73.0	2.8	1.8	-1.4%
Lithuania	72.5	2.9	1.8	-1.6%
Estonia	72.2	2.9	1.8	-1.5%
Poland	72.2	3.3	1.7	-2.2%
Kuwait	72.1	23.1	2.9	-6.7%
Czech Republic	72.0	3.0	1.8	-1.7%
Latvia	71.5	2.8	1.9	-1.3%
Netherlands	70.9	2.9	1.9	-1.5%
Austria	70.4	3.2	1.8	-1.9%
Hungary	69.8	3.0	1.9	-1.5%
Singapore	69.6	5.2	1.6	-3.9%
Switzerland	69.5	3.2	1.8	-1.8%
Bosnia and Herzegovina	69.1	3.5	1.8	-2.2%
Maldives	68.9	20.0	2.9	-6.2%
Belgium	68.8	3.0	1.9	-1.5%
Romania	68.6	3.1	1.9	-1.6%
Cuba	67.5	3.9	1.8	-2.6%
Channel Islands	67.2	3.4	1.9	-2.0%
Slovakia	67.0	3.8	1.8	-2.4%
Sweden	66.9	2.8	2.2	-0.8%

Table 2.2 (continued)
Demographic pressure index and elements

Country	Demographic pressure index	Index elements		
		Support ratio 2020 (20–64/65+)	Support ratio 2050 (20–64/65+)	Annual average variation 2020–2050
Barbados	66.5	3.6	1.9	-2.1%
Serbia	65.8	3.1	2.1	-1.3%
Denmark	65.6	2.9	2.2	-0.8%
Thailand	65.5	5.0	1.8	-3.3%
United Kingdom	65.3	3.1	2.1	-1.3%
Macao	64.3	5.9	1.9	-3.7%
Ireland	63.9	4.0	2.0	-2.3%
Curaçao	63.3	3.2	2.2	-1.3%
Canada	62.4	3.4	2.2	-1.4%
Ukraine	61.7	3.7	2.2	-1.7%
Iceland	61.7	3.8	2.2	-1.8%
Saudi Arabia	61.4	18.7	3.5	-5.4%
Norway	61.2	3.4	2.3	-1.3%
Brunei Darussalam	60.8	11.6	2.7	-4.8%
New Zealand	60.8	3.5	2.3	-1.4%
China	60.7	5.4	2.1	-3.1%
Réunion	60.4	4.5	2.2	-2.4%
Cyprus	60.1	4.4	2.2	-2.3%
North Macedonia	59.8	4.4	2.2	-2.3%
Oman	59.5	28.2	5.1	-5.5%
Montenegro	59.1	3.8	2.3	-1.6%
Belarus	59.1	4.0	2.3	-1.8%
Albania	59.0	4.2	2.3	-2.0%
Australia	58.8	3.6	2.4	-1.3%
Chile	58.7	5.1	2.2	-2.7%
Luxembourg	58.5	4.5	2.3	-2.2%
United States	58.2	3.5	2.5	-1.2%
Bahrain	58.1	27.8	5.3	-5.4%
Russia	57.9	4.0	2.4	-1.7%
Sri Lanka	57.2	5.1	2.4	-2.5%
Mauritius	57.2	5.1	2.4	-2.5%
Costa Rica	56.8	6.0	2.4	-3.0%
Georgia	56.6	3.9	2.5	-1.4%
Aruba	56.4	4.2	2.5	-1.8%
Saint Lucia	56.3	6.3	2.5	-3.1%
Iran	56.2	9.5	2.8	-4.0%
Uruguay	55.9	3.8	2.6	-1.3%
Trinidad and Tobago	55.9	5.4	2.5	-2.6%
Brazil	55.5	6.5	2.5	-3.1%
French Polynesia	55.2	6.7	2.6	-3.2%

Table 2.2 (continued)
Demographic pressure index and elements

Country	Demographic pressure index	Index elements		
		Support ratio 2020 (20–64/65+)	Support ratio 2050 (20–64/65+)	Annual average variation 2020–2050
Lebanon	54.7	7.8	2.7	-3.4%
Seychelles	54.6	7.6	2.7	-3.4%
Vietnam	54.3	7.9	2.8	-3.4%
Republic of Moldova	54.1	5.3	2.6	-2.4%
Libya	53.8	13.1	3.6	-4.2%
Antigua and Barbuda	53.6	6.6	2.7	-2.9%
Turkey	53.5	6.6	2.7	-2.9%
Armenia	53.1	5.2	2.7	-2.2%
Colombia	52.7	6.7	2.8	-2.9%
Tunisia	52.7	6.8	2.8	-2.9%
New Caledonia	52.5	6.3	2.8	-2.7%
North Korea	51.0	6.8	2.9	-2.7%
Peru	50.5	6.8	3.0	-2.7%
Guam	50.2	5.4	2.9	-2.0%
Azerbaijan	49.9	9.4	3.4	-3.3%
Panama	49.0	6.6	3.1	-2.5%
Saint Vincent and the Grenadines	48.6	6.1	3.1	-2.2%
Morocco	48.6	7.6	3.3	-2.8%
Bangladesh	48.6	11.2	3.9	-3.5%
Jamaica	48.5	6.6	3.2	-2.4%
Cape Verde	48.3	12.2	4.1	-3.6%
Western Sahara	48.2	18.0	5.3	-4.0%
Bahamas	48.2	8.1	3.4	-2.8%
Israel	48.2	4.2	3.2	-0.9%
Indonesia	47.8	9.5	3.7	-3.1%
Malaysia	47.4	8.5	3.5	-2.9%
Algeria	47.2	8.3	3.5	-2.8%
Mexico	46.9	7.6	3.5	-2.6%
Argentina	46.4	5.0	3.3	-1.3%
Nicaragua	46.0	9.8	3.9	-3.0%
Ecuador	46.0	7.4	3.5	-2.4%
Mongolia	45.3	13.4	4.8	-3.4%
Dominican Rep.	45.2	7.5	3.6	-2.4%
Syria	45.2	11.4	4.3	-3.1%
Bhutan	45.1	9.6	4.0	-2.9%
Grenada	44.2	6.1	3.6	-1.8%
Guyana	43.9	8.0	3.9	-2.4%
French Guiana	43.8	9.5	4.2	-2.7%
El Salvador	43.8	6.4	3.7	-1.9%
Jordan	43.7	13.4	5.0	-3.2%

Table 2.2 (continued)
Demographic pressure index and elements

Country	Demographic pressure index	Index elements		
		Support ratio 2020 (20–64/65+)	Support ratio 2050 (20–64/65+)	Annual average variation 2020–2050
Venezuela	43.0	7.0	3.8	-2.0%
Uzbekistan	42.6	12.3	4.9	-3.0%
Suriname	42.4	8.1	4.1	-2.3%
Kazakhstan	42.1	7.2	4.0	-2.0%
Honduras	42.1	10.8	4.7	-2.8%
Belize	42.0	11.1	4.8	-2.8%
Djibouti	41.8	12.2	5.0	-2.9%
India	40.8	8.8	4.4	-2.3%
Cambodia	40.7	11.4	5.0	-2.7%
Myanmar (Burma)	40.5	9.5	4.6	-2.4%
Philippines	38.5	10.0	5.0	-2.3%
Paraguay	38.2	8.1	4.6	-1.8%
Turkmenistan	38.2	11.8	5.5	-2.5%
Laos	37.6	12.7	5.9	-2.5%
Bolivia	37.4	7.0	4.6	-1.4%
Nepal	37.4	9.3	5.1	-2.0%
Kyrgyzstan	37.3	11.6	5.7	-2.4%
Fiji	37.2	9.8	5.2	-2.1%
Guatemala	36.6	10.1	5.4	-2.1%
Mayotte	36.4	11.0	5.7	-2.2%
Tajikistan	36.4	16.1	7.1	-2.7%
Botswana	36.0	11.6	5.9	-2.2%
South Africa	34.9	10.4	5.8	-2.0%
Kiribati	34.7	12.2	6.3	-2.2%
Kenya	34.7	19.0	8.4	-2.7%
Haiti	33.8	10.1	5.9	-1.8%
Samoa	33.4	9.4	5.8	-1.6%
Egypt	33.2	9.8	5.9	-1.7%
Palestine	33.0	15.0	7.6	-2.3%
Gabon	32.7	14.3	7.4	-2.2%
Rwanda	31.3	15.1	8.0	-2.1%
Salomon Islands	30.8	12.6	7.3	-1.8%
Iraq	30.6	14.1	7.8	-1.9%
Ghana	30.1	15.8	8.6	-2.0%
Tonga	30.0	8.2	6.0	-1.0%
Micronesia	29.8	12.4	7.4	-1.7%
São Tomé and Príncipe	29.2	14.6	8.3	-1.8%
Pakistan	28.8	11.7	7.4	-1.5%
Lesotho	28.1	10.6	7.2	-1.3%
Papua New Guinea	27.8	14.3	8.6	-1.7%

Table 2.2 (continued)
Demographic pressure index and elements

Country	Demographic pressure index	Index elements		
		Support ratio 2020 (20–64/65+)	Support ratio 2050 (20–64/65+)	Annual average variation 2020–2050
Congo	27.6	16.5	9.5	-1.8%
Vanuatu	27.3	13.4	8.4	-1.5%
Namibia	26.7	13.9	8.8	-1.5%
Comoros	26.0	15.3	9.5	-1.6%
Madagascar	25.8	14.8	9.4	-1.5%
Mauritania	25.5	14.8	9.5	-1.5%
Yemen	25.4	16.2	10.1	-1.6%
Togo	24.2	15.7	10.3	-1.4%
Zambia	23.9	19.8	12.2	-1.6%
Liberia	23.4	13.7	9.6	-1.2%
Afghanistan	23.4	16.5	10.9	-1.4%
Ethiopia	23.1	12.8	9.3	-1.0%
Senegal	22.9	14.1	10.0	-1.1%
Tanzania	22.8	16.3	11.0	-1.3%
Sudan	22.3	12.4	9.4	-0.9%
Zimbabwe	22.3	14.6	10.4	-1.1%
East Timor	21.8	11.0	8.9	-0.7%
Eswatini	21.2	11.8	9.5	-0.7%
Uganda	21.1	20.4	13.6	-1.3%
Malawi	21.0	16.3	11.6	-1.1%
Cameroon	20.9	16.4	11.7	-1.1%
Burkina Faso	20.6	17.5	12.4	-1.1%
Sierra Leone	20.5	15.6	11.5	-1.0%
Benin	20.1	13.5	10.6	-0.8%
Burundi	19.4	17.7	12.9	-1.0%
Guinea-Bissau	18.5	15.5	12.1	-0.8%
South Sudan	17.6	13.3	11.3	-0.5%
Nigeria	17.4	15.8	12.7	-0.7%
Angola	17.3	18.6	14.3	-0.9%
Gambia	17.1	16.9	13.5	-0.8%
Côte d'Ivoire	16.3	15.5	13.0	-0.6%
Eritrea	15.6	9.7	10.2	0.1%
Dem. Rep. of Congo	15.5	13.5	12.2	-0.3%
Mali	14.7	15.9	13.9	-0.4%
Equatorial Guinea	14.5	21.9	17.7	-0.7%
Mozambique	14.4	14.6	13.3	-0.3%
Guinea	13.4	14.4	13.6	-0.2%
Chad	12.5	15.9	14.9	-0.2%
Central African Republic	9.6	14.8	15.5	0.2%
Somalia	7.8	13.6	15.6	0.4%
Niger	6.4	14.2	16.7	0.5%

Source: MAPFRE Economics (with United Nations data)

systems based on these forecasts. By contrast, the regions of West, Central and Sub-Saharan Africa have the lowest rate of population pressure, followed by the South Asian region.

With regard to the breakdown of the countries, as can be seen in Table 2.2, the maximum demographic pressure is for Japan. The country analysis also shows the increased pressure on countries such as France or Germany, as well as all the countries in Southern Europe, which are at the top of the table behind Japan. Among Asian countries, South Korea and China also have a high level of population pressure, driven largely by the expected sharp decline in their workforce-to-retirement ratio over the next three decades. In Latin America, the expected deterioration of the ratio of labor force to retiree shows Brazil having a population pressure index close to that of Uruguay and Chile, despite currently being at a less advanced stage in the process of population aging than the latter two countries, which are currently the ones most affected by the population pressure in that region.

3. Analysis of reference models

3.1 United States

3.1.1 Regulation of the current pension system

In the United States, the public pension system is regulated by the Social Security Act of August 14, 1935, with the public control and regulatory bodies being the Department of Labor and the Social Security Administration. With regard to supplementary social support, the Employee Retirement Income Security Act (ERISA) of 1974, which imposes strict requirements on private pension schemes, should be noted. This law created the "Pension Benefit Guaranty Corporation" (PBGC), an agency within the Department of Labor that protects and guarantees payment based on defined benefit pension plans.

3.1.2 Description of the system

Pillar 0

The basic level of coverage is through the "Supplemental Security Income" program, which was created in 1972. This is a pension supplementing social security (financed through taxes) for persons over 65 years of age, subject to living conditions and family financial means[11]. The maximum monthly pension in 2021 is 794 US dollars, and 1,191 US dollars if the spouse is eligible for this pension. This amount is adjusted annually in accordance with the Cost-of-Living Adjustment, as measured by the Consumer Price Index. Notwithstanding the above, it is important to note that a considerable number of states in the US have their own supplementary pension system, while others provide supplements to this minimum pension.

Pillar 1

The coverage of this level of protection, in general terms, is provided through public pensions under a contributory allocation system. People who have reached retirement age having paid a minimum of ten years can access this scheme.

Contributions

The contribution is 12.4% of the workers' salary: 6.2% by the company and the remaining 6.2% by the workers. Self-employed workers contribute 12.4% of their income directly. In addition, there is a ceiling on the contribution bases, which in 2021 was set at 142,800 US dollars[12]. This ceiling is updated every year in accordance with salary development. It should be noted that this contribution also covers the contingency of disability.

Retirement age

The normal retirement age in the US system is 66 years, but it has been set at 67 years for those born after 1960. The system requires a minimum period of ten years of contributions, and allows deferred retirement up to 70 years of age, provided a minimum of ten years have been contributed, increasing the pension by 8% for each deferred year. It is also possible to combine the payment of the pension with paid work performed; in which case, contributions must be continued at the same percentage as other workers.

There is also the option of early retirement starting at the age of 62, which is possible provided that a minimum of ten years has been contributed. Early retirement has a penalty for the first three years of 6.67% per year and 5% for the rest, and can reach a maximum of 30%.

Qualified years and contributions relevant to the calculation of the pension

The average salary of the 35 years with the highest wage amount is considered for the purpose of calculating the pension. In order to carry out the calculation, salaries are updated based on how they develop, until the contributor has reached 60 years of age[13].

Contributions after the age of 60 are calculated by their nominal value, without updating. One peculiarity of the US system is that the pension is calculated in tranches. So to calculate the pension receivable, after updating the contributed amounts, a percentage (replacement rate) is applied to it based on its amount.

Thus, for the year 2021 the updated contributions are divided into three tranches. For the tranche below 996 US dollars, a replacement rate of 90% is applied; a rate of 32% is applied to the remainder between 996 and 6,002 US dollars, and a replacement rate of 15% is applied above the contribution ceiling. The tranches are increased under certain conditions in cases of dependent family members[14].

Thus, in this first pillar, the US pension system has a marked redistributive nature toward lower incomes that, in any case, achieve a maximum replacement rate of 90%. Replacement rates for higher incomes fall substantially as the level of income increases.

Applicable pension limits (maximum and minimum pensions)

There is a monthly ceiling for benefits received, which in 2020 was 2,861 US dollars per month for the normal retirement age[15]. This figure rises by 0.67 percentage points for each month that retirement is deferred to 70 years of age, or is reduced if it is collected early starting at 62 years, with a decrease that takes into account the level of income. So if it exceeds a certain amount, it can mean a reduction of half of the pension that exceeds that limit, until reaching the legal retirement age.

Pension revision mechanism

In this first pillar of the US system, pensions are revised annually based on the Cost-of-Living Adjustment, as measured by the Consumer Price Index.

Pillar 2

The coverage of this level of private protection is managed through company collective pension plans. US law does not impose the obligation on companies to provide a pension scheme for their workers. However, it may be binding as a result of individual or collective bargaining; in which case, in addition to being subject to specific negotiated conditions, the plans must conform to federal legislation and legislation that supplements it at state level.

All these private pension schemes allow tax on contributions and on investment returns to be deferred until benefits are received during retirement, and have some additional tax breaks provided under certain limits regarding the annual contributions that may benefit from them. In general, transfers to another employment plan are possible, if the new employer accepts it.

There are three basic types of private pension plans: defined contribution (DC), defined benefit (DB) and hybrid, which are discussed below.

Defined contribution pension plans

In the mid-1990s, almost half of the workers covered by private pension schemes belonged to this category, with a significant increase in their relative importance over the last decade. While there is some standardization, there are several forms, making the range of their characteristics broad. The most popular of the defined contribution plans in the United States are "401(k) plans." Some 70 million workers participate in such plans, with a total of managed assets that, at the beginning of 2019, amounted to around 5.3 trillion[16].

Normally, these types of plans are offered by large companies that act as sponsors of the plan and make contributions for their employees, devolving on the investment decisions that their employees make. The management of the investment portfolios is contracted with a management company selected by the sponsoring company, with the worker maintaining control over their savings at all times. They must be provided with regular information on the developments in their investments for this purpose.

The worker can match the contributions their company makes for them, leaving those contributions exempt from taxation until the withdrawal of the funds. Requirements vary between various companies and annual contributions have a ceiling for the US Treasury, which was 19,500 US dollars for the employer's contribution in 2021 and 6,500 US dollars for the individual's extra contribution. In addition, they can offer profit-sharing plans, which significantly alter their complexity. The

use of private pension schemes has also been extended to small and medium-sized enterprises as a way to reduce their costs and administrative burdens.

The plan may pay lump sum benefits or offer other options, including payment over a period of time or a lifetime annuity with monthly payments. 401(k) plans, for example, allow for withdrawals starting at the age of 59.5 years, or if there is any specified difficulty. It also allows participants to be offered loans, within certain limits. There are also certain modalities of plans that allow accrued retirement benefits to be received if a number of years have elapsed, as defined in the plan itself.

There are also forms of 401(k) plans that introduce certain characteristics that differ from the traditional plan in terms of the contributions to be made by the sponsor or when they are accrued by the worker, (e.g. "safe harbor," SIMPLE or "automatic enrollment").

There are also plans such as "Plan profit sharing" or ESOP, which contain formulas for sharing company profits with employees, thereby encouraging them to improve their productivity. There is even the possibility of bank financing to establish or strengthen an ESOP, making it possible to acquire a significant block of shares of a company, which allows workers to buy part of the business, become majority shareholders or acquire it completely (e.g. Avis Corp., the car rental company), or protect a company from possible takeover (e.g. Chevron Corp.).

Another form used in the United States as a vehicle for retirement savings is the "Individual Retirement Account - Savings" (IRA). This is a system of private individual accounts that is widely disseminated among small businesses as an instrument for supplementing their employees' pensions (in its form "IRA-SIMPLE"). This instrument was created in 1979 and allows contributions to be made within limits that vary based on age, offering tax breaks provided that the investment comes from annual income. These accounts can be opened with any company that has received the appropriate authorization from the Internal Revenue Service (IRS), and can be offered by various types of companies such as banks, savings banks, credit unions, insurers or securities management companies (the latter have the largest share of this market)[17].

Defined benefit pension plans

In addition, defined benefit plans offer benefits in the form of life annuity, either funded (if the contributions of the company and the participant are invested in a trust fund for the payment of benefits), or unfunded (if funds are not intended for the specific purpose of the payment of benefits). In addition, these types of plans can be insured or uninsured, whether they outsource pension plan commitments to an insurer or not. In the United States, most defined benefit plans are private non-insured pension funds.

Some companies find that defined benefit plans offer business advantages, although they are more complex and costly than other types of plans. In general, they allow higher annual contributions than defined contribution plans, with their concomitant tax deduction. In addition, employees often value the benefits provided by these types of plans more highly, as they typically receive a higher benefit than any other type of retirement plan.

Hybrid pension plans (or cash balance plans)

Finally, hybrid plans are a combination of defined contribution and benefit plans. In these plans, the investment risk is assumed by the sponsor, although the benefit is expressed in terms of the balance in a corresponding notional account for each participant. It includes some elements that are similar to a defined contribution plan, since the amount of the benefit is calculated on the basis of a formula that uses the contribution credits and their income.

Pillar 3

Finally, in the United States, there are several opportunities to supplement individual private savings with instruments that offer tax breaks. These include the possibility of using individual retirement accounts (IRA) as a private pension savings formula that is not linked to an employment relationship and that, under certain limits, allow taxes on contributions and on investment returns to be deferred until retirement benefits are received. This is a very popular instrument.

It's the same instrument that can be used individually or as an instrument of collective social protection for companies and their workers. As discussed above, these accounts can be opened with any company that has received authorization from the Internal Revenue Service (IRS), and may be offered by various types of companies such as banks, savings banks, credit unions, insurers or securities management companies.

There are also other voluntary private savings instruments for pensions, including the "Keogh" plans, which are aimed especially at self-employed workers and individuals who wish to set up an individual supplementary pension scheme. They are more rigid in terms of the regularity of the contributions, and there may be penalties if the plan is not met, although the limits for enjoying their tax breaks are higher, which makes them attractive to people with higher incomes. They are usually defined contribution, but defined benefit versions may be marketed, although they are not common.

3.1.3 Assessment of previous system reforms

Reforms related to Pillar 1

Since its entry in force, the Social Security Act of 1935 has undergone various changes concerning the regulation of public pensions. In its initial stage, until the 1970s, some parameters aimed at increasing the coverages were reformed. From then on, in a second stage, the trend in reforms changed, and amendments were introduced in the first half of the 1980s to support the system's financing, faced with concerns about the baby boom of the 1960s. In this regard, the 1980 and 1981 amendments limited the benefits paid to the families of disabled workers and terminated the child benefits for university students. However, despite previous reforms, in 1982 the cost of pensions relative to GDP in the United States peaked at 5% (they accounted for 3% some 12 years earlier), fueling concern about the system's lack of budgetary sustainability.

In 1983, an amendment was introduced following the Greenspan Commission report, which adjusted the benefits and contributions to the serious short-term financing problems facing the system. The surplus funds generated in successive years were threatened by the retirement of the baby boomers, with their estimated exhaustion by 2042. In 1985, the *Balanced Budget and Emergency Control Deficit Act* of 1985 (PL 99-177), known as the Gramm-Rudman-Hollings Act, included several measures that altered the budget treatment of social security in that country. In 1986 and 1990, amendments were introduced as a result of the annual budget laws, the "Omnibus Budget Reconciliation Act." In 2000, measures were also introduced so that persons who had reached retirement age and wished to continue working could make this activity compatible with the collection of the retirement pension under certain conditions.

All of these reforms led to a Pillar 1 public pension system redistributing toward lower incomes, in which pensions fall substantially as income increases. At the same time, a series of legislative reforms were implemented to enhance coverage of the retirement funds through the second pillar, which plays a key role in the United States pension system for people with higher income levels.

Reforms related to Pillar 2

With regard to the regulation of systems complementary to public pensions, before 1974 federal legislation affecting private pension funds was limited to the Internal Revenue Code and the Welfare and Pensions Plan Disclosure Act of 1958. Under this legislation, it was possible and frequent for pension funds to have their value fall well below the accumulated liabilities, with workers suffering the consequences of being left without a supplementary pension in cases where the plan closed without sufficient funds.

To address the problem, given the importance in the United States of these pension plans for workers, Congress passed comprehensive legislation that on one hand requires sponsoring companies to make minimum contributions to the funds in order to maintain the actuarial solvency of the funds, and on the other guarantees the payment of benefits to retirees. This law is called the Employee Retirement Income Security Act (ERISA), and was passed in 1974.

ERISA establishes the standards that plan trustees, administrators, managers or consultants must meet so that their decisions are directed toward the benefit of their members. The rule of the "prudent man" in the search and determination of investments has been interpreted as the necessary balance between security, risk and performance, which must translate into an appropriate diversification of the portfolio, as a way of minimizing unsystematic risk. It also defines minimum standards for the vesting of members of a pension plan. For example, it stipulates that after five years of work, an affiliate is entitled to the accumulation of 25% of pension benefits; the percentage increases to 100% after ten years.

It also establishes a mechanism to guarantee beneficiaries' rights to a pension, through the Pension Benefit Guaranty Corporation (PBGC). This government agency works as a form of pension insurance that charges mandatory annual premiums to plan sponsors and ensures coverage of most of the benefits in private pension plans, which includes both the debts companies have toward those who meet the age and years of service requirements, and the payment of benefits to pensioners, even if the plan has been finalized or the sponsor has filed for bankruptcy.

Thus, in the event that a pension plan is finally settled without sufficient resources to pay for pensions, the PBGC will cover part of the deficit[18]. In such circumstances, ERISA provided for a mechanism for the PBGC to recover its contribution in the form of senior debt at the same level as tax credits, ahead of any unsecured creditor, and with a limit of 30% of the net value of the company.

3.1.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

Public pensions in the United States are managed through an allocation system, so it is the public sector (and not the contributor) that assumes financial risk, which is especially relevant for low-income people. They benefit from high replacement rates upon retirement (see Chart 1.4-b in the first chapter of this report for reference).

The funds accumulated by the contributions made to supplementary pension systems by the active workers and those of the sponsors who have been assigned to them are the property of the worker, who assumes the financial risk of the assets in which they are invested (see Chart 1.4-c). In light of this, ERISA established certain prudential rules for the management of investments, in order to reduce financial risk, but investment decisions of the accumulated funds fall on the participant. Much of these investments are usually made through investment funds (diversified mutual funds) and also through "guaranteed investment contracts" (GICs), securities issued by insurance companies that incorporate a maturity interest-rate guarantee.

However, in situations where the bankruptcy of a sponsoring company occurs, it is not uncommon for workers to end up suffering losses from the concentration of investments of the plan funds in assets issued by the sponsoring company itself. Although there are no quantitative limits on the allocation of investments at federal level, there is a ban on investing more than 10% of resources in shares of the same sponsoring company.

The benefit plans defined under ERISA have the coverage offered by the PBGC, which assumes the cited risks in part in the event of a deficit at the time of retirement. However, coverage is not complete and large funds of this type exist with substantial deficits that can result in replacement rates below commitments undertaken[19].

The PBGC, as an active part of pension fund management in its accumulation phase, has defined an investment policy established by a Council composed of the Secretaries of Labor, Treasury and Commerce. Its investment policy currently requires the following asset allocations: 30% in equities and other equity instruments, and 70% in fixed income[20].

Demographic and unemployment risks

Based on an allocation system over the coverages offered by the public pension system, the demographic and unemployment risks are assumed by the public sector, which, under certain circumstances in population and economic dynamics, could lead to budgetary sustainability problems if these risks materialize.

For coverages promised through defined benefit plans, the demographic risks in the accumulation phase fall on the sponsoring company that assumes the commitments under the plan. Along with financial risks, these can be transferred to an insurance company. However, the estimates of obligations under defined benefit plans involve factors such as turnover rates for workers leaving the company without accruing vesting retirement rights, or the estimates of current salaries to consider when determining the benefit, the risk of which in any case remains with the sponsoring company that assumes the plan's commitments.

Inflation risk

When calculating the amount of the public pension at the time of retirement, an update is applied to nominal salaries for the purposes of calculating wages based on their development until the contributor is 60 years old. Contributions after that age are calculated by their nominal value, but not updated. For the pensioner, this system virtually eliminates the risk of the effect that inflation might have on the pensioner's purchasing power if the adjustment is not made, and that risk is again borne by the public sector. The severity of this risk in the case of defined benefit plans depends on the specific mechanism used for their calculation.

Other system-related risks

It should also be noted that there are certain elements that can affect retirement savings capacity, specifically for defined contribution schemes, such as university debt. In the United States this stands at around 1.6 trillion US dollars in 2021, approximately 34,000 US dollars per person. The risk on the part of the individual initiative is the increasing indebtedness (less saving capacity), due to the debt contracted for university studies.

Post-retirement period (distribution phase)

Financial risks

Public pensions in the United States follow an allocation system, so financial risks are borne by the public sector and not by pensioners.

Demographic and unemployment risks

As in the phase where workers are active, demographic and unemployment risks in the coverage offered by the public pension system after retirement are assumed by the public sector making use of an allocation system. In any event this could lead to budgetary sustainability problems if they were to materialize.

Moreover, demographic risks, both idiosyncratic as well as aggregate or systematic, fall on the sponsoring company in coverages provided under defined benefit plans. The company assumes the commitments arising under the plan, to a greater extent depending on how small the covered group is, as far as idiosyncratic risk is concerned. Along with financial risks, these can be transferred to an insurance company.

Inflation risk

As indicated above, public pensions are updated annually according to the Cost-of-Living Adjustment, so the risk of inflation is assumed by the public sector. It is important to note that the adjustment introduced through the recent reforms in the US pension system has had the effect of mitigating the problem associated with the potential occurrence of risks. This would accumulate in public sector financial accounts by giving greater relevance to the role that the other pillars play in the composition of pension income, thereby diversifying the risks associated with the coverages through the other pillars.

3.2 Brazil

3.2.1 Regulation of the current pension system

The concept of social security in Brazil has been incorporated in its Constitution since 1988 and is composed of three basic segments: *Social Security*, *Health* and *Social Welfare*. The first is related to the contributive pillar, while the other two are related to the non-contributive pillar, the latter being financed by fiscal resources for this purpose in the State's social security budget. Since its enactment, several amendments have been adopted, most notably the recent Constitutional Amendment 103/2019, which contains a major reform of the pension system in its current configuration. This reform establishes a set of rules for direct and immediate application to

all entities of the Federation, others applicable only to the Federal Government and some specific provisions for states, the Federal District and municipalities.

A very important factor in the Constitutional Amendment (PEC 6/2019) that alters the pension system is the removal from the Constitution of several rules that are currently present and which will be regulated by sub-constitutional rules. In other words, in the future, supplemental laws will establish regulatory rules on issues currently provided for in the text of the Constitution or in various laws, whether regulatory or supplemental in nature. The Amendment is part of a broad set of proposals that constitute the "New Social Security," which is further explained in the following points of this paragraph.

3.2.2 Description of the system

Pillar 0

In addition to contributors to the general system and specific regimes for military and public officials, social security also protects two other groups: (i) the "special insured," rural workers who engage in their activities individually or in a family business, who do not declare a contribution to the social security system, but whose contribution is made based on the potential sale of rural production; and (ii) non-taxpayers who receive a BPC (*Benefício de Prestação Continuada* - Continuing Benefit Conveyance).

The BPC is the benefit paid by social security designed to guarantee a minimum monthly wage to people who do not have the means to support themselves or their families. It was created by the Organic Law on Social Assistance (LOAS), Law 8,742 of December 7, 1993, and is divided into: (i) the provision of assistance to the elderly, which is granted to persons over the age of 65, and (ii) the provision of assistance to the disabled. The BPC is funded by the federal government, with the participation of the National Social Security Institute (INSS) to verify the requirements and pay the amounts. Because it is a welfare benefit, in order to be entitled it is not necessary to have contributed to the INSS. Access is granted to this benefit for persons aged 65 years or over, with a family income of up to a quarter of the minimum wage per person, and is calculated by means of information contained in the Single Register (CadÚnico) and the INSS.

Pillar 1

As noted above, social security in Brazil, regulated by the 1988 Constitution, is intended to safeguard the health, social welfare and social protection of citizens. There are three major social security schemes: (i) the General System, administered by the INSS; (ii) the Separate Systems for Public Officials (the military has their own system); and (iii) Supplementary Benefits. It should be noted that the General System and the Separate Systems for Public Officials are autonomous, separate from each other and with separate budgets and specific legislation covering each of them.

First, the *General Social Security System* (RGPS), which is allocated and compulsory, serves the private sector. Employers, salaried and domestic employees, the self-employed and rural workers are contributors to this system. It guarantees coverage in the case of: inability to work, old age, contribution time and pregnancy, in addition to imprisonment or death of the insured person. Contribution to this scheme is compulsory. There are two categories of beneficiaries: insureds and dependents. In turn, insureds are divided into compulsory and optional. Compulsory insureds are all those who engage in paid activities and are therefore compulsorily bound to the RGPS, while optional insureds are all those who decide to voluntarily join the RGPS in order to receive the protection of social security. All those legally linked to the insured are dependents and, through the holder's contribution, have guaranteed social protection, which links them to the RGPS indirectly. The policy of this scheme is formulated by the Social Security Secretariat of the Ministry of Finance and implemented by the INSS.

Second, *the Special Social Security System* (RPPS) is a compulsory membership scheme for public officials holding positions in the federal government, the states, the Federal District and the municipalities. Officials in positions of trust, temporary or with an elective mandate, could join the system until 1998; after that year their inclusion in the RGPS became compulsory. It is contributory in nature and

links retirement benefits with contributions from the official and the public entity. Each RPPS is administered by an institute, regional authority or agency for the direct public administration of each entity. Not all municipalities have created their own system for their public servants, and in these cases their officials are linked to INSS.

Finally, the *Supplemental Social Security System* is voluntary and its administration is private. As the name implies, its purpose is to supplement the worker's income.

The reform of the Brazilian pension system of 2019 is intended to establish a single *General Social Security System*, with the same criteria and requirements for calculating and accessing pensions for everyone (with the sole exception of those insured with disabilities or with exposure to materials hazardous to health). However, despite the great progress that the reform aspires to, this has not been fully achieved, as different retirement ages and systems are maintained for certain groups (rural workers, teachers, police officers or prison employees) and the special regimes that exist when the reform enters into force are respected until their exhaustion and integration into the General System.

Contributions

According to the 1988 Constitution, social security, of which social protection is a part, is financed by all of society, directly and indirectly, through funds from the federal government, the states, the Federal District and the municipalities, as well as the following social contributions:

1) From companies and comparable entities on: (a) the payroll of salaries and other income from work paid or provided to service providers; and (b) income and profit.

2) From domestic employers, who tax the contribution wage of domestic employees in their service.

3) From workers and other social security insureds.

4) From sports associations that maintain a professional soccer team, the proceeds on the gross revenue obtained from the sporting events in which they participate throughout the country in any form of sport, including international games, and in any form of sponsorship, licensing for the use of trademarks and logos, advertising, publicity and broadcasting of sports shows.

5) Proceeds on gross revenue from the marketing of rural production.

6) Revenue from lotteries

Constitutional Amendment 103/2019 modifies the contribution rates of insured persons under both systems, and establishes a progressive contribution using a calculation basis (contribution salary), as follows:

For the General Social Security System:

- Up to one minimum salary: 7.5%.
- Between the minimum salary and 2,000 reais: 9%.
- Between 2,000 and 3,000 reais: 12%.
- Between 3,000 reais and the ceiling of the RGPS: 14%.

For officials in the federal government's Special Social Security System:

- Up to one minimum salary: 7.5%.
- Between the minimum salary and 2,000 reais: 9%.
- Between 2,000 and 3,000 reais: 12%.
- Between 3,000 reais and the ceiling of the RGPS: 14%.
- Between the ceiling of the RGPS and 10,000 reais: 14.5%.
- Between 10,000 and 20,000 reais: 16.5%.
- Between 20,000 reais and the constitutional ceiling: 19%.
- Above the constitutional ceiling: 22%.

Moreover, in general terms, the *contribution of companies*[21] that do not opt for *Simple National*[22] is 20% of the total paid remuneration, debited or credited in any form during the month to insured

employees and independent workers who provide services to them. In the case of some financial entities, including insurance or capitalization companies and open or closed social protection companies, an additional contribution of 2.5% is paid on the remuneration of employees, independent workers and individual taxpayers.

There is an additional contribution for those insured parties who carry out an activity under special conditions that may give rise to special retirement, after 15, 20 or 25 years of work exposed to agents hazardous to their health. In addition, for the services that cooperative members provide through labor cooperatives, the rate is 15% of the gross value of the invoice.

As mentioned in the section relating to Pillar 1, for *rural producer legal entities* there is a special contribution of 2.05% (1.7% INSS + 0.1% RAT (Working Accident Risk) + 0.25% SENAR (National Rural Learning Service) on the gross income from the marketing of production. For *the individual rural producers*, the rate is 1.5% (1.2% INSS + 0.1% RAT + 0.2% SENAR)[23]. This is a rural social contribution of a social security nature, paid by the rural producer and charged by the legal entity at the time of purchase of the product, based on the gross value of the sale. The taxpayer may also opt for payroll contribution, which must be formalized in the first payment of the year, and the contribution to INSS in that case would be 20% for both (individual and legal entity rural producer).

Sports associations that maintain a professional soccer team contribute 5% of the gross income of sporting events and any form of sponsorship, license to use trademarks and logos, advertising, publicity and broadcasting of events. *The domestic employer* pays 8% of the household employee's salary to their service. Also, the rate for an *individual taxpayer* serving a company is 11%, and 20% when serving individuals. *Voluntary insureds* contribute 20% of the contribution salary that they declare, observing the minimum and maximum limits of the contribution salary.

In the case of *voluntary contributors* and those classified as *low-income individual contributors*, who only contribute with the minimum salary, a modification of the existing regulation, introduced from 2007, allowed the reduction of the contribution rate from 20% on the monthly work salary to 11% of the minimum salary. Taxpayers who contribute more than the minimum salary remain subject to a normal rate of 20%. Since 2011, optional insured persons from low-income families could opt for the 5% rate provided they are enrolled in the Single Register of Social Programs (CadÚnico), provide services exclusively at home and do not have their own income.

Retirement age

Under the amendments promoted by Constitutional Amendment 103/2019, retirement based on time of contribution that allowed retirement upon 30 years of contribution for women and 35 years for men was abolished. Under the RGPS there was no minimum age, but the benefit was reduced by applying the welfare factor. The RPPS required 55 years for women and 60 years for men, without affecting the value of the benefit.

Under the *General Social Security System* (RGPS), the new regulation sets the retirement age at 62 years for women and 65 years for men, with a minimum contribution time of 15 years for women and 20 years for men. In the case of the *Special Social Security System* (RPPS), Constitutional Amendment 103/2019 establishes the necessary requirements as a general standard for retirement in the federal government: minimum age of 62 for women and 65 for men; contribution time of 25 years; effective exercise of public service of 10 years; and time in office of 5 years.

For *teachers*, in the RGPS they have to show 25 years of contribution exclusively in the effective performance of teaching functions in kindergarten, elementary school and high school, and to be 57 years of age if a woman and 60 years if a man. Under the RPPS of the federal government, a similar rule applies to *holders of federal positions*, which also requires ten years of effective performance of public service and five years in the actual position in which retirement is granted, for both sexes. The minimum retirement age for *federal police officers* will be 55 for both sexes, with a contribution time of 30 years (both sexes), as well as 25 years in the career.

Also, the reform maintains the same age retirement rules for *rural* workers and those who work in a family business, including rural producers, miners and traditional fishers: 55 years for women and 60 years for men, with 15 years of rural work. *Workers whose activities are carried out in conditions hazardous to their health* require a minimum contribution time, which varies according to professional activity and a minimum retirement age (applies to both men and women).

Working career-related factors: qualified years, relevant contributions and pension calculation

With regard to the calculation of benefits, the value of pensions shall correspond to 60% of the average of all social security contribution bases made since July 1994[24], to which a percentage proportional to the contribution time must be added. However, the minimum salaries to be considered for averaging cannot be less than the legal minimum salary in force for each month. Under the RGPS, there will be a 2% increase for each contribution year that exceeds 15 years of contribution time for women, and 20 years of contribution time for men. In turn, the RPPS calculates the additional 2% per year starting at the age of 20, for both men and women. Thus, in order to be entitled to retirement for the amount of 100% of the average contribution, women must contribute for 35 years and men for 40 years.

Under the permanent and transitional rule of the RGPS, the percentage of the benefit received may exceed 100% for women who contribute more than 35 years and men who contribute more than 40 years. For federal public servants who started their career as of January 1, 2004, the benefit calculation will be similar to that of the RGPS. For those who entered public service up to December 31, 2003, the amount of retirement shall be that of their last salary, provided that the requirements of the transitional rules are met.

The new legislation provides transitional rules for those already in the labor market, allowing them to choose the most advantageous form of retirement. There are five transitional rules in the General Social Security System, while there are two transition options for federal employees[25].

Applicable pension limits (maximum and minimum pensions)

The amount of pensions shall not be less than the minimum wage (998.00 reais in 2020), nor may it exceed the RGPS ceiling (5,839.45 reais per month). In addition, the percentage of benefit received may exceed 100% for women who have contributed for more than 35 years and for men who have contributed for more than 40 years, always limited to the RGPS ceiling.

Pension revision mechanism

The adjustment of benefits is calculated on the basis of the National Consumer Price Index (INPC). In this regard, the adjustment of benefits is carried out once a year, taking into account inflation in the immediately preceding period (the last 12 months).

Pillar 2

In Brazil, *the Private Supplementary Pension System* is optional and independent of the other public welfare schemes, based on the establishment of reserves that guarantee a future benefit. It is intended to provide the worker with protection in addition to that offered under the General Social Security System (RGPS) or the Special Social Security System (RPPS). Its basic rules are laid down in Article 202 of the Federal Constitution and in Supplementary Laws 108 and 109 of 2001.

This system is operated by supplementary pension companies that are intended to institute and implement pension plans of a social security nature. This system consists of two segments: (i) an *open segment*, operated by insurers and Open Supplementary Pension Companies, and (ii) a *closed segment*, operated by Closed Supplementary Pension Companies, each with its own requirements and characteristics and supervised by government agencies specific to each segment.

Closed private pension

The *Closed private pension* form, also known as Pension Funds, consists of plans created by companies and intended exclusively for their employees. In this case, the supervisory body is the National Superintendency of Supplementary Pensions (Previc).

Closed Supplementary Pension Companies (EFPC) are those that are accessible to employees of a company or group of companies and federal government, State, Federal District and municipality employees (entities referred to as *sponsors*), and to associates or members of legal entities of a professional, class or sectoral nature (entities referred to as *settlors*). Their purpose is to guarantee their employees or associates a supplement to the retirement pension through the management of pension plans. EFPCs are organized in the form of a non-profit foundation or civil society. Pension plans administered by these companies may, in addition to supplementing retirement, ensure protection against unforeseen events such as death, illness, disability and others, depending on the plan's regulations.

Contributions to the plan are made by both the employer and the employee. When funds are offered by associations or class entities, the process occurs in the same way, but contributions will be made only by members. When employees leave the sponsoring company, they can remain in the fund, as long as they assume the contributions of the former employer. The beneficiary may transfer their funds to another pension fund (for example, one offered by their new employer) or to an open pension plan.

The modalities of the benefit plans provided for under the legislation are: *defined contribution*, *defined benefit* and *variable contribution*. It should be noted that the defined benefit plans for companies and sponsors subject to Supplementary Law 108/2001 are closed to new participants, the latter law having been passed in 2010.

All plans have a regulation setting out the rights and duties of stakeholders, participants, sponsors and institutions, as well as the benefits offered and their respective rules of provision, calculation and method of payment. Although it is not required, plans often offer specific risk benefits, in addition to the scheduled benefits.

Open private pension

In addition, *the Open private pension* form is combined with plans marketed by insurance companies authorized to operate in personal insurance and Open Private Pension Companies (EAPP). They are entities constituted solely in the form of public limited companies, and whose aim is to institute and operate pension plans of a social security nature granted in the form of continuous income or lump-sum payment, accessible by any individual. The plans can be contracted individually or in a group. The functions of the regulatory and supervisory body are exercised by the Ministry of Finance, through the National Council of Private Insurance (CNSP) and the Superintendency of Private Insurance (SUSEP).

In addition to survivorship coverage, the open private pension system offers consumers coverage against risks (death and permanent disability), which consists of benefits paid in one lump sum or in the form of a planned monthly income (pensions). Similarly, as with the closed pension, the forms of the benefit plans provided for in the legislation are: *defined contribution*, *defined benefit* and *variable contribution*.

Almost all of the open private pension products sold on the market are of the PGBL (*Plano Gerador de Benefício Livre* – Free Benefit Generator Plan) form. In this product, during the accumulation period the mathematical provision is remunerated in accordance with the profitability of the investment portfolio established for the plan (FIE), with no guarantee of minimum remuneration. It may produce losses, which would be assumed by the participant. The plan can have its investment portfolio structured under sovereign income, fixed income and mixed plan forms, being able to set up at the time of contracting a decreasing percentage of exposure to investments with greater risk, especially in equity assets.

The calculation of financial results at the time of benefits is optional and the same FIE as for the accumulation period can be used. The reversion rate for the financial results shall be provided in the regulation. The amount of the benefit shall be calculated on the basis of the mathematical provision of benefits to be granted on the date of granting of the benefit and the type of benefit contracted, in accordance with the income factors presented in the application.

There is another product, called VGBL (*Vida Gerador de Benefício Livre* – Free Life Benefit Generator), which is life insurance designed to provide a supplement to pensions and enjoys favorable tax treatment. The amount of income to be received during the withdrawal phase depends on the funds set up in the accumulation period. The income is calculated at the end of that period with an interest rate, a survival table and an inflation index guaranteed at the time the contract is signed. These financial and actuarial guarantees will be applied at the future moment when the accumulated capital is transformed into an annuity, and this is what gives them the status of insurance, although in the accumulation phase they do not provide any guarantee, either financial or actuarial, with the policyholder assuming all the risk. Although these products are a form of insurance, they are usually referred to as VGBL plans (and, where applicable, plan regulations).

There are other forms of open private pension plans that incorporate certain guarantees of profitability, participation in the investment portfolio surplus in a certain percentage and/or revaluation of the provision constituted during the accumulation phase (known as PAGP, PRGP and PRSA), but they are rarely marketed in the Brazilian market.

Group pension plans can be "*averbado*" (contributory) and *instituted*. "*Averbado*" plans are designed to be placed with entities (such as trade unions, class entities or professional associations) in favor of persons directly or indirectly related to them. Contributions are the sole responsibility of the individual participants. *Instituted* plans are obtained by applicants (usually employers) in favor of employees and managers of the legal entity, and there can be three ways of funding: exclusively contributory, where the payment of contributions is the sole responsibility of the plan participants; partial contribution, where the requesting entity/employer and the participant/employee are responsible for the payment of contributions in the contractually agreed proportion; and non-contributory, where responsibility for the payment of contributions rests solely with the requesting entity/employer, who is primarily responsible for the negotiation and observance of contractual terms, including the renewal of the contract, as applicable[26].

Pillar 3

The open private pension plans described in the previous section relating to Pillar 2 may also be contracted on an individual basis. VGBL insurance and PGBL plans enjoy income tax breaks that have made these products particularly attractive to savers. In the case of the VGBL, contributions to the fund will be taxed at the time of obtaining the benefit or redemption, and shall be paid only on the profit obtained and not for the entire amount contributed to the plan[27].

PGBLs are mainly recommended for individuals who satisfy the complete formula (persons who exceed a certain level of income), who may deduct contributions made from their taxes, up to a maximum limit of 12% of gross taxable income. At the time of redemption, income tax shall be applied to the total amount of the refunds or the income received.

3.2.3 Assessment of previous system reforms

As indicated above, the 1988 Constitution formally incorporated the concept of Social Security in Brazil, which is composed of three basic segments: Social Security, Health and Social Welfare. Since its enactment, six amendments affecting the Social Security have been approved: Constitutional Amendments 3/1993, 20/1998, 41/2003, 47/2005, 70/2012, 88/2015 and the last, Constitutional Amendment 103/2019.

The Constitutional Amendment (EC) 103/2019, resulting from the deliberation and adoption of Constitution Amendment Proposal (PEC) No. 6, sent by the Executive to the National Congress on February 20, 2019, seeks to ensure a pension model that is financially and actuarially more sustainable, as well as more socially just. It was approved by the plenary session of the Chamber of Deputies in the first round in July and in the second round in August 2019. In turn, the pension reform was finally approved by the Senate on October 23, 2019. The promulgation of the text as a Constitutional Amendment by the presidents of the two chambers took place on November 12, 2019. The rules have entered into force since their publication in the Federal Official Gazette on November 13, with the exception of changes in contribution rates that began to apply in March 2020.

It is important to note that the social security reform resulting from Constitutional Amendment 103/2019 establishes a set of rules for direct and immediate application to all entities in the country, others applicable only to the government and some specific provisions for states, the Federal District and the municipalities. An essential aspect of the Constitutional Amendment (PEC 6/2019) is the retiring of several standards currently in the Constitution, which will be regulated by sub-constitutional rules. Therefore, in future supplementary laws may establish regulatory standards on matters currently provided for in the text of the Constitution or in various laws, whether regulatory or supplementary in nature.

The Amendment is part of a broad set of proposals that constitute the "New Social Security," which also include the following measures:

- Law No. 13,846 of January 18, 2019 (Conversion of Interim Measure (MP) No. 871 of 2019), to improve the management of Social Security benefits and to institute actions to combat fraud and irregularities through the implementation of a permanent program to review the granting and maintenance of benefits administered by the National Institute of Social Security, INSS;

- Law No. 13,954 of December 16, 2019, which provides for the reform of the Military Social Protection System; and

- Bill No. 1,646 of 2019, which establishes measures to combat debtors and strengthen the collection of active debt.

With regard to the Supplementary Pension System, it was regulated in 2001 by Supplementary Laws 108 and 109. Supplementary Law No. 108 of 2001 establishes the relationship between the federal government, the states, the Federal District and the municipalities, their regional authorities, foundations, mixed economy companies and other public entities and their respective closed supplementary social security entities. Supplementary Law No. 109 of 2001 provides for the Supplementary Pension System and repeals Law No. 6,435 of 1977, the first law in Brazil that specifically regulated the supplementary pension universe.

In addition, Law No. 12,618 of April 30, 2012 established the Supplementary Pension System for federal public officials and authorized the creation of closed supplementary pension entities, called the *Supplementary Executive Branch of the Public Servant Pension Foundation*. The creation of the Supplementary Provision system for public officials was authorized by Amendment 20/1998. Furthermore, EC 103/2019 provides that supplementary pensions of civil servants may be set up through an open entity.

Prior to the 2019 reform, Brazilian Social Security has been the subject of other constitutional reforms: Constitutional Amendments 3/1993, 20/1998, 41/2003, 47/2005, 70/2012 and 88/2015.

In the first place, EC 3/1993 instituted the contributive nature of social security in the public administration, determining that retirements and pensions of federal public officials will be financed by resources from the federal government and from the contributions of the officials.

One of the most important changes introduced by the 1998 reform (EC 20/1998) was that the principle of financial and actuarial balance was imposed as the basis for the organization of social security and the criterion for the calculation of pensions was redefined, replacing the original term "years of service" with "years of contribution." In addition, the new regulation made it possible to restructure supplementary private pension systems, leading to the enactment of supplementary laws to govern the general regulations of the system and the specific regulations on the relationship between state-owned enterprises and their pension funds (Supplementary Laws Nos. 109 and 108 of 2001). The amendment also provided for the institution of supplementary pensions for public officials, with the possibility of creating supplementary pension schemes for the federal government, the states, the Federal District and the municipalities. The criterion for calculating retirement under the General Social Security System, which was based on the salary of the last three years worked, was modified, establishing a new criterion based on 80% of the contribution salaries starting from 1994.

Subsequently, Law No. 9,876 of November 26, 1999 changed the rules for determining pensions, which would be calculated on 80% of the highest contribution salaries since July 1994. The "pension factor" was also created, a mechanism to balance the time and value of contributions, as well as the time and value of benefits. Its formula contains parameters such as life expectancy, contribution time and the age of the insured at the time of retirement, which may reduce or increase the value of the pension to the extent that the insured plans for their retirement, and reducing it if life expectancy continues to rise. Subsequently, the 85/95 factor, approved in June 2015, was applied. This guaranteed full retirement to those who comply with the regulations, without applying the pension factor: the worker receives 100% of the pension if the sum of their age plus their contribution time reaches 85 for women and 95 for men. After the 2019 reform, the pension factor applies to workers who had already applied for retirement with the pension factor before the new regulation came into force. Those who have reached the minimum requirements for applying for retirement under contribution time may choose to retire according to the old rules if it is more advantageous, and the transition rule applies to anybody meeting 50% of the rate.

The focus of the reform presented at the beginning of 2003 and promulgated in December of the same year (EC 41/2003) was the pension of federal, state and municipal officials. It sought to establish a more financially sustainable long-term system and to initiate a process of convergence of the pension systems, eliminating the existing disparities. As regards the General System, the ceiling value of the benefits was increased from 1,869.34 reais to 2,400.00 reais, revisable to retain its value. Another change in this system is the introduction of Article 201, paragraph 12, which provides that the law shall establish a special social security inclusion system for low-income workers, guaranteeing them access to benefits equivalent to a minimum salary, except for retirement based on contribution time.

In addition, EC 47/2005 allows more flexibility in some of the transitional regulations that had been established in the previous Constitutional Amendment in relation to aspects of integrity and parity. It raises the exemption limit in the calculation of the social security contribution for persons with disabling diseases; it guarantees the right to special retirement for persons with disabilities; and it extends the provisions of the previous reform to the special system of inclusion under social security for "those who do not have their own income and are engaged exclusively to domestic work within the scope of their residence, provided that they belong to low-income families, guaranteeing them access to benefits equivalent to a minimum salary," with rates and periods of absence lower than those in force for other insured persons under the general system.

EC 70/2012 establishes criteria for the calculation and indexing of retirement benefits for disability of public servants who entered the public service prior to the proclamation of Constitutional Amendment 41/2003 (12/31/2003). Finally, EC 88/2015 increased the compulsory retirement age of public servants from 70 to 75 years, depending on the provisions of the Supplementary Law.

3.2.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

The General Social Security System (RGPS) is a system of simple allocation and defined benefits, where in the event of financial insufficiency, the federal government and other federal entities are responsible for covering this deficit, so there is no financial risk for employees in the accumulation phase. The same is true of the systems for civil servants, where the more accelerated increase of expenditure over income is a risk to be borne by the federal government, the states, the Federal District and the municipalities.

Under both closed and open pension plans, the financial risk of defined benefit plans is assumed by the Closed Supplementary Pension Companies or by the insurance companies and Open Private Pension Companies (and, ultimately, by the employer). In addition, financial risks are assumed by the insured in defined contribution plans, since there is no guarantee of profitability in the contribution payment phase of the plan, and in variable contribution plans it will depend on the conditions contracted.

Demographic and unemployment risks

Demographic and unemployment risks are borne by the public sector under both the RGPS and the Special Social Security System (RPPS), which could lead to sustainability problems in the future.

However, the demographic risks in the accumulation phase under the Private Supplementary Pension System fall on the sponsor of the plan for defined benefit plans, whereas under defined contribution plans they are assumed by the insured. As the open and closed private pension sectors offer consumers so-called risk coverage (death and permanent disability), the demographic and unemployment risk would also fall to the sponsors of the plan in this case.

Inflation risk

As indicated above, the pension is calculated by applying a percentage to the average of the salaries for the applicable contribution time, so that inflation does not affect the calculation of the benefit, the risk of which lies with the employee at this stage.

Moreover, during the accumulation period under defined contribution plans, the risk of inflation rests with the insured, who obtains the corresponding coverage through the profitability of their investments. In the other plans it will depend on the formula used for the calculation of the benefit; if they are fixed amounts it will depend on whether clauses have been agreed for the revision of these amounts in terms of price developments.

Post-retirement period (distribution phase)

Financial risks

The Brazilian government assumes the task of ensuring the future sustainability of the country's pension system, so therefore the financial risks in the pension payment phase are assumed by the State.

Under the Private Supplementary Pension System, both closed and open, the financial risks for the defined and variable contribution plans are assumed by the insured. In the event that the insured chooses a life annuity when receiving the benefit, the financial risk arising from the investments is assumed by the insurer or pension company.

Demographic and unemployment risks

As both the RGPS and RPPS are redistributive defined benefit systems, demographic and unemployment risks are borne by the public sector. In order to encourage the taxpayer to remain active longer and to mitigate demographic risk, Brazilian legislation introduced the pension factor in 1999, the formula for which contains parameters such as life expectancy, contribution time and the age of the insured. However, this factor only applies in a few cases after the 2019 reform.

Under the Private Supplementary Pension System, products such as PGBL apply biometric tables at the time of receiving the pension, which are revised every five years, and reflect the reality of survival or mortality of the female and male population at the time of providing the contracted benefit. Furthermore, when the insured opts for a life annuity, it is the insurance company or pension entity that assumes the demographic risk.

Inflation risk

As indicated above, the National Consumer Price Index (INPC) is used to readjust pension benefits in Pillar 1, so the potential risk of reduction in the real value of pensions is assumed by the public sector. But in addition, the amount of pensions cannot be less than the minimum salary, so the policy of real adjustments to the minimum salary has a significant fiscal impact on the overall social security scheme, because, by increasing the salaries of active workers, the government automatically increases pension spending.

In Pillars 2 and 3, the risk of inflation is in the hands of the pensioner, who will see the real value of their pension reduced in an increasing inflation scenario. In some private pension products, such as VGBL, the amount of income to be received during the withdrawal phase depends on the funds set up in the accumulation period, and income is calculated at the end of that period with an interest rate. a survival table and an inflation index guaranteed at the time of signing the contract, with the entities that market them assuming the risk in this case.

3.3 Chile

3.3.1 Regulation of the current pension system

In the case of Chile, the old age, invalidity and survivor pension system is regulated by Decree-Law 3500 of 1980, which introduced a comprehensive reform to replace the old allocation system (defined benefit) with one of individual capitalization (defined contribution). The Chilean pension system is administered by Private Pension Fund Administrators (AFP), which are regulated and supervised by the State through the Superintendency of Pensions, which is responsible for the supervision of this new system. This Superintendency oversees the collective pension system and the old allocation system that still exists for certain groups. Although the creation of a state-owned AFP has been raised on several occasions, for the moment this plan has not materialized[28]. It is also established that this agency should be coordinated with the supervisory entity (the current Financial Market Commission) regarding annuities, which are handled by insurance companies in the distribution phase of the system.

More recently, in order to mitigate the impacts of the economic crisis resulting from COVID-19, Law No. 21,248 on Constitutional Reform has been passed, which exceptionally authorized the withdrawal of pension funds from the balance of individual capitalization accounts. This entered into force on July 30, 2020. Through this reform, up to 10% of the funds accumulated in the individual capitalization account can be withdrawn, with a maximum amount of 150 Indexing Units (UF) and a minimum of 35 UF. If the participant has less than 35 UF, they may withdraw all funds. As a result of this measure, about 81% of the potential universe of people who could withdraw the funds has requested it, with more than 1.9 million participants having withdrawn their entire balance. It is estimated that this withdrawal of funds will mean an average 13% reduction in pensions for system participants[29].

Subsequently, in December 2020, Congress and the Senate approved a government project that allows a second early withdrawal of 10% of pension funds. On December 10, 2020, Law No. 21,295 establishing a single and extraordinary withdrawal of pension funds was announced in the Official Journal. The difference with respect to the first withdrawal of funds is that the new law provides that persons who withdraw funds and whose remuneration or income exceeds 30 annual tax units (UTAs) will be subject to the payment of taxes. According to the Pension Superintendency's estimate, some 10.7 million people could withdraw funds on this occasion.

3.3.2 Description of the system

Pillar 0

This basic pillar in Chile is represented by the level of coverage that is arrived at through the Collective Pension System, with the Institute of Social Security (IPS) as the agency in charge of administering the systems of distribution and collective pensions. On December 11, 2019, Law No. 21,190 was published in the Official Journal, "Improving and establishing new benefits in the Collective Pension System," which were conceived in their current version by the 2008 reform. This expanded and included the guarantees of this system, eliminating assistance pensions and the fixed minimum pension and replacing them with a number of guaranteed benefits, regardless of the payee's tax history.

Programs at this basic level of protection are funded from the general income of the State and consist of:

- *Basic Collective Pensions* (PBS). These are non-contributory pensions accessible to persons who are not entitled to a pension under any pension scheme, whether as holders or as beneficiaries of a survivor pension, and who meet the age, target group and residence requirements of Law No. 20,255.

- *Collective Pension Contributions* (APS). This is a benefit supplementing pensions that participants receive from the compulsory contributory system of the AFP. In case of old age, it is granted to those who have a base pension lower than the Maximum Pension with Collective Contribution (PMAS).

The benefits of these programs are adjusted by the variation in the Consumer Price Index every 12 months, or earlier if the variation reaches 10%.

It should be noted that Law No. 21,190, which "improves and establishes new benefits in the Collective Pension System," has increased the basic old-age collective pension and the maximum pension with collective contribution commencing from December 1, 2019, as follows:

- For beneficiaries aged 80 and over, 50% of their current values on November 2019.
- For beneficiaries aged 75 to 79 years, 30% of their current values in November 2019, leveled on January 1, 2021 with the amounts of the basic collective pension and the maximum collective pension of the beneficiaries aged 80 and over.
- For beneficiaries under the age of 75, 25% of their current values in November 2019, reaching a cumulative increase of 40% on January 1, 2021 plus the adjustment referred to in Article 8 of Law No. 20,255, matching the amounts of the basic old-age collective pension and the maximum pension with collective contribution of the beneficiaries aged 75 and over commencing from January 1, 2022.

From its entry into force until December 31, 2021, the total or partial disability PBS shall be of equal value to that of the old-age PBS for beneficiaries under the age of 75.

The Law also introduces a number of changes to Law No. 20,255 of 2008 on Pension Reform. In this regard, the old-age pensioner under the programmed retirement system who has a base pension of a value greater than or equal to the maximum pension with collective contribution shall be entitled to a pension equal to the basic collective old-age pension, when the amount of the pension or total of all pensions received is less than the basic collective pension.

Finally, the pension is paid out of the beneficiary's balance in their individual capitalization account until it is exhausted. After that, the amount of the pension will be financed with State funds.

Pillar 1

In the characteristic first pillar of protection of the Chilean scheme, protection is obtained through a system of capitalization of individual accounts via defined contributions. It is compulsory for all payroll workers, except for workers who are affiliated with the old distribution system. Likewise, self-employed workers are obliged to participate in this system, although the introduction of this obligation has been gradual, so that all of these workers have been obliged to contribute starting from January 1, 2018.

Contributions

The contribution to the pension system is 10% of the workers' monthly remuneration or taxable income, which is allocated to the individual pension account. In addition, an additional commission is charged by the AFPs for the administration of the individual accounts. The commission is determined by the market and usually fluctuates in a range of around 0.5–1.5%, depending on the AFP.

A contribution over 10% of the salary is set only in certain cases, with the aim of allowing the early retirement of workers who perform heavy labor. The compulsory additional contribution is 2% or 4%, depending on the situation, with half of that contribution being charged to the company in this case. There is a ceiling on contributions, which was 80.2 Indexing Units (UF) for 2020, equivalent to 2,331,440 Chilean pesos (3,174 US dollars). This ceiling is reviewed every year in relation to the positive variation experienced in the Real Remuneration Index (IR) determined by the National Institute of Statistics.

Retirement age

In Chile's pension system, the normal retirement age is 65 for men and 60 for women. However, deferment of the retirement age and continued working is permitted, in which case the obligation to continue to contribute for retirement ceases, although it can be made on a voluntary basis.

Early retirement is also allowed if the balance in the individual account allows the financing of a pension equal to or greater than the value between 70% of the average remuneration of the last ten years and 80% of the maximum pension with collective contribution, whichever is higher.

Factors relevant to the calculation of benefits

The factors relevant to the calculation of the pension depend on the form chosen. In the Chilean pension system there are four forms of pensions:

1) *Immediate life annuity*. This is a constant pension in real terms throughout the life of the pensioner. The lifetime pension amount is calculated using actuarial formulas and will depend on the retirement age, the survival tables used and the guaranteed interest rate. It is a form of pension offered by life insurance companies. If the pensioner dies, the annuity reverts to the beneficiaries (survival income), so the pensioner's age at the time of the calculation of the income is also relevant. The balance of the individual account is transferred to an insurance company to pay the corresponding insurance premium, to assume responsibility for paying the life annuity and capital for the payment of survivor income, if any.

2) *Temporary annuity with deferred life annuity*. A portion of the balance in the individual account is allocated to a temporary annuity. The rest is transferred to an insurance company to acquire a deferred life annuity, which starts to be paid after the temporary annuity period has ended. The temporary annuity is calculated under financial parameters, depending on the market interest rate, and the life annuity with actuarial formulas, depending on retirement age, age of beneficiaries, the survival tables used and the guaranteed interest rate.

3) *Scheduled withdrawal*. The pensioner withdraws money from their individual account on a monthly basis. The amount of such withdrawal is calculated annually on the basis of the remaining balance in the individual account, the life expectancy of the pensioner and their eligible family group, and the interest rate. The amount resulting from the scheduled withdrawal is multiplied by an adjustment factor, which is designed to form a reserve that softens the declining trajectory of the benefit. When the pension is less than 30% of the initial scheduled withdrawal, the reserve is used to reach that percentage until it is exhausted. In this form, the pensioner is allowed at any time to revoke their decision and to opt for a life annuity calculated on the basis of the remaining balance in the individual account.

4) *Scheduled withdrawal with immediate life annuity*. This form allows members who are eligible to collect a pension to use a portion of their individual capitalization account balance to obtain a life annuity in an amount greater than or equal to the basic old-age collective pension, while being able to keep the remaining compulsory balance in any of the C (Intermediate) D (Conservative) or E (Most conservative) pension funds selected by the participant, to be used under the scheduled withdrawal plan. Affiliates who have contracted a life annuity greater than or equal to 70% of the average taxable remuneration of the last ten years and greater than or equal to 80% of the maximum pension with collective contribution can allocate the remaining compulsory balance from their individual capitalization account to type A (most risky) or B (risky) pension funds.

Applicable pension limits (maximum and minimum pensions)

Under all the above-mentioned forms, if the worker receives a pension greater than 100% of the maximum pension with collective contribution and greater than 70% of the average monthly taxable remuneration of the last ten years, they can make use of the free disposal surplus, meaning the funds remaining in their individual capitalization account, after the calculation of the amount necessary to obtain the pension and discounted from the cumulative balance. This surplus may be withdrawn by participants to be allocated for the purposes they deem appropriate.

It should be noted that Law No. 21,190 of December 2019 introduces amendments to Decree-Law No. 3500 of the new pension system, and sets the requirement for the withdrawal of free disposal surpluses in the compulsory savings pension system at 12 UF, instead of considering 100% as the basis for the maximum pension with collective contribution.

As for the minimums, Collective Pension Contributions (APS) are used to supplement the pensions for old age for those who have a base pension lower than the Maximum Pension with Collective Contribution (PMAS).

Pension revision mechanism

The pension amount is expressed in Indexing Units, which are adjusted monthly following the variation in the Consumer Price Index during the calendar month prior to its setting.

Future increases in life expectancy

Chile's pension system provides for the effect of future increases in life expectancy. This effect is considered by insurance companies in the mortality tables they use when calculating the life annuity insurance premium, which have a security index or margin incorporated. These tables are updated approximately every five years, applying to people who retire after that point. Deviations in life expectancy beyond those provided in the tables applied at the time of calculation of the single premiums must be assumed by the insurance companies.

Pillar 2

The main instrument used in this level of protection is Group Voluntary Pension Savings (APVC)[30]. This is a savings mechanism that a company can offer whereby voluntary savings made by workers are supplemented by their respective employers. APVC plans include employer and worker contributions. However, plans are allowed where only the employer agrees to contribute, in which case the employer may make contributions that vary in terms of their amount and availability compared to plans where the worker also contributes.

The employer may freely negotiate commissions for the administration of APVC plan deposits with the management institutions, with the possibility of varying commissions between different contracts and also in the same contract, depending on the number of workers subscribed under the plan.

Workers may withdraw all or part of the accumulated funds that they own, under the conditions that correspond to the tax regime selected at the time of the contribution. In order to withdraw contributions from the employer, they must certify that they have met the minimum period of service with the company, in accordance with the APVC plan contract.

Pillar 3

In this third pillar, the main coverage instrument is called Voluntary Pension Savings (APV), which can be managed by AFPs, banks, insurance companies, mutual fund and investment managers, as well as by housing fund managers.

Another instrument is the voluntary savings account, also called "account two," which is created as a supplement to the individual capitalization account with the aim of constituting an additional source of savings for participants to increase the amount of their pensions. The voluntary savings account is independent of all other accounts managed by the AFPs.

Contributions to these instruments enjoy tax breaks, depending on the rules applicable at the time of making them. Funds may be withdrawn at any time by the worker, in which case there are certain mechanisms for the re-imposition of the tax benefits that have been applied to it.

There is also an alternative figure under voluntary pension savings called "agreed deposit." In this case, workers may agree with their employers to deposit amounts in their individual capitalization account, in order to increase capital to finance an early pension or increase the amount of their pension. Similarly, these agreed deposits enjoy certain tax breaks that depend on the regulations applicable at the time. However, unlike voluntary pension savings, funds accumulated as agreed deposits cannot be withdrawn by the worker before commencing their pension. Although in the case of pensioners of schemes administered by the Social Security Institute, they may withdraw all or part of the funds originating in agreed deposits from the companies.

In the event of death, APV balances must be transferred to the individual AFP account to finance survivor pensions, except in savings insurance plans where beneficiaries may request indemnification and savings to be paid directly.

3.3.3 Assessment of previous system reforms

The most recent antecedent of the current Chilean pension system dates from the beginning of the 1950s, and was modified in the second half of the 1970s to establish the system of Welfare Pensions for the poorest population, those over 65 years of age and people with disabilities over 18 years of age. A reform was also introduced to change the retirement scheme from years of service to retirement by age. Since then, the minimum retirement age would be 65 for men and 60 for women. Under this system, at the end of the 1970s, there were 32 pension institutions that administered more than 100 different schemes, characterized by a wide variety of requirements for access to benefits and by significant inequalities in pension amounts.

In this context, the financial situation of the system was weakened mainly as a result of the fall in the ratio between contributors and pensioners, as well as the strong incentives for underreporting income for most of the active life of employees, as pensions were calculated on the basis of salaries received during the last years worked, between three and five years, depending on the program. Different partial solutions were tested and proved ineffective, until eventually a comprehensive reform was selected to move to a system of defined contributions, with accumulation of financial reserves. Decree-Law No. 3500 of 1980 is the regulatory standard for the new system.

The transfer of workers from the old to the new system began in 1981. Workers who opted for the new system were offered an immediate incentive resulting from the lowering of the contribution rate. All workers were required to join the AFPs starting January 1, 1983.

The State plays a subsidiary role in the individual capitalization system, mainly through the regulation and supervision of the system and the granting of guarantees. However, the government submitted a bill to congress that would expand the scope, extent and role of the State, with the creation of a state-run Pension Fund Administrator[31].

It should be noted that the individual capitalization system was not applicable to members of the armed forces and the police force, who to date have maintained a defined benefit and allocation system. The allocation system for the former Pension Funds also remains. This is administered through the Social Security Institute (IPS), which receives the contributions and pays the benefits of those who chose to remain in the system.

Need for adjustments

Following the migration to a defined contribution system, the Chilean state took over the financing of the payment of pensions under the old system until its extinction and of the "recognition bonds" (a financial instrument that recognizes the years of contributions in the old system for taxpayers who switched to the new system). In 2006, after 25 years of the reform, the various presidential candidates chose to review the results of the reform, mainly as regards the extent of population coverage, due to the low membership and the difficulty of participants to maintain their contribution density ratio.

Estimates made in 2005 showed that half of the population would be without pensions, 5% would reach only a minimum pension and 45% would self-finance an above-minimum pension. The forward projections made at that time concluded that under the assumptions of: a real minimum pension growth of 2% per year; real salaries by 2% per year; and a net pension fund performance of an actual 5% per year, the percentage of people who self-financed their pension would be reduced, increasing the number eligible for minimum pensions and also of those who would be left without pensions.

On the basis of these results, a consensus was created that the pension system should be improved. Thus, the reform of 2008 (Law No. 20,255 on Social Security Reform) created the Collective Pension System, supplementing the pension system referred to in Decree-Law 3500 of 1980. This new legal directive provides basic pension collective benefits for old age and disability and collective pension contributions for old age and disability. Its objective is to strengthen the collective nature of the pension system, offering greater state support to workers with lower incomes and less capacity to contribute and accumulate pension savings, and to

provide effective social protection to the entire population. In addition, the law establishes conditions for improving competition between AFPs and creates a Technical Investment Committee. In addition, the 2008 reform makes contributory participation compulsory for a large group of self-employed workers, establishes a series of measures aimed at improving gender equality in the system, encourages contributions through subsidies for the formal recruitment of young workers and provides improved tools for the effective collection of contributions due.

In the same vein, on April 29, 2014 the Presidential Advisory Commission on the Pension System (known as the Bravo Commission) was set up to perform a new diagnosis of the operations of the pension system and to draw up proposals to help resolve its shortcomings. As explained in one part of its report, the 2008 reform noted outstanding issues, including low pensions, low coverage, high commissions charged by AFPs, gender inequality and lack of confidence in the system.

The Bravo Commission's analysis estimates that 50% of people who retired between 2007 and 2014 receive pensions equal to or less than 82,650 pesos (124 US dollars), including the Collective Pension Contribution (APS). Half of women receive pensions equal to or less than 42,561 pesos (64 US dollars), while men receive pensions of 112,333 pesos (168 US dollars) or less. The replacement rate for about half of pensioners is 34%: half of men obtain replacement rates equal to or less than 60%, while half of women reach a maximum of 31%.

The Commission showed that the accumulation of savings for old age during working life is very low for a significant percentage of the population, especially women and lower-income sectors. Furthermore, the contribution rate of 10% of taxable remuneration is relatively low compared with the international level, and also with those under the old pension system. It also refers to the low price competition between AFPs and the fact that only 20% of contributors are affiliated with AFPs that won the tender introduced by the 2008 reform. This established a tender mechanism under which the right to incorporate all new workers entering the pension system into the AFP offering the lowest commission is granted, so that new workers are required to join the AFP over the next two years, at which time a new tender is made.

The report also highlights that there are rules that affect men and women differently, such as the application of gender-differentiated mortality tables or different legal retirement ages for men and women (65 and 60, respectively). Women live longer and pay for a shorter period, resulting in different self-funded pensions for men and women with the same level of contribution. In addition, the low labor participation of women in the labor market, the higher proportion of periods of inactivity in their working life and the generally more uncertain conditions affecting those participating in the labor market should be considered.

The reform project

The Chilean government drafted a bill that it submitted to Congress on August 14, 2017[32], which took elements from the Bravo Commission's proposals. It introduced elements of collectivity to move from a system based on individual savings to another system where individual savings are supplemented at the group level, through the creation of a new compulsory system called "New Group Savings," and its purpose was to diversify the sources of pension financing through a mixed system in the compulsory contribution pillar. The administration of this new group pension savings system would create an autonomous public body, technical in nature, called the Group Savings Council. The bill was rejected by the Chamber of Deputies in January 2018 and, although it was not withdrawn by the government, its proceedings were halted.

On November 6, 2018, the government of President Sebastián Piñera submitted to the Chamber of Deputies a "Bill that improves pensions under the collective pension system and the individual capitalization pension system, creating new pension benefits for the middle class and women, creating long-term care subsidies and insurance, and making changes to the legal bodies involved" (Bulletin No. 12,212-13). Following its passage through the respective Labor and Finance Committees and its approval and clearance from the Chamber of Deputies in January 2020, the initiative began its second process in the Senate Working Committee in March 2020.

The measures provided for in this new bill include the following:

- An increase of 6% in the contribution rate for the financing of pensions, charged to the employer in the case of employed workers and to the workers in the case of the self-employed, which would be implemented gradually over a period of 12 years. Of this contribution, 3 percentage points will be used to finance Additional Pension Savings (APA) that will supplement the old age and permanent disability pensions under the pension system of Decree No. 3500 of 1980. The remaining 3 percentage points will go to the Group Collective Savings Program (PACS), which in turn includes Long-Term Care (LTC) insurance, which is financed with 0.2 percentage points of the new contribution rate. The benefits to be granted by the Collective Group Savings Fund (FACS) with the remaining 2.8 percentage points will be:
    - A monthly annuity-type benefit for those over 65, old age and disability pensioners, which will amount to 2 Indexing Units for men and 2.5 Indexing Units for women, when the participant accumulates 15 and 10 years of contributions respectively, provided that the contributions have been for at least a minimum monthly income for workers over 18 years and under 65.
    - Notwithstanding the foregoing, the affiliate shall be entitled to a monthly benefit equivalent to 0.04 Indexing Units for each year contributed in the Group Collective Savings Program, provided that the contributions have been for at least a minimum monthly income for workers over 18 years of age and under 65 years of age.
    - Any member who has contributed at least 30 years shall be entitled to a total pension in an amount not less than 10.6 Indexing Units.
- It reforms and strengthens the benefits of the collective pillar by gradually increasing, over four years, the amount of benefits to current and future beneficiaries of the Collective Pillar.
- It introduces new pension benefits for the middle class and for women.
- It establishes a subsidy and insurance in case of long-term care. The long-term care subsidy will have a non-contributory component, financed by State resources. Long-term care insurance will be part of the Group Collective Savings Program and will be financed by a compulsory monthly contribution, from the employer in the case of employed workers, and from the member in the case of self-employed workers and voluntary participants. The contribution shall correspond to 0.2% of the member's remuneration or taxable income.
- The Social Insurance Administrative Council (CASS) is established as an autonomous, technical body with legal identity and its own property. It shall be supervised by the Superintendency of Pensions. The purpose of the program is to administer Additional Pension Savings, the Group Collective Savings Program including Long-Term Care insurance, the Children's Assistance Insurance Act No. 21,063 and other social insurance programs defined by law.

3.3.4 Risk analysis

Pre-retirement period (accumulation phase)

Based on the conceptual scheme of risks associated with defined contribution schemes (see Chart 1.4-c in the first chapter of this report) presented in the first section of this study, the following risks can be identified in the Chilean pension system.

Financial risks

Due to the nature of individual capitalization systems, pension system participants maintain ownership of the accumulated funds in their capitalization accounts, thus assuming the financial risk of the investments in which they are invested. In other words, the effect of the potential materialization of financial risks that impairs the amount of these funds will be reflected (all other things being equal) in the pension that the workers will receive at the time they begin collecting their pensions.

Savings are managed under a multiple pension fund scheme. Each of these funds (from A to E, from highest to lowest risk) is invested in different proportions between fixed income instruments and equity instruments. Members who do not choose a pension fund are assigned to one of them based on their age; younger members have a more equity-oriented fund, and older members have a more fixed income-oriented fund.

Also, from the financial point of view, participants assume a frictional risk (or market financial risk) that exists at the time of liquidating investments for the acquisition of temporary or life annuities, depending on the form chosen. This risk is related to the divestment process that the AFP must make on their behalf, in order to generate the liquidity necessary to transfer the funds to the insurance company that will take over the life annuity in any of its forms.

Risks associated with asset managers

In Chile's pension scheme, AFPs are financial institutions responsible for managing the individual accounts of affiliates, which will allow the benefits established by law to be granted. AFPs are restricted object corporations, which are required to have a minimum capital that increases with the number of participants to a maximum of 20,000 UF. In addition, they must maintain a reserve of the assets of the AFP shareholders, in an amount equivalent to at least 1% of the pension funds.

In accordance with the regulations in force, every two years a tender is conducted for the administration of individual accounts of workers entering the labor market and joining the system, which is awarded based on price. All market AFPs and new investors authorized by the Superintendency of Pensions may participate in this tender.

Workers using the awarded administrator must remain with it for a period of two years from the month of joining, unless the AFP goes bankrupt or falls into legal difficulties, or there is another administrator who charges a lower commission for two months in a row or obtains a profit difference that compensates for the lower commission. In turn, the awardee must maintain its percentage commission for a period of two years from the first month in which it began receiving new participants. It can increase its commission at the end of this period, but in this case all participants are released and can transfer to another AFP, regardless of the month in which they joined. New participants that meet the specified minimum participation period and any other participants may freely transfer between AFPs, without requiring them to meet any other minimum contribution period.

Despite the new bidding mechanism introduced through the 2008 reform to reduce commissions and increase competition between AFPs, the latest analysis by the Bravo Commission continues to refer to the ongoing low levels of price competition between the AFPs and to the fact that only 20% of the contributors are affiliated with the managers who won the tender introduced by the reform.

Post-retirement period (distribution phase)

Financial risks

In the event that the worker chooses the scheduled withdrawal form, the financial risk associated with the investment of the funds is still assumed by pensioners, under conditions very similar to those they faced during the accumulation period. However, there are certain restrictions on the type of risk-profile investment funds in which they can maintain their assets, in order to limit that risk. If opting for a life annuity, the financial risk arising from the instruments in which the insurance premium is invested and the guaranteed rates are assumed by the insurance company. Insurance companies therefore assume the credit risk for investments in which the insurance premium is invested. Similarly, they assume the market and reinvestment risks of asset flows, insofar as there is a mismatch between the flows received from investments and those received from the payment of life annuities (asset and liability matching risk).

Demographic risks

Since it is a capitalization system, the Chilean system is not directly exposed to the demographic risk of changes in the population structure, with the exception of those groups for which the old distribution system remains. In cases where a life annuity is chosen (under any of its forms), both idiosyncratic and

aggregate or systematic demographic risks are assumed by the insurance company. However, pensioners assume in full the risk of a longer survival if they choose scheduled withdrawal, which, if realized, will affect the amount of the pension at the end of their life.

Inflation risk

In the case of the Chilean pension system, payments obtained from life annuities are expressed in Indexing Units, which transfers the risk of inflation to the insurers who assume their payment. Therefore, it is these entities that cover the possible deviations in actual inflation rates from estimated inflation rates when calculating the price of the insurance premium.

Finally, it should be noted that, regardless of the entity that ultimately assumes each of these risks in the accumulation and distribution stages, the amount of pensions and their corresponding replacement rates have different degrees of sensitivity to these risks, to the extent that these have different structural characteristics.

3.4 Sweden

3.4.1 Regulation of the current pension system

The pension system in Sweden was designed in the 1990s. The reform was approved by Parliament in 1994, although it was not implemented until 1999, to begin paying the first retirement benefits in November 2001. In this scheme, public pensions are supplemented by sectoral collective pension schemes under the employment system, compulsory or quasi-compulsory, with broad coverage among the population and, where appropriate, individual private schemes.

3.4.2 Description of the system

Pillar 0

The basic level of protection is provided by a guaranteed minimum pension for those without income or with very low incomes throughout their working life, which are supplemented by the contributory pension until the minimum pension is reached. Collection of the minimum guaranteed pension is subject to the requirements of 40 years' residence in Sweden and having reached 65 years of age. If the residence time is shorter, the benefit is reduced proportionately.

Pillar 1

Coverage of this level of public protection in Sweden is the result of a combination of a *notional (allocation) account* system with a system of capitalization accounts. The greatest weight in this pillar rests on the notional account system, whose purpose is to take individual control of what workers have contributed throughout their working life in order to be able to calculate the retirement pension based on their contributions. However – and this constitutes its allocation characteristic – the money from the contributions recorded in the notional accounts does not accumulate, but is intended to pay the ongoing pensions of retired persons.

Furthermore, the money accumulated in capitalization accounts can be transformed into a life annuity without survivor benefits, or into a variable annuity, in which the pensioner assumes the investment risk. In the accumulation phase, funds are managed through private pension plans, with the workers able to choose where their individual account is invested. There is also the possibility of placing it into a fund managed by the State, in which case the investment decisions are left to the public managers.

Each year, the Swedish Pension Agency sends individuals the status and performance of the notional and individual capitalization accounts, known as the "orange envelope." This public agency also performs the functions of a "clearing house" for transactions involving funds in capitalization accounts and provides daily information on participating funds[33]. In addition, it has a monopoly on the provision of life annuities. The agency is financed by an annual rate on capital accumulated in individual accounts, 0.30% in 2012. This rate has since been declining as the volume of funds managed has increased[34].

Contributions

The total amount of the contribution for this coverage level is 18.5%, with 16% going to the

notional account system and the remaining 2.5% going to the capitalization individual account system[35]. There is also a ceiling on benefits applied to the company's contribution base, of 115% of the average salary. However, there is an additional tax on income above the ceiling for people up to the age of 65, at the same percentage as the pension contribution. A floor of 5% of the average salary is also applied, so contributions are only made if the income exceeds that minimum level.

Retirement age

Under the Swedish scheme, a retirement pension can be claimed starting from the age of 61, and there is no maximum age limit for retirement. There is an option to claim the public pension from the notional account system and the provision of the individual capitalization account system independently.

The information submitted each year by the Swedish Pension Agency (the "orange envelope") reports the effect on the monthly pension of extending the retirement age. Four different ages (between 61 and 67 years) are shown to illustrate the increased cost in terms of income that retiring at earlier ages entails.

Factors in the calculation of benefits from the notional accounts

This first element of the public pension is derived from compulsory annual contributions of 16% of the contribution base and is calculated on the basis of the individual notional capital accumulated at the time of retirement by each worker or professional. The notional account balance is the one taken as the basis for the calculation of a life annuity. This is therefore a fully individualized calculation based on contributions made throughout the working career, which is monitored by its entry in the notional account. The amounts recorded in individual notional accounts are adjusted each year by applying an index ("income index"), which considers average salary growth over the last three years and price growth over the last year, with an adjustment based on the latest forecast. However, it is important to note that there is a mechanism that automatically disconnects indexing to average salary growth when the stability of the system is compromised.

The pension amount is calculated by dividing the accumulated amount in the notional account by a divisor that is basically dependent on life expectancy at retirement. Life expectancy is based on unisex mortality tables for the previous five years. This means that increases in life expectancy automatically translate into lower pensions for people who are retiring. This divisor also carries a discount rate of 1.6%, although the amount of income may vary each year from the one calculated initially, if the real growth of the economy falls above or below that percentage.

Factors in the calculation of benefits from the individual capitalization accounts

This second element of the public pension is derived from the mandatory annual contributions of 2.5% to individual capitalization accounts. Contributions are collected monthly by the Swedish National Tax Authority. Individuals have a wide range of choice as to where these funds are invested during the accumulation phase. If no choice is made, the money is deposited into a fund managed by the State (AP7), with the investment decisions remaining in the hands of the public managers in this case.

A management fee is charged by the managers of the investment funds, with the Swedish Pension Agency responsible for ensuring lower than normal commissions through agreements with the fund managers (currently ranging from 0.25% to 0.7%, depending on the funds; in the case of the AP7 managed by the State they are around 0.12%). Individuals select the funds through the Agency, which must ensure the confidentiality of their selection so that the manager does not know their identity.

In retirement, individual owners can choose how to withdraw funds. The accumulated pension account may be converted into a life annuity in order to avoid investment risk which, in that case, is assumed by the Swedish Pension Agency. Alternatively, it is possible to choose a "variable annuity" where funds continue to be invested by the asset manager selected, and in which case the pensioner retains the investment risk.

The calculation of the benefit for the life annuity is similar to that for notional accounts, dividing the value of the account by a divisor calculated

based on life expectancy and a discount technical interest rate. In this case, however, life expectancy is based on estimates, and may incorporate a correction for future improvement expectations.

Pension revision mechanism

The amount of pensions is revised each year in consideration of changes in the economic situation, and may be adjusted downward or upward throughout the life of the pensioner. The economic indexing mechanism involves an annual adjustment in pensions by the difference between the growth factor applied to calculate the pension initially (of 1.6%) and the real growth of the economy for that year (measured by the "income index," which considers average salary growth in the last three years and price growth in the last year). However, as mentioned above, there is a mechanism that automatically disconnects indexing to average salary growth when the stability of the system is threatened.

Future increases in life expectancy

There is also a balance mechanism for adjusting pensions in relation to demographic changes. This adjustment affects not only notional accounts of active workers but also pensions being paid out. The adjustment is applied when the estimated value of assets in the form of contributory income falls below the liabilities or notional value earned in the form of capital for current pensions. In this case, the indexing of both pensions and income credited to notional accounts is reduced by the ratio of assets to liabilities.

Pillar 2

Corporate pension schemes (which would be found in the second pillar) are highly traditional in Sweden, historically for skilled workers and public employees, and today extend to all types of workers. It is estimated that such plans cover about 90% of employees, and are compulsory or quasi-compulsory. The annual contributions agreed between companies and their workers tend to vary from 2% to 4.5%.

There are four main categories of group company pension plans, which have evolved from defined benefit systems to defined contribution systems or mixed systems. This evolution began in the 1990s, in step with the reform of the public pension system, and was only completed after 15 years. The four main categories of group pension plans are: (i) plans for low-skilled workers (SAF-LO); (ii) plans for qualified workers (ITP1, ITPK supplement and ITP2); (iii) plans for state public employees (PA 03); and (iv) plans for public employees of local entities (KAP-KL).

An analysis of the main characteristics of these collective pension schemes indicates:

- Previous versions still remain that apply to older workers in the defined benefit form.

- While there is freedom of choice as to the investment of accumulated funds by workers, there are also certain restrictions. Thus, for example, in the case of ITP1 at least 50% of contributions must be invested in traditional investment funds with guaranteed interest rates. The PA 03 plan in turn requires that at least half of the funds be invested in traditional insurance.

- The ITP1 plan for skilled workers fully applies to workers born in 1979 and later. This plan is a defined contribution plan, but it has a defined benefit component for workers with high salaries, more than 7.5 times the defined basic income. The contribution is 4.5% of gross salary, but if gross salary exceeds 7.5 times the basic income, the contribution is 30% over the excess, in order to finance the defined benefit component.

- Pension plans for public employees retain a defined benefit element, for those employees who have salaries above the contribution ceiling in the public pension system.

Pillar 3

Finally, coverage through the voluntary third pillar can be made through contributions to private pension schemes or other financial instruments. They have no associated tax benefits, although this may vary depending on the legislation in force at the time. Recently, the Swedish Pension Agency has warned that some sectors of the population should be saving for retirement more than they currently do, and that it sees the need to create a private pension savings instrument for this purpose (without taking a position on its tax deductibility).

3.4.3 Assessment of previous system reforms

Sweden's previous public pension system (called ATP) was conceived in the 1950s, based on an allocation system. The scheme combined a universal minimum pension with an additional pension based on contributions made during working life. Under this system, the maximum pension could be obtained after the age of 65, with 30 years of contributions, taking as a reference for its calculation the average of the 15 years with the highest contribution bases. Thus, one could start a career at the age of 35 and obtain 100% of the retirement pension for the age of 65.

Previously, there was an allocation system with a single inflation-indexed basic pension that provided very modest replacement rates, which led more skilled workers and public employees to clamor for the negotiation of employment pension plans, leading to a system with large differences in retirement income. This led to a fierce social debate and a vote for its reform in a referendum, resulting in the ATP system, in force from the 1950s. It was then decided that a new reform for sustainability problems was needed, to arrive at the current system.

The new notional account system combined with individual capitalization accounts applies fully to persons born in 1954 and later. It was gradually introduced for those born between 1938 and 1953, with those born in 1938 receiving 20% of the pension calculated with the new system and 80% with the previous one, increasing the proportion to be received under the new system by 5% per additional year (born in 1939 would equal 25%, and so on).

3.4.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

Coverage of the level of public protection in Sweden is the result of a combination of a system of allocation, through notional accounts, with a system of capitalization. As regards the balances of notional accounts, there is no financial risk to workers in the accumulation phase, since the balances in question are not supported by investments exposed to market or credit risks. In any case, any potential risk from investment, which would come from the remaining funds if any, would remain in the hands of the State.

By contrast, the investments in which the funds in the capitalization accounts are placed are owned by the worker, who therefore assumes the financial risk for the assets. These funds are managed through private pension plans, with the workers able to choose where their individual accounts are invested. There is also the possibility of placing it in a government-managed fund. In this case investment decisions are left to the public managers (AP7 fund) who distribute the investments in two funds, one fixed income and one equity fund, with different weights depending on the age of the worker. According to information provided by the Swedish Pension Agency, for ages under 56, all investments are directed to the equity fund and a percentage increasing by age is then directed to the fixed income fund. For a 70-year-old, half of the investments would remain in the fixed income fund and the other half in the equity fund. In this way, these investment decisions seek to minimize the market risk to the worker in relation to their proximity to retirement.

Similarly, the funds accumulated by contributions made to supplementary defined contribution pension systems are owned by the worker, who therefore also assumes the financial risk of the assets in which they are invested. In order to mitigate this risk, while there is freedom of choice regarding the investment of funds, there may be certain restrictions depending on the specifications of the plan[36].

Finally, in mixed plans, which currently still exist for skilled employees with higher income levels, the financial risk of the defined benefit component is borne by the sponsor companies.

Demographic and unemployment risks

For the coverage offered by the public notional account pension system, the demographic and unemployment risks in the pre-retirement phase would, in principle, be assumed by the public sector, following an allocation system. However, as discussed earlier, mechanisms have been introduced that transfer these risks, at least partially, to active workers through adjustments to the balances of notional

accounts and in the calculation of new pensions.

For coverages provided under defined benefit plans, the demographic risks in the accumulation phase fall to the sponsoring company that assumes the commitments under the plan. Along with the financial risks, these can also be transferred to an insurance company.

In the public capitalization account pension system and in defined contribution employment and individual plans, demographic and unemployment risks are borne by the workers. This can lead to insufficient funding in order to supplement their public pensions with reasonable replacement rates.

Inflation risk

The amounts recorded in the notional accounts of workers are adjusted each year in accordance with an index (the "income index"), which considers average salary growth over the last three years and price growth over the last year, with an adjustment based on the latest forecast. Therefore, the risk of loss in purchasing power at this stage lies with the State. However, as indicated above, there is a mechanism that automatically disconnects indexing to average salary growth when the stability of the system is compromised by the adjustment, so the assumption of risk by the State is not complete and may fall on the workers.

For defined benefit plans, it depends on the formula used to calculate them. If the final salaries of the active worker are considered, the risk is assumed by the sponsoring company, and if they are fixed amounts, it will depend on whether clauses have been agreed for the revision of these amounts based on price developments.

In the public capitalization pension system and in defined contribution employment and individual plans, the risk of inflation lies with the worker who can obtain the corresponding coverage through the profitability of their investments.

Post-retirement period (distribution phase)

Financial risks

In the distribution phase of notional account-based public pensions, financial risks are borne by the State to the extent that they are based on an allocation system. Furthermore, the money accumulated in capitalization accounts can be transformed into a life annuity, or a type of variable annuity. In the first case, the risks would remain with the State as administrator of the life annuity, while in the second case the pensioner would assume the investment risk. Thus, it is the decision of the pensioner whether to retain financial risks or transfer them to the Swedish Pension Agency, a state agency that holds the monopoly for the provision of life annuities.

Similarly, the financial risk of the assets, in which the funds accumulated by the contributions made to the supplementary defined contribution systems are invested, are held by the pensioner, and therefore the pensioner assumes the risk of the investment. Pensioners can, however, transfer that risk by acquiring a life annuity from the Swedish Pension Agency, whereby they would assume only the counterparty risk (sovereign risk). It has also been noted that selection of the choice to convert accumulated funds into temporary annuities is increasing. In these cases, the financial risk is transferred to an insurer, but not the biometric risk. This phenomenon appears to be more pronounced in the plans for less qualified personnel and for employees of local companies[37].

Demographic and unemployment risks

For coverage offered by the public notional account pension system, the demographic and unemployment risks in the post-retirement phase are assumed, in principle, by the public sector. However, mechanisms have been introduced that, in certain cases, transfer these risks to retirees, who may see their replacement rate reduced in relation to demographic changes and real economic growth.

In the coverages provided under defined benefit plans, demographic risks, both idiosyncratic and aggregate or systematic, fall in turn on the sponsoring company that assumes the commitments under the plan (in the case of

idiosyncratic risk, the smaller the group covered, the greater the risk). In any event, these risks can be transferred to an insurance company, along with the financial risks.

With regard to defined contribution plans, the demographic risk is assumed by the pensioner. In cases where the accumulated funds are chosen to be converted into a life annuity by the payment of one premium, demographic risks, both idiosyncratic and aggregate or systematic, would be transferred to the insurance company. In cases where pensioners choose to transform accumulated funds into temporary annuities, the biometric risk lies with the pensioners, who can see how their replacement rate falls drastically after the term of the temporary annuity, if they survive to that date.

Inflation risk

Finally, inflation risk is covered through the "income index" mechanism, which is adjusted annually by the difference between the growth factor applied to initially calculate the pension (at 1.6%) and the index result, which considers average salary growth in the last three years and price growth in the last year, with an adjustment based on the latest forecast. If it is less than 1.6%, the adjustment will be negative, while increases above 1.6% will result in a positive adjustment.

As regards funds from employment plans or individual defined contribution plans that have been converted into life annuities, the risk of inflation lies with the pensioner. Its effect will depend on the terms of growth agreed upon at the time of obtaining the annuity and on annual price developments.

3.5 United Kingdom

3.5.1 Regulation of the current pension system

In the United Kingdom, the regulation of the current public pension system is set out in the Pensions Act 2014 and its implementing regulations. This law applies to persons who reach retirement age as of April 6, 2016. It will still take a few years for it to be fully implemented, as there is a transitional regime provided for those who have reached retirement age or who have a significant amount of contributions before that date.

The pension system is designed in such a way that the State public pension provides minimum coverage, supplemented by private coverages, especially those of the employment system. These supplementary pension systems are regulated in the Pensions Act 2008, which introduces an obligation for companies to register their workers under a company pension scheme. The Pensions Schemes Act 2015 in turn contains relevant regulations regarding the configuration of plans, which are discussed below.

3.5.2 Description of the system

Pillar 0

At this basic level of protection, coverage is provided through the Guarantee Pension Credit, and applies to those people over 63 who confirm that they have not reached a minimum income level. This basic support is financed by taxes and amounts to 177.10 pounds per week in 2021, or 270.30 pounds for couples. The applicable provisions provide for certain increases in the case of sick persons or persons with dependents or mortgages, among other factors[38].

Pillar 1

Coverage of this level of public protection is provided through the new State Pension (nSP), introduced by the Pensions Act 2014, and consists of a single income, the amount of which is revised annually. This basic income (or single tier) is revised annually in April. From April 2021 onward, it has been set at 179.60 pounds per week.

This pension applies to all persons who retire starting from April 6, 2016, and its collection is contingent on paying contributions to the system for 35 years, allowing the deferment of retirement for persons who do not reach the minimum. There are also transitional provisions applicable to those persons who have a minimum of ten years of contributions, having completed at least one of them before April 6, 2016.

Contributions

The contribution to this pension system depends on the worker's status and income level. The normal amount is 25.8% (13.8% at the expense of the company) for income not exceeding 4,167 pounds per month in 2021[39]. However, 792 pounds are deducted from the contribution base per month, so the effective contribution is around 21%, of which 12% is the responsibility of the company and 9% is the responsibility of the worker.

Low-income persons whose salaries fall within a certain range are not required to contribute, but are equal to those who have contributed. In 2020–2021, the minimum limit was 120 pounds and the maximum was 183 pounds per week. Persons earning below that minimum limit would not be eligible for the new State Pension and would fall under the basic coverage provided under Pillar 0.

Once the retirement age is reached, the obligation to make contributions ceases, even if the individual continues to work. The 35 years of contributions include not only paid work situations but also child care or active job searches. There is no ceiling on contributions under this first pillar, but for income over 3,750 pounds per month, in 2017 the contribution paid by the worker was reduced to 2% for the amount exceeding that quantity, keeping the company's contribution constant at 13.8%, except in special cases.

Retirement age

The retirement age for this pension scheme is increasing progressively to reach 67 years in 2026 and 2028 for men and women, respectively. For those born between 1970 and 1978, the age rises to 68 years. It is currently 66 years of age for both men and women (since October 2020).

Qualified years and contributions relevant to the calculation of the pension

To be eligible for the full amount of the pension, it is necessary to have reached the retirement age and have a work history of 35 years. However, it can be accessed with a minimum of ten years of contributions. If 35 years are not reached, they shall be entitled to their proportional value (1/35 per year worked).

Pension revision mechanism

The amount of public pensions is revised in April each year based on either the increase in the inflation rate or the growth of average salaries, whichever is higher, with a minimum increase of 2.5%. This revision mechanism is called the "Triple Lock," although it is not guaranteed that it will be the one applied in the future, because it is not explicitly covered by the regulation.

Future increases in life expectancy

Furthermore, the retirement age is expected to be revised to fit life expectancy and other factors that the government considers relevant. The first revision was to be published before May 7, 2017, and thereafter every six years (the next revision will take place in 2023). In this first revision, it was decided that people born between 1970 and 1978 will have to wait an additional year to retire; namely, they will only be able to claim the state pension starting from the age of 68.

Pillar 2

The coverage of this level of private protection is provided under company group pension plans, which have a long history in the United Kingdom, and constitute a fundamental pillar in the country's pension system.

Defined benefit pension plans

Until two decades ago, the most common form was the defined benefit plan, in which the benefit in the form of a life annuity is calculated on the basis of the average salary of a given period immediately prior to retirement or the last salary when working. However, coinciding with the sustained drop in interest rates and the consequent difficulty of these plans in obtaining risk-free returns, these have gradually been closed to new participants. However, the amount of benefits provided under such plans is still high, many of them operating in deficit with regard to the funds needed to meet existing commitments until their extinction.

Defined contribution pension plans

The accelerated decline in defined benefit plans, coupled with a major wave of closures between 1995 and 2004, led to the enactment of

the Pensions Act 2008. From October 2012, this would make it compulsory for companies to accept into a company pension plan those employees who meet certain conditions. This obligation was introduced in phases, starting with companies with more than 250 employees in October 2012 and a deadline of April 2017 for smaller companies. Newly created companies (between April 1, 2012 and September 30, 2017) had a staggered schedule up to February 1, 2018. As of that date, all companies are obliged to offer their workers an employment pension scheme.

Such plans are called "quasi-compulsory," a term that reflects the fact that companies are required to offer employees an employment plan, but the employee may choose not to join. This option was designed to handle special cases of persons who, because of their personal circumstances, cannot or do not agree to contribute at a given time.

The company, the worker and, indirectly, the State contribute to the employment plans through the granting of a tax benefit. A gradual implementation schedule was defined for the minimum contributions starting at 2% of the salary in 2012, and up to 8% in 2019, which is the current contribution (2021). The minimum contribution for both the worker and the company is 3% of the pensionable salary respectively, and the State contribution, in the form of a tax benefit, is 1%. Since the total contribution must reach 8%, the rest of the contribution until that percentage is reached must be agreed between the company and the worker, and in the event it is not agreed, it is for the account of the worker. The computable salary for calculating the contribution is defined by the company and can be the entire gross salary or a lesser amount (between 6,240 and 50,000 pounds)[40].

Given the general obligation for all companies to offer an employment pension plan, for small businesses that do not have their own plan the State has created the National Employment Savings Trust (NEST)[41], including its own manager. This is a low-cost national plan available to any company that wants it.

Defined contribution plans, in turn, can be *Managed Plans*, sponsored by the company and managed by a board of directors that has the duty to act in the best interests of the participants, or *Contract Plans*, in which the company designates a pension management entity, usually an insurance company.

Hybrid pension plans or cash balance plans

There are also hybrid plans, which are still of little relative importance. "Risk-Sharing" and "Group Benefit" plans fall under this category. These plans offer some level of guarantee, and were introduced by the Pensions Schemes Act 2015. Before this legislation, however, there were already some plans that were somehow "hybrid" (e.g. "cash balance plans" or "benefit-sharing plans").

Pillar 3

Finally, the personal pension plans that would fall under the third pillar are based on direct contracts between the participants and the managers (the company does not intermediate), and are also classified as *Contract Plans*. Although the company does not intermediate, it can still make contributions, which are tax deductible for it. In this case, the company also benefits from a reduction in its contribution to National Insurance (Social Security).

As of April 2001, individual personal pension plans were only available to the self-employed, and to individuals who were not involved in any company plan. With the introduction of "stakeholder pension" plans, which have limited commissions, access to a broader universe of individuals has been opened up starting from that date. Thus, as of April 2006, individual pension plans are accessible to all persons under the age of 75.

Stakeholder pension plans fall under the category of *Group Personal Pension Plans*. They are defined contribution plans, which enjoy tax incentives and are accessible to everyone, regardless of whether the individual is an employee of a company, is self-employed or does not work. What is especially characteristic of these group plans is that their commissions are limited, under conditions established by the government. They function like any other personal plan (group or individual), and establish a contract between the participant and the managing company, which is usually an insurance company or a fund manager, but can also be banks or mortgage banks (referred to in

the UK as building societies). Most such plans are subject to a commission ceiling of 0.75% of assets under management.

3.5.3 Assessment of previous system reforms

The UK pension system originated in the 1940s and underwent numerous changes starting from the 1960s. At that time, a basic pension and an additional pension were introduced and could be waived if employees opted to join an employment plan that would improve on it. This system still persists for certain groups, gradually being discontinued by cohorts.

During the first decade of this century, various reforms were promoted to raise the pensions of people with lower-income working lives, faced with growing concern that people would not have sufficient savings for their future retirement. While measures had been taken to encourage the private sector to contribute to this task, they were not achieving the desired success. Thus, with the adoption of the Pensions Act 2007, state pension coverage was improved, reducing the number of contributory years required and introducing the "pension credit," in order to avoid poverty conditions among retired people. However, an in-depth analysis by the British government revealed three main problems in the system:

1) The complexity and uncertainty of the result of the state pension made it very difficult to know what amounts would be received at the time of retirement.

2) A high level of linkage of benefits to financial means acted as a disincentive for retirement savings, leading too many people to rely on the pension credit.

3) The continuing significant inequalities in relation to women, lower-income people and the self-employed, who tend to have lower pensions.

With the 2014 reform, efforts have been made to simplify the system, promote personal responsibility and introduce a sustainable system, designed so as not to increase future public spending.

3.5.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

Public pensions (new State Pension) are managed through an allocation system, so the contributor assumes no financial risk at this stage, with these risks remaining with the public sector. As regards the funds accumulated by contributions made to supplementary pension systems (second pillar) by active workers and sponsors that have been charged for them, ownership is held by the worker, who assumes the financial risk of the assets in which they are invested.

Also, although they are gradually disappearing, there are currently defined benefit plans in the United Kingdom operating in deficit in terms of funds to meet existing commitments until they are extinguished, due to the materialization of both financial and demographic risks. In these cases, workers are exposed to the risk of bankruptcy of the sponsor due to the amount of the deficit. At times, the high amount makes it difficult and even impossible for other companies to acquire the sponsor as a viable solution.

It is important to note that the Pension Schemes Act 2015 introduces rules on transparency and control for pension plans, intended to make future pensioners aware of this type of risk and to prevent them from incurring losses resulting from the poor management of their investments.

Demographic and unemployment risks

For the coverages offered by the public pension system, demographic and unemployment risks are assumed by the public sector, following an allocation system. The amount of the new State Pension is reduced, so the impact that these risks might have, should they materialize, on the budgetary sustainability of the system has been minimized, notwithstanding the fall in replacement rates.

For coverages provided under defined benefit plans, the demographic risks in the accumulation phase fall to the sponsoring company that assumes the commitments under the plan; along with the financial risks, these can be

transferred to an insurance company. However, the estimates of obligations under defined benefit plans involve factors such as the turnover rates of workers leaving the company without obtaining pre-retirement vesting or the estimates of active salaries to consider when determining the benefit. The risk of this in any case remains with the sponsoring company that assumes the commitments under the plan.

Finally, in defined contribution plans, the demographic and unemployment risks that can lead to insufficient funding to supplement their public pension with reasonable replacement rates fall on the workers.

Inflation risk

The new State Pension is a single tier that is updated at least annually for inflation, so the risk of inflation is assumed by the State. For defined benefit plans, it depends on the formula used to calculate them. If they are linked to the final salary of the active worker, the risk is assumed by the sponsoring company; if they are fixed amounts, it will depend on whether clauses have been agreed for the revision of these amounts based on price developments. For defined contribution plans, the risk of inflation lies with the worker, who must obtain the corresponding coverage through the return on their investments.

Post-retirement period (distribution phase)

Financial risks

In the case of public pensions, to the extent that they follow an allocation system, financial risks are borne by the public sector. The assets in which the accumulated funds are invested by the contributions made to the supplementary defined contribution systems under the second pillar are in turn the property of the pensioner, who therefore assumes the risk of the investment. The pensioner may transfer that risk to an insurer by acquiring a life annuity in exchange for a premium, in which case the pensioner assumes counterparty risk vis-a-vis the insurance company.

There are certain contracts that offer an additional guarantee through mechanisms called ring fenced funds, whereby investments in which the insurance premium is invested are linked to commitments with the insured, preferably with other creditors in the event of the company's bankruptcy. Finally, in defined benefit plans that still operate in deficit, the bankruptcy of the sponsoring company could put the benefits of pensioners at risk.

Demographic and unemployment risks

By following an allocation system in the coverage offered by the public pension system, demographic and unemployment risks are borne by the public sector, both in the pre- and post-retirement stages, which could lead to certain problems in terms of budgetary sustainability should they materialize. However, this possibility is limited by the fact that the new State Pension is only a basic income that is supplemented by other sources, allowing the added risk of the system to be dispersed among its various participants.

In the coverages provided under defined benefit plans, demographic risks, both idiosyncratic and aggregate or systematic, are the responsibility of the sponsoring company that assumes the commitments under the plan; in the case of idiosyncratic risk, the smaller the group, the higher this risk will be. In any case, these risks, together with the financial risks, can be transferred to an insurance company.

In the case of defined contribution plans, the demographic risk is assumed by the pensioner. In cases where the accumulated funds are converted into a life annuity by payment of a premium, demographic risks (both idiosyncratic and aggregate or systematic) would be assumed by the insurance company.

Inflation risk

As indicated above, in April of each year, the amount of public pensions is revised based on either the increase of the inflation rate and the average salary growth, whichever is higher, with a minimum increase of 2.5%. Thus, pensioners do not assume the risk of loss of purchasing power due to inflation, and are even able to experience increases in real terms, have a minimum increase of 2.5% and leave this inflationary risk on the public sector side. However, as noted earlier, this revision mechanism is not explicitly covered by the regulations, so it is not guaranteed that it will be implemented in the future.

With regard to payments from life annuities for those persons who have decided to convert the funds of the defined contribution plans into this type of income, the risk will depend on agreed terms for income growth and on the development of inflation.

3.6 Germany

3.6.1 Regulation of the current pension system

The basic regulation of the public pension system in Germany is contained in Book VI of the Social Security Code (SGB VI) of 1992.[42]. The compulsory pension system is managed by the German Federal Insurance Fund and administered by the Federal Ministry of Labor and Social Affairs. Regulation concerning the supplementary pension system is in turn basically covered by the *Employment Pensions Act* of 1974[43], which has been the subject of various amendments. One such amendment in 2017 sought to strengthen this type of instrument for corporate supplemental social security, especially defined contribution pension schemes.

3.6.2 Description of the system

Pillar 0

Coverage at this basic level of protection is provided through the basic subsistence income in old age[44]. This is social assistance for those who have reached the legal retirement age and lack sufficient resources for their subsistence, even if they have never contributed or have not contributed long enough to reach benefits at the contributory level. The monthly amount of benefits depends on the personal and economic situation of the beneficiary (income, assets, cost of housing, heating cost, disability, etc.). It is tax-funded and an examination application must be submitted to the local authority responsible, usually to the local welfare agency. Benefits are to be discontinued if the need for assistance can be superseded by receiving a priority social benefit (such as housing) or there are other providers of social benefits.

The *Basic Pension Act* adopted on August 12, 2020[45] provides for a supplement to long-term insurance (over 45 years contributed to compulsory pension insurance with lower-than-average income) and the adoption of new measures to increase old age income[46]. It entered into force on January 1, 2021 and will benefit 1.3 million pensioners. This act provides that they must have contributed at least 35 years and had average incomes at most below 80% of the average. The calculation of the amount of the basic pension[47] will represent 12.5% of the monthly pension meeting these limits on the basis of tables[48]. This supplement to the minimum pension will amount to a maximum of 419 euros per month[49], and will also exempt from paying taxes those retirees whose monthly income does not exceed 1,250 euros, in the case of single-family households, or 1,950 euros per month in households of couples.

Pillar 1

The coverage at this level of protection is provided through a system of allocated state-sponsored annuity pensions, based on a system of points, and financed through the contributions to the pension insurance of employees subject to compulsory insurance, as well as through a federal subsidy. It is accessible to insured persons who have reached the normal retirement age and have completed the general five-year contribution period. If the pension does not reach the basic subsistence income, it is supplemented until it is reached, under the conditions set out in the previous section (Pillar 0).

Contributions

In 2020, the contribution rate to general pension insurance was 18.6%; half of the contribution is paid by the employer and half by the employee. The rate of contribution to pension insurance is fixed annually by legislators based on the financial situation of the compulsory pension insurance, reaching its highest value in 1997/98 (20.3%). In Germany, there is a sustainability reserve for pensions whose accumulated amount is conclusive when calculating the annual contribution rate. If the sustainability reserve threatens to fall below 0.2 monthly expenditures, it increases; and if the sustainability reserve exceeds 1.5 monthly expenditures, the contribution rate is reduced. It is stipulated until 2025 that the contribution rate must be at least 18.6% and must not exceed 20%.

Each year, the Federal Ministry of Labor and Social Affairs announces the total average social security contribution rate[50]. Reduced contribution rates apply for low-salary employees (known as "minijobs") and low-salary employees in private households. There are also maximum and minimum limits to the contribution bases. In 2020, this came to a gross monthly salary of 6,900 euros in the West German states and 6,450 euros in the east[51]. Employees who earn 450 euros per month or less may not be eligible for compulsory pension insurance. There are also reduced contributions for employees who earn from 450.01 to 1,300 euros per month. However, because earnings from compulsory pension insurance contributions alone are not sufficient to finance expenses, the federal government ultimately guarantees the viability of compulsory pension insurance (federal budget funds cover about 30% of compulsory pension insurance expenses).

Retirement age

The standard retirement age is gradually increasing from 65 to 67 years from 2012 to 2029[52]. Since 2011, the option of retirement for the old-age pension at the age of 63 has been available[53]. Eligible persons must have a contribution history of at least 35 years, and it is subject to penalties. As of 2014, workers with 45 years of contributions can retire at 63 without penalty (this age will gradually increase from 63 to 65 in 2029).

Working career-related factors: qualified years, relevant contributions and pension calculation

The calculation of the individual pension is based on a points system[54]. One year of contributions for contributors with an average salary provides vesting of one point for the pension; contributions above or below the average salary are entitled to more or less points, respectively, on a proportional basis. The determination of what is considered an average salary for the purpose of calculating the points is made by referring to the data obtained from the national accounts. There is a ceiling on the contribution basis (82,800 euros in 2020).

At retirement, the total is calculated of all points generated during the years of the worker's active working life. To calculate the annual pension, the sum of the pension points is multiplied by a point value (determined each year) and by a factor that depends on the age of the start of retirement. This factor is usually equal to one, but decreases if retirement is below the legal age or grows if it is above, depending on the number of years. The annual value of the point applies to all pensioners, both for those who retire in that year and for all other pensioners.

Retirement has penalties for each month that the pensioner wants to retire before the regular age. A total of 0.3% is deducted from their monthly pension; calculated throughout the year, this comes to 3.6%. There is a specific exemption for people with a very long employment (or child care) history of at least 45 years. These persons may temporarily claim an old-age pension without deductions at the age of 63. To avoid any type of early retirement, for example, through planned unemployment at the age of 61 or 62, the pension law includes the rule that short-term unemployment periods at the age of 61 and 62 shall not in general count toward the 45 years of insurance.

Moreover, the pension can be accessed at an age higher than the retirement age, with the individual being granted an additional percentage for each full year of contributions. Thus, if the regular old-age pension is not claimed until later than the regular retirement age, a pension surcharge of 0.5% is granted for each month in which it is subsequently claimed. This supplement is payable for the entire duration of the pension.

The *Flexible Pensions Act*, which has been in force since the beginning of 2017, aims to facilitate a more flexible retirement. With a flexible pension, the employee can continue to contribute to pension insurance, which increases pension vesting once a year. Those who retire at the normal time were allowed to earn an unlimited amount of additional income before; however, this did not increase pension vesting. Those who retire early can only earn a limited amount of additional income, and those who retire regularly were allowed to earn an unlimited amount of additional income. The limit on additional income after early retirement for 2020 was raised from 6,300 euros to 44,590 euros. Therefore, pensioners can earn up to 44,590 euros in addition to their pension in a calendar year without their pension being reduced. The

purpose of this increase in income limits is to offset the shortage of personnel that has emerged as a result of the pandemic. The above limits will be applied again starting in 2021.

Applicable pension limits (maximum and minimum pensions)

The German maximum pension is 2,742 euros per month for 2020. But to receive it, the highest level of contribution has to have been provided for 45 years. However, there is no legal minimum pension. Instead, there is a mechanism that allows the pension to supplement the minimum for basic needs (basic pension law).

Pension revision mechanism

The point value is adjusted annually, in principle in accordance with gross salary growth. In addition, the contribution factor takes into account changes in the rate of contribution to the pension system; an increase in contribution rates will reduce the adjustment to the point value of the pension. As indicated above, the increase in contribution rates is linked to the financial situation of compulsory pension insurance, so that if it worsens it will not only result in an increase in the contribution rate, but also that the adjustment of the value of the pension point will be below the increase in salaries.

Future increases in life expectancy: sustainability factor

The process whereby the value of the pension point is calculated includes a sustainability factor determined by the variation in the "standardized" number of contributors in relation to the number of pensioners, also "standardized," linking the adjustment of the pension point value to changes in the ratio of pensioners to contributors (the statutory pension plan dependency ratio). These two factors in the indexing formula can change the size of the adjustment, resulting in a gradually lower growth of the value of the pension point in relation to gross per capita salaries in the long-term. The calculation of the relevant average income for calculating the points for the pension, as well as the value of the point, is slightly different for pensions in East Germany on a transitional basis until the year 2024, when there will no longer be differences in the regulation[55].

Pillar 2

The corporate voluntary supplementary pillar was strengthened through the reform approved in 2017 applicable to defined contribution employment pension schemes, with new labor, tax and supervisory regulations. In Germany, employers may establish pension plans on a voluntary basis for their employees, individually or in conjunction with other employers. These plans may be on the initiative of the employers themselves or based on collective agreements with workers for a particular industry (increasingly common), company-level agreements or agreements with individual employees.

The company's pension scheme in Germany is primarily a voluntary benefit of the employer. However, there has also been a great deal of innovation since January 2002, with another substantial reform coming into force under this pillar[56]. Since then, employees have the right to convert part of their salaries into contributions to a company pension plan that can be set up by the employer, the workers or both together.

Under this reform, employees covered by the compulsory social security pension plan may request that their employer deduct a portion of their salary (with a limit of 4% of the maximum contribution base to the compulsory system, which is fixed each year) to make a contribution to a defined contribution pension plan or to an insurance company (there are up to five different types of plans under which contributions can be made, including the option of an insurance policy with an insurance company or the establishment of an internal accounting reserve on the balance sheet of the employer, and a combination of these may be chosen). In the case of a salary fixed under a collective agreement, the deduction mentioned can only be made if the collective agreement so provides. The employer must also contribute 15% of the salary deducted, provided that this deduction involves a savings on the worker's social security contributions[57].

Thus, in addition to the employer-funded "classic" business pension, which will continue to constitute the vast majority of corporate pensions in the future, funding through so-called deferred

compensation is often used as a supplement, whereby employees can convert parts of their future salary, special payments (e.g. Christmas and holiday pay) or salary increases into company pension vesting rights. The employer must fulfill this request with the above conditions. The new regulation applies as of January 1, 2019 for the future, and as of 2022 for defined contribution agreements concluded in the past. Contributions invested in a pension fund or in a direct insurance policy for corporate pension plans are exempt from income tax, subject to certain limits.

Following the 2017 reform, defined-benefit pension schemes that may continue to exist will tend to disappear, as is the case in most pension systems worldwide. In addition, the establishment of a State-supported corporate pension is compatible with the Riester[58] subsidy, which forms the third pillar of the German pension system.

Pillar 3

In Germany, there is a specific voluntary private pension instrument called the *Riester pension*, which enjoys tax benefits in the form of exemption or direct subsidy for low-income persons or for those with dependent children. It can be offered by both insurance companies and banks or investment fund managers. These products must guarantee at least the amounts contributed, and at least 70% of the accumulated amount must be used for payments in the form of a life annuity.

3.6.3 Assessment of previous system reforms

The principle of the welfare state is enshrined in Germany's Basic Law (Article 20.1, Article 28.1), with compulsory social insurance plans being one of its essential elements. With 130 years of history, it is now the fruit of many steps in reforming the law on disability and old age insurance approved by Chancellor Otto von Bismarck in 1889.

The compulsory pension system is managed by the German Federal Insurance Fund and administered by the Federal Ministry of Labor and Social Affairs. Retirement benefits are provided through compulsory pension insurance, administered by German federal pension insurance, which is divided into 16 pension insurance institutions, 14 regional providers and 2 national providers.

The current German pension system originated in the 1960s. Previously, the 1957 Reform was a milestone in the history of compulsory pension insurance. Since then, the amount of the pension has been calculated on the basis of contributions paid over the years, and no longer on the basis of the absolute amounts of previous salaries. As a result, workers' retirement benefits increased significantly, at around 60%; they were no longer simply "additional income," but were assigned a salary replacement function.

To finance pension insurance, the legislature introduced the pure allocation system, whereby current contributors finance current pensions. For the first time, there was talk of the generation contract, which emphasizes the responsibility of generations to each other. The pension reform led to the coordination of the pension insurance and benefits law for salaried employees and workers, but the institutions were still separate.

The 1972 pension reform opened compulsory pension insurance for the self-employed and housewives. Since then, all persons who are not compulsorily insured have been able to make voluntary contributions to pension insurance. Later, with German unification in 1991, pension systems in the eastern and western parts were also unified. In that year, five state insurance institutions were established in eastern Germany: LVA (State insurance institution) Saxony, LVA Mecklenburg-Western Pomerania, LVA Brandenburg, LVA Saxony-Anhalt and LVA Thuringia, which should gradually take over the tasks of workers' pension insurance. The scope of responsibility of institutions at national level, such as the BfA (*Bundesversicherungsanstalt für Angestellte* – Federal Insurance Agency for Salaried Employees), was also expanded to include East Germany.

Another major pension reform in Germany entered in force in January 1992. Pension laws for manual, administrative and mining workers were summarized and standardized in the new Social Code, Book VI (SGB VI). The SGBVI replaced the Reich Insurance Code (Reichs-

versicherungsordnung). Some pillars of pension reform are: the 60-year age limit for women and the unemployed, and the 63-year age limit for long-term insureds has been raised to 65 years. Parenting periods can now be claimed for three years, instead of just one year.

The legal basis for the current regular old-age pension is Articles 35 and 235 of Social Code, Book VI (SGB VI) of 1992. The Old Age Insurance Act (Altersversicherungsgesetz - ALG), in conjunction with the Agricultural Social Insurance Reorganization Act (Landwirtschaftliche Sozialversicherung Neuordnungsgesetz - LSV-NOG) – the law that reorganizes the organization of agricultural social insurance –, are the legal base for agricultural workers. Finally, some subsequent laws that have modified the SGB VI are:

- The Old Age Assets Act (Altersguthabengesetz) passed in 2001, known as the "Riester pension" because it was introduced at the suggestion of Federal Labor Minister Walter Riester (1998–2002), in which the State promotes the private pension scheme.

- The Pension Insurance Age Limit Adjustment Act (RV-Altersgrenzenanpassungsgesetz) of April 20, 2007 correlates the standard retirement age with demography, development and strengthening the financial basis of the law. It entered into force in 2007 and was introduced commencing in 2012, with long transitional periods. It supplements the previous reforms, especially the reform through the Pension Insurance Sustainability Act (RV-Nachhaltigkeitsgesetz) of 2004, with the objective of receiving an acceptable long-term contribution rate, regardless of unfavorable demographic development.

- The Compulsory Pension Insurance Performance Improvement Act (RV-Leistungsverbesserungsgesetz) of June 23, 2014 essentially entered into force on July 1, 2014. The regulations set out the conditions for taking into account more periods of care for children born before 1992, the "maternal pension," the new old-age pension (deductible) particularly for long-term insured persons and improvements in disability pensions.

- With the Pension Transition Completion Act (Rentenüberleitungs-Abschlussgesetz - RÜ-AG) of July 17, 2017, lawmakers set the objective of completing the transition from the German pension law to the "accession territory" by 2024, a process that began in 1992 with the Pension Transition Act (Rentenüberleitungsgesetz - RÜG).

- In November 2018, the "Act on the Improvement of Benefits and Stabilization of Statutory Pension Insurance (RV-Leistungsverbesserungs- und -Stabilisierungsgesetz): the Pension Pact, the Federal Council" was passed, and its regulations have been in force since January 2019. In order to strengthen confidence in the long-term stability of compulsory pension insurance, lawmakers have decided to maintain limits on the contribution rate and the level of pensions. Under this provision, the pension contribution rate should not exceed 20% by 2025 and, at the same time, the pension level should not fall below 48%.

- Through the bill introducing a basic pension (2020), the cabinet approved the introduction of a basic pension under the 2018 coalition agreement by means of the "Bill for the introduction of basic pensions for long-term insurance in compulsory pension insurance with below-average income and for the adoption of new measures to increase the old age income (Law on Basic Pensions - Grundrentengesetz)" on February 19, 2020.

- The Old Age Assets Act adopted in 2001 set the pension system in Germany on a new basis. Since 2002, the legal pension has been supplemented by a company capitalization plan or a private pension plan.

- Since October 2005, all compulsory pension insurance providers in Germany have operated under a common name and logo. The Association of German Pension Insurance Institutions (Verband Deutscher Rentenversicherungsträger - VDR), which has been the coordinating organization for pension insurance under this name since the end of World War II, and the BfA merged to form the German Federal Association for Pension Insurance. Since then, the new Deutsche Rentenversicherung Knappschaft-Bahn-See has been the second federal sponsor for employees in the mining, rail

and transport sectors. State insurance companies remained regional carriers, and some merged. Today there are a total of 16 pension insurance institutions.

- The purpose of the RÜ-AG of July 17, 2017, which was enacted on July 24, 2017, was to complete the transfer of the German Federal Pension Act to the "accession territory" by 2024, a process that began with the RÜG. In an initial step, the present value of the pension (East) would rise to 95.8% of the western value from July 1, 2018. The reference value (East) and the income threshold (East) would approach the level of the respective western value commencing on January 1, 2019; the revaluation factor would be reduced accordingly.

- Finally, the 2018 Contribution Rate Regulation (Article 158, paragraph 1) made adjustments to the contribution rate to the general pension scheme in relation to the development of the sustainability reserve fund.

3.6.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

As noted above, public pensions in Germany are managed through an allocation system, so the contributor does not take any financial risks at this stage. As regards the funds accumulated by contributions made to defined contribution supplementary pension systems, they are owned by the worker, who assumes the financial risk of the assets in which they are invested.

In Germany, there is no obligation for companies to outsource pension commitments agreed on in labor contracts or collective bargaining outside their balance sheets. These commitments can be outsourced through pension plans or insurance contracts, but they can also be held as internal funds, which involve the company retaining the ownership of the funds set aside. In this way, although the financial risk falls on the employee, the employee is linked to the performance of the sponsoring company, as the latter assumes the commitments under the plan. In these cases, to compensate for this risk, it is mandatory for the company to obtain insurance to cover employer insolvency[59].

Demographic and unemployment risks

For the coverages offered under the public pension system, as it follows an allocation scheme, demographic and unemployment risks are assumed by the public sector. This can lead to problems of budgetary sustainability. To this end, the Pension Insurance Sustainability Act amended the pension adjustment formula, including by introducing a sustainability factor implicit in the way that the pension point value is calculated and in the calculation of contributions. In addition, in view of the additional increase in life expectancy and the long-term demographic decline in the number of people of working age, the gradual increase of the age limit for the standard old-age pension from 65 to 67 years for 2029 was regulated by law. This adjusted the standard retirement age to demographic development and strengthened the financial basis for legal pension insurance.

Inflation risk

The system for accruing pension points on the basis of the salaries on which contributions are calculated almost eliminates, for the pensioner, the risk that inflation could have on purchasing power in the pre-retirement phase, thus reverting this back to the public sector. For defined benefit plans in the second pillar, it depends on the formula used for their calculation. However, as has been said, as in most pension systems worldwide, in Germany these types of schemes have not been receiving new contributions since 2018 and are tending to disappear.

Post-retirement period (distribution phase)

Financial risks

Public pensions follow an accumulation system, so the financial risks in the pension payment phase are assumed by the State. The financial risk of the assets, in which the funds accumulated by the contributions made to the defined contribution supplementary systems are invested, are the property of the pensioner, who assumes the risk of the investment. The pensioner may transfer that risk to an insurer by acquiring a life annuity in exchange for a premium, in which case the pensioner assumes

counterparty risk vis-a-vis the insurance company. In the coverages provided in defined benefit plans under the second pillar, the financial risk lies with the sponsoring company, which assumes the commitments under the plan. This may be transferred to an insurance company, in which case the obligation and responsibility of the companies for these commitments shall be limited exclusively to those assumed in such insurance contracts.

Demographic and unemployment risks

In the same way as in the accumulation phase, since the German pension system is an allocation scheme, demographic and unemployment risks are borne by the public sector, which can lead to medium- and long-term budgetary sustainability problems as these risks materialize. In order to mitigate this risk, existing legislation provides for the application of a sustainability factor implicit in the calculation of the value of pension points. Thus, to calculate the annual pension, the sum of the pension points is multiplied by a point value, which is determined each year and applies to all retirees, both those who retire in that year and all other pensioners.

In the coverages provided under the defined benefit plans of the second pillar, the demographic risks, both idiosyncratic and aggregate or systematic, fall on the sponsoring company that assumes the commitments under the plan. In the case of idiosyncratic risk, the smaller the group, the higher the risk.

Inflation risk

Finally, with regard to inflation risk, the annual pension revision is, in principle, based on salary developments, but may be lower if the financial situation of the compulsory pension insurance system deteriorates. Therefore, this risk (which in principle lies with the State) can be partially transferred to the pensioners in that case.

3.7 The Netherlands

3.7.1 Regulation of the current pension system

The regulation of the public pension system of the Netherlands is covered by the General Old Age Pension Law (Algemene Ouderdomswet - AOW) Act of May 31, 1956. In addition, the Pension Act of December 7, 2006 ("Pensioenwet," PW) introduces the relevant rules of protection and transparency toward beneficiaries of private pension plans. It strengthened the institutional system for monitoring compliance with the pension agreements of companies with their workers, financial supervision of the management of funds and transparency rules regarding information to be received by both active workers and pensioners on the status of their vesting rights. This control involves the Ministry of Employment and Social Affairs, the central bank (De Nederlandsche Bank - DNB) and the financial market control authority (Autoriteit Financiële Markten - AFM).

In addition, it should be noted that under the Netherlands pension scheme, the supplementary private pension systems of the employment system constitute a fundamental pillar in supplementing the State public pension.

3.7.2 Description of the system

Pillar 0

Coverage of this basic level of protection is provided through assistance (Aanvullende Inkomensvoorziening Ouderen - AIO pension), which municipal authorities may grant to those persons over 65 years of age resident in the Netherlands who do not have income or who do not reach a minimum level through the State public pension, receiving in that case a supplement until they reach the current social minimum.

Pillar 1

As regards the first pillar of the system, the public retirement pension at the contributory level (AOW pension) consists of a life annuity using an allocation system, in which ongoing pensions are financed through the contributions of active workers. The contributions are collected by the tax authorities and managed by the Social Insurance Bank (*Sociale Verzekeringsbank* - SVB).

Contributions

The contribution for the retirement pensions of this first pillar is 17.9% of the salary and is collected through income tax, with the company

withholding the amount from the worker's payroll and entering it in the public finances. In addition, there is a ceiling on the basis of which the contribution rate, which in 2020 amounted to 57,232 euros per year, is applied.

Retirement age

The retirement age in the Netherlands is 67 years (67 years and three months starting in 2022). There are incentives for extending working life, and it is possible to combine the collection of the State Retirement Pension (AOW) with paid work, in which case the obligation to contribute ceases. It should be noted that it is not possible to collect the AOW pension before the legal retirement age is reached.

Working career-related factors: qualified years, relevant contributions and pension calculation

The State public pension entitlement accrues at a rate of 2% for each contribution year. To be eligible for its full amount, a period of 50 years contributing continuously is required. If this period has not been completed, the allowance is reduced in proportion to contribution time. This rate is applied on an amount that depends on the family status. For single persons, the amount would be 70% of the legal net minimum salary in force, while for married persons or de facto couples it would be 50% of the legal net minimum salary in force for each person.

Currently, the amount for a single person living alone and entitled to the maximum pension is 970.27 euros per month plus an additional payment in May of a similar amount (holiday pay). This monthly amount may be increased to 1,218.19 euros through tax credits that depend on personal status, basically on the total level of income. If you live as a couple, and both receive a pension, the amounts go to 663.53 euros (without a tax reduction) and 832.86 euros (with a tax reduction). In addition, there is a transitional regime for persons retired prior to January 1, 2015, who may receive an additional supplement if they live as a couple under 65 years of age and who are without income. These amounts are updated and published every six months[60].

Pension revision mechanism

The legal minimum salary in force, which is used as a reference for the calculation of pensions under this first pillar, is updated every six months based on salary development in the economy.

Future increases in life expectancy

For the time being, steps have been taken to extend the retirement age progressively to 67 years in 2021, and it is planned to extend it to 70 years after the first phase has been completed. While this determination is not yet final, linking retirement age to life expectancy is also being considered, starting in 2024.

Pillar 2

The coverage of this level of private protection is provided through group company and professional organization pension schemes, which are widely implemented in the Netherlands where about 95% of public workers and employees participate in a pension scheme that supplements the public pension. In such plans, the company contribution is around 16% of the worker's income. It should be noted that contributions to supplementary pension systems must be outsourced outside the balance sheet of companies, either in a pension fund or with an insurance company. As a result, the reserve of funds accumulated to meet these pension commitments is one of the largest in the world.

These plans are usually established under collective bargaining between labor unions and business associations. Workers' representatives can decide which level of coverage they prefer, whether specific to the company or whether to qualify for a sector plan. The accrual of rights under a pension agreement begins, by law, no later than the date the employee reaches 21 years.

There are specific regulations concerning the consequences for agreements that may be made under collective bargaining. Thus, according to the "Wet Bpf 2000" law on compulsory participation in sectoral funds, when the social partners reach an agreement on pensions in a particular industrial sector for their members and when representatives of business organizations so request, the Minister of Employment and Social Affairs may declare

the agreement binding on all other employees in that particular sector (provided that the business organizations requesting it employ at least 60% of workers in that sector). This has happened, for example, in sectors such as metal, graphics and the communications industry[61]. In this way, employees can change companies within the sector without consequences for their pension vesting. Finally, other regulations establish specific rules for professional groups and for the equalization of pension rights generated during the period of cohabitation in the event of divorce.

Defined benefit pension plans

Unlike other pension systems at international level, the most common form in the Netherlands is defined benefit employment plans, where the benefit in the form of a life annuity is calculated on the basis of the average salary of a given period, prior to retirement or the last active salary, depending on the form of the applicable plan.

Defined contribution pension plans

The company, the worker and, indirectly, the State contribute to defined contribution employment plans through the granting of a tax benefit. While they are growing in recent years, they currently represent a small percentage of total supplementary pension funds.

Hybrid pension plans

In the Netherlands system, there are certain pension plans called Collective Defined Contribution (CDC) schemes that combine a specific promised benefit with a fixed payment for the employer. The fact that the amount to be paid by the employer is fixed implies that, if there are significant deviations from the assumptions considered for its calculation, the final amount of the benefit is not guaranteed. For the purposes of their qualification, defined benefit plans would only be considered if an additional buffer is provided that can reasonably cover these deviations.

Pillar 3

Voluntary coverage through the third pillar can be set up through contributions to private pension plans or other types of financial instruments. In the case of the Netherlands, tax benefits have a great influence on the pension system. Contributions are, in general, deductible at the time they are made, taxed at the time of receiving the corresponding benefits during retirement and subject to lower marginal rates. However, it is not always possible to apply these benefits to voluntary private pension schemes, depending on the tax regime applicable at the time. At present, they cannot be deducted, notwithstanding the existence of transitional regimes that still remain.

3.7.3 Assessment of previous system reforms

The law regulating the current pension system in the Netherlands dates back to 1956, so the search for antecedents of this regulation goes back very far in time, specifically to the year 1919. It should be noted that the previous pension scheme in the country was characterized by a system in which the benefits were very close to the contributions made, and there was no indexing to protect them from the risk of loss of purchasing power; a risk that ultimately materialized, highlighting the need for its reform[62].

The development of the public pension system began in the 1950s, culminating in the current AOW Act of May 31, 1956; the State Law on Old-Age Pension which entered into force on January 1, 1957. This reform introduced the concept of a universal retirement pension for residents of the country, with public pensions under the first pillar acquiring a marked redistributive character and linking benefits to salary developments.

The system is conceived in such a way that second-pillar corporate pension schemes play a key role in supplementing public pensions. Since then, the volume of funds derived from corporate pension agreements with their workers has been increasing to levels above 1 trillion euros today.

The most significant reforms related to the AOW have taken place recently (in 2012 and 2015), to progressively increase the retirement age and to take measures to prolong the working activity beyond the ordinary retirement age, respectively, in order to relieve the pressure on public accounts that may result from increased life expectancy and the aging of the population.

3.7.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

As mentioned earlier, public pensions (AOW) are managed through an allocation system, so the contributor assumes no financial risk at this stage as it remains on the State side instead. As for supplementary pension systems, in defined benefit plans and mixed schemes, the financial risk of the defined benefit component is borne by the sponsoring companies. The funds accumulated by the contributions made to the supplementary defined contribution pension systems are in turn owned by the worker, who therefore assumes the financial risk of the assets in which they are invested.

In order to mitigate the potential effects of the materialization of such financial risk, the Pension Act of December 7, 2006 (PW) introduced transparency and control rules for pension plans. The financial market control authority (AFM) plays a relevant role in monitoring information regarding investments and their risk profile, which must be provided to pension plan beneficiaries.

Demographic and unemployment risks

For the coverage offered under the public pension system, demographic and unemployment risks are assumed by the public sector, as it is an allocation system. And for coverages provided under defined benefit plans, the demographic risks fall on the sponsoring company during the accumulation phase, which assumes the commitments under the plan. However, both these and financial risks can be transferred to an insurance company.

However, the estimates of obligations under defined benefit plans involve other specific risk factors in addition to demographic and financial risk factors, such as estimates of future salaries for active workers or projections regarding the development of public pensions; factors that must be considered in determining the benefit. The risk arising from deviations from the assumptions considered when calculating the future amount of benefits remains in any case with the sponsoring company assuming the plan's commitments.

By contrast, in CDC scheme pension plans, which combine a defined benefit promise with a fixed payment for the employer, the risk of deviations in the assumptions is transferred to workers.

Finally, in defined contribution plans, demographic and unemployment risks (which may result in insufficient funds to supplement their public pension with reasonable replacement rates) fall on the workers.

Inflation risk

The retirement pension (AOW) is revised every six months based on salary development, so the risk of loss of purchasing power of the public pension is assumed by the State in both the pre- and post-retirement stages. For defined benefit plans under the second pillar, the party assuming the risk depends on the formula used for their calculation. When referring to the most recent salaries of active workers, the risk is borne by the sponsoring company (final pay schemes). If you consider an extensive salary period, it will depend on the mechanism used, if any, to update them for calculation purposes (career-average schemes). If they are fixed amounts (unusual in the Netherlands system), it will depend on whether they have included clauses for the updating of these amounts based on price developments. Considerations are therefore varied, and there is no particular guarantee of updating to be carried out according to the conditions agreed in the plan.

Finally, for defined contribution plans, the risk lies with the workers, who must obtain the corresponding coverage through the return on their investments.

Post-retirement period (distribution phase)

Financial risks

As regards the first pillar, public pensions (AOW) use an allocation system, so the financial risks associated with the distribution phase (payment of pensions) are borne by the State. Defined benefit employment plans under the second pillar guarantee a lifetime income to their beneficiaries, so the financial risks are borne by the sponsoring company, which, in any case, can transfer them to an insurance company.

As for funds accumulated in employment and private defined contribution pension schemes, these can be transformed into life annuities or other benefits, in the form of income or capital. If transformed into life annuities, the financial risk is transferred to an insurance company.

Demographic and unemployment risks

Under an allocation system, in coverage offered by the public pension system, the demographic and unemployment risks are assumed by the public sector in both the pre- and post-retirement stages, which can lead to problems of budgetary sustainability under certain scenarios should they materialize. However, it should be noted that the amount of the public pension (AOW) covers a reduced percentage of the retiree replacement rate, so the impact these risks could have on the budgetary sustainability of the system is therefore more limited than in other systems based on a strong first pillar and with a residual second pillar. Even so, the risk is not negligible in the case of the Netherlands, and measures are currently being taken to progressively delay the retirement age and to facilitate the extension of work activity beyond the retirement age.

In the coverages provided under defined benefit plans, demographic risks, both idiosyncratic and aggregate or systematic, fall on the sponsoring company, which is the entity that assumes the commitments arising from the plan. In the case of idiosyncratic risk, the smaller the group, the higher the risk. Such risks, together with financial risks, may in any case be transferred to an insurance company.

For defined contribution plans, the demographic risk is assumed by the pensioner. In cases where it is decided to convert the accumulated funds into a life annuity through the payment of a premium, the demographic risks (both idiosyncratic and aggregate or systematic) are assumed by the insurance company.

Inflation risk

Finally, with regard to inflation risk, the public retirement pension (AOW for the first pillar) is revised every six months based on salary development in the economy, so the risk of loss of purchasing power from the public pension is assumed by the State. For defined benefit employment plans, the impact of this risk depends on the conditions agreed in the plan. And for defined contribution plans, the risk lies with the worker, who must obtain the corresponding coverage through the return on their investments. Finally, if it is decided to convert the accumulated funds into a life annuity, it will depend on the agreed terms regarding income growth and the evolution of inflation.

3.8 France

3.8.1 Regulation of the current pension system

The regulation of the general public pension system in France is essentially covered by Ordinance No. 45-2454 of 1945,[63] which establishes social insurance based on an allocation system applicable to all persons insured in non-agricultural professions, which covers the majority of employed persons. Furthermore, Law No. 72-1223 of 1972 lays down the obligation for private sector employees to supplement their basic retirement with a compulsory supplementary retirement scheme (Arrco-Agirc scheme), which is also based on an allocation mechanism.

In addition to the general scheme, it is worth noting that there are numerous special schemes in France for certain groups of workers that establish varying components in comparison with the general scheme, with a high level of fragmentation (there are currently more than 40 special schemes, including for government officials). Self-employed workers, however, do not have their own special scheme. They have been covered by the general scheme since January 1, 2018, as the special self-employed scheme (*Régime social des Indépendants* - RSI) has been eliminated.

3.8.2 Description of the system

Pillar 0

Coverage at this basic level of protection is provided by the minimum old-age pension, which is a guarantee that ensures any older

person can benefit from a minimum amount to live. Access to this minimum old-age pension (*Allocation de solidarité aux personnes âgées*, APSA) is provided for those persons aged 65 years (62 in certain cases of invalidity or permanent disability), who do not have minimum funds and who have their legal residence in France. Residency requirements are more stringent for persons with a nationality from countries outside the scope of European regulations, with some flexibility in certain cases (stateless persons, refugees, among others).

There is also a minimum supplement for those persons who receive contributory pensions below an amount that is determined each year (known as the "*minimum pension*"). The minimum pension is provided to workers whose contribution bases have been very low and who are eligible for full-rate retirement. In 2021, its minimum amount is fixed at 645.50 euros per month, to which supplements related to the contribution period or other factors can be added[64].

Pillar 1

This level of protection is covered through a system of allocated public life annuity pensions. General retirement pension schemes for the private sector in France have two mandatory elements. The first is based on age and working career parameters (basic pension), while the second element is based on a system of points (supplementary pension) that are accumulated based on contributions to a compulsory employment pension scheme. Both parameter-based and point-based elements follow an allocation system, with contributions by active workers for the payment of basic and supplementary pensions currently being paid out.

Contributions

The normal contribution to the system of public allocation annuity pensions amounts to 27.5% of the salary remuneration received (including the part corresponding to the supplementary pension contribution, which for non-managerial workers is 7.5%)[65], 16.3% paid by the company and 11.2% by the workers. The basis on which the contributions are calculated has a ceiling for the basic pension and a separate higher ceiling for the supplementary pension, which is updated each year. This assumes that the contribution rate may fall from 27.5% to 24.8% when 100% of the average remuneration is exceeded, and once the ceiling of the contribution base for the supplementary pension is reached[66].

Retirement age

The legal age for obtaining a retirement pension in France is 62 years. The worker is not obliged to retire at this age, and may obtain an increase in the amount of their pension if they continue to work after reaching the legal age. To obtain a full retirement (which is referred to as "at full rate"), it is necessary to retire at the age of 67 (applicable to persons born after January 1, 1955). People who retire between the ages of 62 and 67 are therefore penalized, which is in addition to the penalty that may be due to them in the event of incomplete contribution histories. Therefore, in the general scheme it is possible to retire from the age of 62, but it is strongly discouraged, except for people with very long contribution histories (41.5 years) or permanent disability.

Much of the special retirement schemes in France for certain groups set different retirement ages, extending the possibility of bringing the retirement age forward to that established under the general scheme.

Retirement with increased amount and late retirement

If work continues after reaching the legal age, even if the required quarters have been acquired in all pension plans, each additional quarter that is completed increases the amount of pension to be paid out. Furthermore, when people work beyond the legal minimum retirement age and have met the contributory conditions for a full pension, each additional quarter subject to contributions increases the benefit under the public scheme by 1.25% (5% per year). During the deferred retirement period, people continue to accumulate points for their supplementary pension.

There are other measures that aim to encourage delayed retirement by means of formulas that allow for progressive retirement, working part-time at the end of your career, while collecting a portion of your retirement. You can also continue or start some work while you are retired.

Working career-related factors: qualified years, relevant contributions and pension calculation

Pillar 1 of retirement pensions in the general private sector scheme in France have two mandatory elements. The first is based on parameters related to age and working life (basic pension or "retraite de base"), and the second is based on a points system (supplementary pension or "retrait complementaire").

The parameters required to calculate the first element of the retirement pension (*basic pension*) are:

- The average annual balance of the 25 highest salaries in working life, revised based on inflation (the "average annual salary," or "salaire annuel moyen").

- A rate of 50% is applied to this average annual salary to obtain the portion of the pension receivable for the first parameter-based element, provided that the pensioner has a full contribution history; otherwise, it is assigned a certain reduction coefficient based on the number of quarters lacking for a complete history. Currently, only people with a 41.5-year history can benefit from the full rate of 50%.

- In addition to the penalty applicable to incomplete work histories, an additional reduction is applied to those who decide to retire between the ages of 62 and 67 (both deductions constitute the so-called "discount" ("décote"))[67]. In this way, the system incorporates a strong disincentive for early retirement and/or incomplete careers.

- Persons who have reached the period of time to obtain the full-rate pension, given their year of birth, and who continue to work after the legal age of pension settlement, benefit from a premium ("surcote") on the pension. Different rates apply depending on when these periods of activity have taken place. For periods after January 1, 2009, the bonus rate is 1.25% per additional quarter (5% per year).

- Currently, there are some improvements in the basic pension for the care of three or more children.

Moreover, the calculation of the *supplementary pension* element uses a points system. Each year, the contributions are converted into retirement points that accumulate in an individual account, taking into account the amount contributed in the year divided by the purchase value of the point fixed for that year. To find out the amount of this component of the public pension, multiply the number of points accumulated in the account by the value of that point, which is established each year[68].

Updating of both the value and the purchase price of the point is performed by agreement of the social agents. Since 2013, it has been agreed to update the value of the pension point based on price increases minus one percentage point, and the purchase price according to average salaries. However, in 2021 it was decided to apply the same values as in the previous year. Updating both parameters affects both pensions currently being paid out and the change in the value of benefits accrued, between the time they were accrued and the time in which they were paid out (in line with the revaluation process in the basic pension)[69].

This element of the general public pension scheme is managed by the Agirc-Arrco association, born out of the merger, as of January 1, 2019, of the two schemes Arrco (Association for the Supplementary Scheme for Employees) and Agirc (general association of old-age insurance institutions for management positions). Contributions are deducted each month from salaries to pay this pension element to retirees and converted into points, dividing the amount of contributions by the purchase price of the point, which changes each year.

In 2020, the purchase price of one Agirc-Arrco point was set at 17.3982 euros. When the worker retires, their accumulated points are converted into euros, multiplying them by the point value set each year. In 2020, the value of the Agirc-Arrco point was set at 1.2714 euros. The pension received will depend on the number of points acquired. The value of the point is fixed each year for each plan, and it was not revalued in 2021, in which the same value for the point and its purchase price from the previous year was applied.

Applicable pension limits (maximum and minimum pensions)

In France, there are minimum and maximum limits applicable to the basic pension that are established each year. This is one of the elements of the system showing differences between the general and the separate special schemes.

Pension revision mechanism

The revision of the compulsory pension in France differs depending on its various elements. The basic pension element is updated annually according to price developments, while the compulsory supplementary pension element is carried out annually with the revaluation agreed with social agents. As mentioned above, a revaluation agreement for this element has been applied since 2013 based on the price increase minus one percentage point. However, in 2021 it was decided not to revalue it, and to apply the same value for the point as in the previous year.

Future increases in life expectancy: sustainability factor

The way in which the value of a pension point is calculated involves a *sustainability factor* applicable only to the supplementary pension element, through the revision mechanism for the pension point value. This applies both to people who retire each year and all other current retirements.

Pillar 2

The French retirement pension system has traditionally been based on the strength of a public and allocation first pillar, so there is no major development of this second complementary pillar of corporate pensions. Despite this, there are defined benefit, defined contribution and mixed employment pension schemes that may be implemented under collective bargaining or under an individual agreement with the employee. In recent years, these types of supplementary schemes have been promoted due to the increasing population pressure on the public pension system. In this regard, at the beginning of this century the "Loi Fillon" reform introduced the Supplementary Retirement Savings Plan (*Plan d'Epargne Retraite Complémentaire - PERCO*) and the Company Retirement Savings Plan (*Plan d'Epargne Retraite Entreprise - PERE*), two new employment pension vehicles with tax breaks.

Collective Retirement Savings Plan (PERCO)

This is a company-related group savings plan for retirement, under the framework of labor relations. In principle, these are voluntary schemes for businesses, but they may be mandatory based on an agreement with workers. Employee contributions may be supplemented by the employer, if agreed, and funds are invested under mutual management, usually by banks, insurance companies or bodies belonging to social protection groups.

There are tax incentives for both the company and the employee, within limits beyond those established for individual pension savings plans. They can be withdrawn in the form of a life annuity or a lump sum. In the case of small businesses that cannot create their own PERCO, there are joint company PERCO agreements created by industry agreements that allow access to the joint management of funds and their risks.

Company Retirement Savings Plan (PERE)

This is a group compulsory membership and contribution agreement resulting from a unilateral decision of the employer, a group agreement with the employees or a collective agreement. Such plans are more known as "Article 83 regime" plans, in reference to the General Tax Code[70]. Once the security and transparency rules of these plans are adopted, the contributions must be the same for all employees in the same category and allow for additional voluntary contributions by the worker that benefit from the same tax breaks. They are deductible from the employee's income tax, within the tax limits set. The savings invested allow for the payment of a life annuity starting at retirement age, and withdrawal in the form of capital is not possible, except in unusual cases. They have restrictions on the type of assets that funds can invest in, unlike other types of employment pension plans, and are often used as a supplement to PERCOs.

The PRÉFON scheme for officials

The PRÉFON (Prévoyance de la fonction publique) scheme is reserved for public officials, their spouses and all those who have worked in public administration during their career. This scheme is subject to the same taxes as the PERP discussed in the next section.

Pillar 3

Traditionally, voluntary supplementary pension savings in France have been channeled through individual life insurance and, as in the case of the second pillar, have had a very limited weight in its pension system, influenced by the strength of the compulsory public pillar coverage. However, the above-mentioned "Loi Fillon" reform introduced a new savings vehicle at the beginning of this century called the People's Retirement Savings Plan (*Plan d'épargne retraite populaire*, PERP), which can be used as a second pillar employment plan (in which case it is called a PERCO) or as a private voluntary individual plan. It is obtained under individual contracts concluded between an association responsible for the supervision of the PERP, the People's Retirement Savings Group (*Groupement d'épargne retraite populaire*-GERP), and a management body that may be an insurance company, a pension institution or a mutual insurance institution. The plan allows the accumulation of a supplementary pension through contributions that are deductible from taxable income, up to 10% of this income. The amount of the contributions is freely decided by the insured. After professional activity ends, withdrawal is compulsory in the form of a pension.

For self-employed workers there is also a specific product called "Loi Madelin," intended for all independent professionals, wholesalers, merchants, craftspeople, liberal professions and assisting spouses. Self-employed workers are allowed to deduct contributions from professional income from their taxable income (within certain limits) to voluntary and defined contribution "Madelin" plans[71]. After professional activity ends, withdrawal in the form of a pension is compulsory, except for the beneficiaries of a disability pension.

3.8.3 Assessment of previous system reforms

The design of the pension system in France is based on the regulations adopted in 1945, which have been the subject of numerous reforms, including the following.

First, the 1993 reform introduced four changes in the relevant parameters that reduced the level of pensions. In this reform, the reference salary was calculated on the basis of the 25 highest salaries instead of the 10 highest; the previous salaries taken into account in the calculation of the reference salary were indexed to prices (and no longer to salaries); pensions were now indexed to prices; and the reference contribution period was increased from 37.5 to 40 years for private sector employees.

The 2003 reform introduced a semi-automatic increase in the contribution period required to obtain a full pension, in line with increases in life expectancy. The objective was to keep the relationship between the contribution period and the average duration of retirement constant at its 2003 value (1.79). In application of this principle, the reference contribution period has gone from 40 years for the 1948 generation to 41.5 years for the 1957 generation. However, this mechanism has been replaced by the 2014 reform.

Under the 2008 reform, the bonus for additional years worked after reaching the required full-pension contribution period was raised to 1.25% per additional quarter. In addition, the possibility of simultaneously collecting a pension and a salary for persons entitled to a full pension was totally liberalized; employers were encouraged to achieve quantitative targets for the employment of older workers and were dissuaded from using retirement as a substitute for dismissal. Similarly, the conditions were strengthened for receiving the minimum pension (the "minimum contributif," or Mico), a minimum contributory pension created for persons entitled to a full pension. This minimum pension is now subject to a resource test in order to target people with low pension levels more effectively.

The 2010 reform introduced a number of new measures aimed both at curbing spending and increasing income, including a progressive increase in retirement age limits. The earliest retirement age was gradually increased, for all pension plans, from 60 to 62 years. At the same time, the full retirement age went from 65 to 67. Each generation, from the 1951 generation to the 1955 generation, has seen these age limits increase by four to five months. For example, people born in 1956 may claim their pension at the age of 62 in 2018 and a full pension at the age of 67 in 2023. The early retirement age for long working histories has also been increased by two years. The 2010 reform, as well as the 2008 reform, increased

the minimum contribution period required to obtain a full pension before the age of 67, and introduced exceptions related to workers in poor health. Some categories of workers are still granted a full pension at the age of 65 (disabled, mothers of three children), and people with an occupational illness or accident that has caused a permanent disability of at least 20% can continue to retire at age 60 on full pension. Retirement for individuals with long working histories is extended to people who started working before age 18; they may retire at age 60 if they meet certain conditions. The convergence of pension rules between the public and private sectors was reinforced by the decision to eliminate the possibility of early retirement for parents with three children and a 15-year career in the public sector, as well as the "Progressive cessation of activity" program in the public sector. Finally, the rules for calculating minimum income-related pensions and the contribution rate of officials will also converge toward private sector standards.

In turn, the 2014 reform introduced short-term measures (increase in social contributions for both employees and companies by 0.3 points between 2013 and 2017; elimination of the 10% tax exemption on the pension bonus for pensioners with three or more children; postponement of pension indexing), but also several long-term measures such as the progressive increase in the reference contribution period for a full pension before the age of 67, to 43 years (reached in 2035).

This rule replaces the mechanism introduced by the 2010 reform and affects all pension schemes (private sector basic plans, public sector plan, special plans and second pillar plans). In order to strengthen governance, a steering committee was set up to publish an annual report on the French pension system, including long-term projections. Recommendations will be made in the event of significant departures from the reference hypothesis.

In addition, this reform introduced the possibility of early retirement for persons with long work histories, and scheduled an increase in the minimum income-related pension. The early retirement mechanism for long work histories refers to people who started working before the ages of 16 or 20 and who have contributed longer than the reference contribution period. They are entitled to collect their pension up to four years before the legal retirement age (56 years). Given the legal obligation to study up to the age of 16, fewer and fewer persons will be entitled to this arrangement. A bonus system was also introduced (in all schemes) for people who postpone the start of retirement if they have reached the minimum retirement age and meet the reference contribution period status.

Also, the early retirement penalty was gradually reduced from 10% to 5% of retirement benefits for private sector workers, and introduced into the public system. The reform also introduced the possibility of collecting a pension and a salary, and encouraged the development of private occupational and voluntary savings through tax incentives. A gradual convergence of public- and private-sector systems was implemented through three channels: (i) the increase in the number of contribution years required to qualify for a full pension (from 37.5 to 40 years); (ii) the creation of an early retirement penalty and a deferred retirement premium that gradually converged with the parameters set by the CNAVTS (*Caisse Nationale d'Assurance Veillesse des Travailleurs Salariés* - Old Age Insurance Fund for Salaried Workers) and (iii) the creation of a supplementary scheme RAFP (*Retraite Additionnelle de la Fonction Publique* - Public Employment Additional Pension).

Furthermore, the agreement of October 30, 2015 on the supplementary Agirc and Arrco pension schemes introduced a number of measures relating to: (i) the amount of pension benefits paid to retirees; (ii) the retirement age, with incentives to postpone retirement; (iii) governance, with the merger of executive and non-executive systems; and (iv) social contributions.

The measures related to the amount of retirement benefits were implemented between 2016 and 2018. One part of the adjustment affects current pension beneficiaries by restricting nominal increases in existing pensions, and another part shall affect future pensioners by making the pension system less generous in the long-term. Incentives to remain in employment ("solidarity ratios" and "increase ratios") should increase the effective retirement age and keep an additional 100,000 people in the labor force by 2025, thereby increasing the amount of contributions. The merger of the Agirc (executive) and Arrco (non-executive) systems in

2019 shall simplify the pension system and reduce administrative costs. Finally, the new unified plan shall expand the basis for assessment of contributions and increase certain contribution rates.

Finally, in July 2017, the LURA (*Liquidation Unique de retraite de base des Régimes Alignés* - Single Base Pension Settlement for Aligned Systems) reform came into force, which was also part of the 2014 reform. Prior to the reform, private sector workers who had contributed to several basic schemes throughout their working career (CNAVTS, MSA salaries or SSI) received as many pensions as they had contributed to, and each pension was calculated separately. Since July 2017, people in this situation only receive a pension calculated according to a single benefit formula: the reference salary is the average of the top 25 annual salaries (assessed on the basis of inflation) for their entire career, and an individual can only validate four quarters per year (individuals who have contributed to two plans simultaneously will receive a lower pension than they would have received prior to the LURA reform).

3.8.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

Coverage at the level of public protection for retirement in France follows an allocation system, both for basic and supplementary pensions, so there is no financial risk for workers in the accumulation phase. Similarly, the funds accumulated by contributions made to supplementary defined contribution pension systems are owned by the worker, who therefore also assumes the financial risk of the assets in which they are invested. Finally, in defined benefit and mixed plans the financial risk of the defined benefit component is borne by the sponsoring companies.

Demographic and unemployment risks

For the coverages offered under the public pension system, the demographic and unemployment risks in the pre-retirement phase are assumed by the public sector, following an allocation system. However, the mechanism for calculating the value of pension points for the share for supplementary pensions each year could lead to a transfer to the active worker of the effects resulting from the materialization of demographic risk related to the calculation of the purchase price of the points fixed each year.

For coverages provided under defined benefit plans, the demographic risks in the accumulation phase fall to the sponsoring company that assumes the commitments under the plan. Along with the financial risks, these can also be transferred to an insurance company. In employment and individual plans with defined contributions, demographic and unemployment risks are borne by the workers. This can lead to insufficient funding in order to supplement their public pensions with reasonable replacement rates.

Inflation risk

The basic pension element for public pensions is updated annually based on price developments, so the risk of inflation for this component is assumed by the State. With regard to the compulsory supplementary pension element, the purchase price of one pension point is updated annually with the revaluation agreed with the social agents, so that the risk of inflation could be transferred to active workers, depending on the outcome of these negotiations.

Post-retirement period (distribution phase)

Financial risks

As indicated above, public pensions, both the basic and the compulsory supplementary pension, follow an allocation system, so the financial risks in the pension payment phase are borne by the State. As regards the financial risk of the assets in which they are invested, the funds accumulated by the contributions made to voluntary supplementary defined contribution systems are the property of the pensioner, who assumes the risk of the investment. This risk can be transferred to an insurer by acquiring a life annuity in exchange for a premium, in which case the counterparty risk with the insurance company is assumed. In the coverages provided in defined benefit plans under the second pillar, the financial risk lies with the sponsoring company, which assumes the commitments under the plan.

Demographic and unemployment risks

At this stage, as the French pension system is an allocation scheme, demographic and unemployment risks are borne by the public sector, which can lead to problems of medium- and long-term budgetary sustainability to the extent that these risks occur. However, in the case of the compulsory supplementary pension element, the annual adjustment of the value of pension points applies both to workers who retire in that year and to ongoing pensions, so the demographic risk could be transferred to pensioners, based on the outcome of the update.

Inflation risk

The basic pension element of the public pension is updated annually based on price developments, so the risk of inflation for this is assumed by the State. The compulsory supplementary pension element is updated annually with the revaluation agreed with the social agents, so the risk of inflation could be transferred to the workers depending on the outcome of these negotiations, which would affect them at this stage through the setting of the pension point value. As regards funds from employment plans or individual defined contribution plans that have been converted into life annuities, the risk of inflation lies with the pensioner. Its effect will depend on the terms of growth agreed upon at the time of obtaining the annuity and on annual price developments.

3.9 Spain

3.9.1 Regulation of the current pension system

In the case of Spain, the regulation of the public pension system is contained in Royal Legislative Decree 8/2015, which approves the recast text of the General Law on Social Security and its developing regulations. As for the regulation relating to the second and third pillars, it is essentially contained in Royal Legislative Decree 1/2002 approving the recast text of the Law on the Regulation of Pension Plans and Funds, as well as in its developing regulations.

3.9.2 Description of the system

Pillar 0

Coverage at this basic level of protection is provided by non-contributory pensions for those persons who lack sufficient resources for their subsistence, even if they have never paid or have not paid long enough to reach benefits at the contributory level. There is also a supplement that can be applied for by those who receive a contributory pension that does not reach a minimum that is fixed annually, for those who do not have other sources of income or whose income does not exceed a certain limit (called the "minimum supplement"). These coverages are financed by taxes, and their amount and requirements are updated each year in the General State Budget Act, at least by the same percentage as contributory retirement pensions.

Pillar 1

This is the fundamental pillar of the Spanish pension system. The coverage of this level of protection is provided through a system of public annuity allocation pensions, which can be accessed by those who have reached retirement age and have contributed a minimum of 15 years, provided that at least two are within the 15 years immediately prior to the time of starting a pension entitlement.

Contributions

The contribution to the public annuity allocation pension system for retirement is 28.3% of the salary payments received, 23.6% paid by the company and 4.7% by the workers. These contributions also cover other minor contingencies such as disability or parental leave. Self-employed workers contribute 29.8% of their income, including temporary disability coverage (26.5% if they decide not to cover that contingency).

The contributions have a ceiling that is set each year; in 2020, it was fixed at 4,070.10 euros/month and this remains in force in 2021, since its revision was not approved this year[72]. There is also a minimum contribution base ranging from 1,108.30 euros to 1,547 euros/month, depending on the worker's professional category.

Retirement age

The age for access to a retirement pension depends on the age of the person concerned and the years contributed throughout their working life. It is required that the pensioner has reached the age of 67 years, or 65 years when 38.5 years of contributions are credited. However, these retirement ages will be applied gradually until 2027; by 2021, they must have reached 66 years, or 65 years if 37 years and 3 months of contribution are credited[73].

In principle, pension benefits cannot be combined with work by the pensioner, but there are some exceptions[74]. Thus, cases of partial retirement are allowed with a proportional reduction in the pension. In addition, a form called "active aging" has been introduced which, under certain circumstances, makes the use of the pension compatible with the performance of any work for the pensioner's own or another's account. The amount of the pension that can be combined with work will be equivalent to 50% of the amount resulting from the initial recognition, without the right to pension allowances lower than the minimum for the time in which the pension is obtained while working[75]. Finally, it is also permitted to perform work for one's own account below the official minimum wage, together with receiving the pension and without the obligation to contribute. If that activity involves hiring a full-time person, it may be compatible with 100% of the pension to which the worker is entitled. Moreover, the pension can be accessed at an age higher than the retirement age, with the individual being granted an additional percentage for each full year of contributions.

Working career-related factors: qualified years, relevant contributions and pension calculation

For the calculation of the pension, the average of the contribution bases (regulatory base) made in the last 25 years is taken into account. Those for the two years before retirement are calculated by their nominal value and the rest are revised based on the development of the consumer price index. However, there is a transitional period for the gradual increase in the calculation period, so that the 25 years will apply to people who reach retirement age in 2022; in 2021, the period to be considered is 24 years.

The amount of the retirement pension is determined by applying 50% for the first 15 years of contributions to the regulatory base. Starting from the 16th year, for each additional month of contribution for the months from 1 to 248, 0.19% will be added, and for each month beyond 248, 0.18% will be added, with a limit of 100%.

When the pension is accessed at an age older than the retirement age, the person concerned is granted an additional percentage for each full year of contributions between the date on which that age was reached and the start of the pension, depending on the contribution years. The percentage will be 2% but increases to 2.75% if credited between 25 and 37 years of contributions, and 4% if credited for more than 37 years[76].

Applicable pension limits (maximum and minimum pensions)

There are minimum and maximum pension limits that are established each year in the State General Budget Act. The maximum for the benefits received in 2021 amounts to 37,904.86 euros per year. The minimum pensions in 2021 range from 5,639.20 euros to 12,406.24 euros per year, depending on the retirement age and whether or not there is a dependent spouse.

Pension revision mechanism

Pensions are revised annually using the revaluation provided in the General State Budgets. In 2021, contributory pensions were updated based on the consumer price index. Law No. 23/2013 of December 23 established an index-based revision mechanism that takes into account the rates of change in the income of the social security system, the number of contributory pensions, the average pension and the amount of income and expenditure of the social security system. Arithmetic moving averages for the last 11 years are taken, except for the income and expenditure of the system, which are geometric averages that accord more weight to the latest observations. A parameter is applied for these latter factors, which is reviewed every five years. The result cannot be less than 0.25%, nor can it exceed the percentage change in the consumer price index of the previous year plus 0.5%. It should be noted that the use of this revaluation mechanism is currently suspended and is not

being implemented, with annual updating via the General State Budget Act being used instead.

Future increases in life expectancy: sustainability factor

In addition to the pension revaluation mechanism, Law No. 23/2013 of December 23 introduced a sustainability factor to support the long-term stability of the system. This mechanism is automatic and allows the pension amount to be linked to developments in the life expectancy of pensioners, and is applied one time for the determination of the initial amount of retirement pensions. The calculation of the sustainability factor considers the inter-year variation, over a five-year period, of life expectancy at 67 years,. This is obtained based on mortality tables for the retirement pensioner population of the social security system. This sustainability factor was to be applied to pensions that commenced as of January 1, 2019, but its application has been rescinded due to the budget law.

Pillar 2

In Spain, the role of the second pillar currently remains very limited. It is voluntary, but may be compulsory for some companies, depending on the conditions negotiated in their employment contracts or through collective bargaining. One of the main recommendations of the Parliamentary Committee report for the Toledo Pact of November 2020 is to explore ways of strengthening this complementary pillar of the Spanish pension system.

It should be noted that, in these cases, there is an obligation for companies to outsource pension commitments off their balance sheets, an obligation contained in the first additional provision of Royal Legislative Decree No. 1/2002 approving the recast text of the Law on the Regulation of Pension Plans and Funds. These commitments must be implemented through pension plans or insurance contracts, and their coverage through internal funds or similar instruments involving maintenance by the company owning the reserved resources is not admissible[77]. By way of exception, credit institutions, insurance companies and securities companies and agencies can maintain internal funds for commitments made to their own workers.

Pillar 3

Finally, coverage through this voluntary pillar can be provided through contributions to private pension plans, insurance contracts or any other savings instrument. In the first two cases, it usually involves some kind of tax break, depending on the current regulations, and always with a limit on contributions. There is also a regulatory structure containing a protection framework for those who choose to contribute through a private pension scheme, enshrined in Royal Legislative Decree No. 1/2002 approving the recast text of the Law on the Regulation of Pension Plans and Funds and its implementing regulations.

3.9.3 Assessment of previous system reforms

The current Spanish pension system originated in the 1960s. The modifications introduced at that time sought to correct the financial problems in the system, essentially trying to bring the contribution bases closer to real salaries. However, at the beginning of the 1980s, the system continued to show problems of both viability and lack of social coverage, with significant levels of misuse of protection and failure to comply with the obligation to contribute.

In light of this situation, new parametric reforms were adopted during the 1980s, as well as measures aimed at simplifying the system. In this scenario, the maximum contribution ceilings were increased to enhance the contributory nature of the system and improve the level of benefits; the periods required for access to benefits were extended from ten to fifteen years and the contribution period, which serves as the basis for calculating the amount of pensions, was extended from two to eight years. For the first time, Law No. 26/1985 linked the automatic revaluation of pensions to the consumer price index and equated the minimum pension to the minimum salary. The number of systems was also reduced to less than half of those existing previously.

Despite previous reforms, the system continued to be beset with problems and, in the Toledo Pact of 1995, Congress agreed to conduct an in-depth analysis of the structural problems and the necessary reforms of the system. The text of the agreement already indicated a number of factors that could affect the financing of social

security, as well as a number of recommendations. Reference was made to demographic variables such as the fall in birth rate and the increase in life expectancy, with the consequent problem of the aging of the population[78]. Reference was also made to employment, the low activity rate, the dependency ratio, the financing of the system and social changes such as the incorporation of women into the workforce. It was recommended that the sources of funding be separated, that the reserves be constituted with balanced budgets, that the financing of the Special Systems be modified, that the collection mechanisms be improved, that fraud be combated and that the management bodies (collection and benefits) be integrated, among other items.

Along these lines, various reforms have been introduced since the beginning of this decade that shape the current system. Among them is the reform introduced in 2011 that extends the retirement age, under the terms discussed above. Similarly, Law No. 35/2002 and its implementing standards adopt measures to promote active aging. Subsequently, Royal Decree-Law No. 5/2013 furthered this reform, trying to strengthen the system's sustainability. It introduces the possibility of making the pension compatible with self-employed or salaried work, which is very restricted in Spanish legislation to date, this being the usual thing in the laws of surrounding countries. This allows workers who have entered retirement at the legal age and who have long contribution periods to be able to reconcile full- or part-time employment with the collection of 50% of the pension, with limited social contribution obligations. Royal Decree-Law No. 5/2013 also refers to the fact that the measures adopted by Law No. 27/2011 were insufficient to ensure the viability of the system in the long-term, tightening the conditions for early retirement.

Furthermore, Law No. 23/2013 of December 23, regulating the Sustainability Factor and the Revaluation Index of the Social Security Pension System, introduces another substantial reform in anticipation of access to retirement by the baby-boom generation, which will result in a significant increase in the number of pensions over a long period of time (2025–2060). Unfavorable demographic developments and the deep economic crisis had forecast the emergence of deficits in social security accounts, forcing the adoption of this reform.

However, despite the latest reforms, the progressive increase in pension spending and the deterioration in the Social Security Reserve Fund have led to a new debate on their sustainability, resulting in a follow-up and evaluation committee of the Toledo Pact Agreements in Congress to analyze the system's situation at the end of 2016. After a long debate that lasted for several years, on November 10, 2020 Congress published the recommendations approved by the Committee under the concept of making improvements to the current system, rejecting the replacement of the allocation system with a capitalization system[79]. They recommend adapting the financing of the social security system to the nature of the protection, so that non-contributory benefits are financed through State contributions, the maintenance of the purchasing power of pensioners through the annual revaluation of their pensions on the basis of the real CPI, as well as their guarantee by law and their preservation through the adoption of measures to ensure the future social and financial equilibrium of the system.

With regard to the possible parametric reforms, they propose the adaptation of contribution bases and periods, evaluating the progressive extension of the period for calculating the pension base and the extension of the required contribution period, by law to reach a pension of 100% of the regulatory base. The report highlights the need to preserve and strengthen the *contributory* principle, without prejudice to the system's cohesion. They state that the maintenance and improvement of minimum pensions using a structure and amounts that do not discourage contribution is appropriate. With regard to retirement age, they point out that two basic lines of action need to be strengthened: promoting continued active employment of workers and addressing the situations of vulnerability that the extension of working life can generate in certain groups.

With regard to sufficiency, they understand that an appropriate benchmark should be set, which could be the replacement rate (which they define as the percentage of the average pension divided by the average salary of the employed workers), and establish a territorial scope for comparative measurement; in particular, that of the most advanced countries of the European Union. In addition, they believe that structural measures should be taken to ensure the equalization of pension coverage

between women and men, and to promote gender equity. In this regard, in anticipation of the future reform currently being negotiated, Royal Decree-Law 3/2021 of February 2, which adopted measures for the reduction of the gender gap, among others, replaces the maternity supplement by demographic contribution with a supplement aimed at reducing the gender gap. Here, the number of children is the objective criterion used to determine the measure, as their birth and care is the main cause of the gap[80].

Finally, it should be noted that the report also refers to issues related to improvements in system management, including the struggle against fraud, with a convergence analysis of the various schemes to reduce them to two: employed workers and autonomous workers, moving toward the full equality of rights and obligations of self-employed workers with those of the general system. They point out that the measures necessary to bring the contribution bases of the self-employed closer to their actual income must be promoted as part of the social dialog, and information obligations must be fulfilled so that citizens can have individualized, regularly provided information on their future pension rights.

Another important Committee recommendation concerns supplementary systems and the need to boost employment pension schemes supported by collective bargaining. Finally, with regard to the third pillar, they recommend greater transparency in their management.

3.9.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

Public pensions in Spain are managed through an allocation system, so the contributor does not assume financial risks at this stage. By contrast, the funds accumulated by contributions made to supplementary defined contribution pension systems are owned by the worker, who assumes the financial risk of the assets in which they are invested.

It was mentioned above that in Spain there is an obligation for companies to outsource pension commitments included in labor contracts or in collective bargaining off their balance sheets. These commitments must be implemented through pension plans or insurance contracts, and their coverage through internal funds or similar instruments involving maintenance by the company owning the reserved resources is not admissible. In this way, and notwithstanding the obligation to outsource, in the coverages provided under defined benefit plans (practically extinct in Spain) the financial risk lies with the sponsoring company, which assumes the commitments under the plan. This risk could be transferred to an insurance company once outsourced, with the sole exception of financial institutions, and securities companies and agencies, which can retain this risk through their commitments to their own workers.

Demographic and unemployment risks

For the coverages offered by the public pension system, by following an allocation scheme, demographic and unemployment risks are assumed by the public sector, which can lead to problems of budgetary sustainability in the medium- and long-term in the event of their materialization. In turn, in the coverages provided under defined benefit plans of the second pillar, the demographic risks in the accumulation phase fall on the sponsoring company that assumes the commitments under the plan. However, the obligation to outsource requires these commitments to be implemented through pension plans or insurance contracts; once they are outsourced, the obligation and responsibility of the companies for these commitments is limited exclusively to those assumed under such insurance contracts and pension plans. Thus, in the case of defined benefit plans, demographic risks (both idiosyncratic and aggregate or systematic) would be transferred to an insurance company.

Inflation risk

The average of the contributions made in the last 25 years is considered when calculating the amount of the public pension at retirement. Those for the two years before retirement are calculated by their nominal value and the rest are revised based on the development of the consumer price index. This system virtually eliminates, for the pensioner, the risk that inflation could have on purchasing power in the pre-retirement phase of not making the adjustment, transferring it back to the public sector.

For defined benefit plans in the second pillar, it depends on the formula used for their calculation. However, as mentioned earlier, as in most pension systems worldwide, in the Spanish system this type of scheme is tending to disappear.

Post-retirement period (distribution phase)

Financial risks

In Spain, public pensions follow an allocation system, so the financial risks in the pension payment phase are assumed by the State. The financial risk to the assets, in which the funds accumulated by the contributions made to the supplementary defined contribution systems are invested, are held by the pensioner, who assumes the risk of the investment. They are able to transfer this risk to an insurer by acquiring a life annuity in exchange for a premium, in which case the pensioner assumes the counter-party risk with the insurance company.

Notwithstanding the obligation to outsource, the financial risk falls on the sponsoring company that assumes the commitments under the plan in the coverages provided under second-pillar defined benefit plans. This must be transferred to an insurance company, in compliance with outsourcing regulations. Once outsourced, the obligation and responsibility of the companies for such commitments shall be limited exclusively to those assumed in such insurance contracts and pension plans.

Demographic and unemployment risks

As in the accumulation phase, following the Spanish pension system as an allocation scheme, demographic and unemployment risks are borne by the public sector, which may lead to medium- and long-term budgetary sustainability problems as these risks occur. In order to mitigate this risk, the current legislation provides for the application of the sustainability factor, which introduces indexing to the pension calculated at the time of retirement, depending on the development in life expectancy. Thus, part of the effect of the risk is transferred to the pensioner. This could lead to a drop in the replacement rate in the future. This measure only applies to new retirees and not to pensions currently in progress, and was first applied starting in 2019.

Regardless of the obligation to outsource the funds, for coverages provided under defined benefit plans of the second pillar, the demographic risks, both idiosyncratic and aggregate or systematic, fall on the sponsoring company that assumes the commitments under the plan. In the case of idiosyncratic risk, the smaller the group, the higher the risk. However, as set out above, the obligations of such plans must be transferred to an insurance company. Once these funds have been outsourced, the obligation and responsibility of the companies for the aforementioned commitments are limited to those assumed in the insurance contracts and pension plans through which outsourcing is implemented.

Inflation risk

Finally, the risk of inflation is currently assumed by the State when the pensions are updated every year, based on the general price index through the State Budget Act. The legal method of calculation (which is suspended) provides that the annual pension is revised on the basis of an index. This index takes into account the rates of change in the income of the social security system, the number of contributory pensions, the average pension and the amount of income and expenditure of the social security system, with a minimum increase of 0.25%. If this mechanism were to be applied again, it would mean that the risk of inflation would not be transferred to the State in its entirety, and could have a partial impact on the purchasing power of the current pensions. In this regard, the Toledo Pact Commission, in its November 2020 report, has recommended that the update be reintroduced definitively in line with price developments under the next reform underway.

3.10 Japan

3.10.1 Regulation of the current pension system

The regulation of the current Japanese public pension system is contained in the 1954 Employee Pension Insurance Act and the National Pension Act of 1959. It created a universal pension coverage system for all residents of Japan under the title "*Kokumin Nenkin*" (KN), which, although under various modifications, remains in force today. The 1985

reform, under which the current social security and pension system was designed, considers a basic national pension (flat rate), a compulsory additional pension dependent on the payment of contributions and income level, and private voluntary coverage as a savings system.

As regards supplementary systems, the main regulation is found in the Defined Benefit Employment Pensions Act and the Defined Benefit Employment Pensions Act of 2001.

3.10.2 System description

Pillar 0

At this basic level of protection, coverage is provided through various non-contributory pensions in order to achieve greater coverage and minimize poverty risks for older people (known under the name "*Onkyū*"):

1) *Basic old-age pensions for low-income groups*. Low-income groups may be exempt from paying part or all of the flat KN pension contribution rate. The upper annual income limit for the total or partial exemption varies depending on the size of the household; once exempted, these people are qualified to receive half of the full basic old-age pension, which is financed by transfers of general income.

2) *Two-tier old-age benefits for persons with parental leave*. Japanese parents can enjoy a one-year parental leave (for husband and wife combined) each time they have a baby. During parental leave, they are exempt from paying the KNH (*Kosei Nenkin Hoken* - Employee Pension Insurance) contributory pension, but receive credit for old-age pensions as if they had continued to earn the same salary they had at the time before the leave. Thus, the old-age pension benefits of persons accrued during parental leave are ultimately assumed by contributions from other participants.

3) *Pension rights due to a contribution gap*. Companies and employers withhold their employees' pension contributions from their monthly salaries. However, for those who fall short on their payments to the Japan Pension Service (JPS) due to financial difficulties or bankruptcies, these generated gaps are offset by contributions made by other participants in the system.

4) *Health care pensions for low-income elderly groups at the start of the program*. The basic old-age pension is normally paid to those who have contributed no less than 25 years. However, when the KN began, those between the ages of 36 and 49 in 1961 were entitled to a lower basic pension with shorter contribution periods (ranging from 10 to 24 years); as for those over the age of 50 in 1961, they were not entitled to basic pensions. To alleviate the situation, "social pensions" are provided after the age of 70 years, under proof of income, financed entirely by transfers from general income.

5) *Basic disability pensions for persons qualified as disabled, mentally or physically, for children under the age of 20*.

Pillar 1

The compulsory public pension system consists of a life annuity with two elements: the first involves an equal amount for all pensioners, which is determined annually (*basic retirement pension*), and a second element (*Employee Pension Insurance* - KNH) that depends on parameters related to the working life of those who receive it, whom employers must accept into the compulsory pension plan for employees[81].

The first element of this pillar (*basic retirement pension*) is allocation-based, financed partly from the contributions of companies and workers, but also partly from contributions by the State. As for the second element (*employee retirement pension*), in principle it is an allocation system, but it allocates part of the contributions to the establishment of a government-managed reserve fund backed by investments, without any link through individual accounts for the workers. Today, this reserve fund is one of the two largest in the world, along with that of Norway.

The scheme is compulsory for employees in companies with more than five workers, and it is the most important of the whole system. Traditionally, companies had the option of a partial second pillar through the presentation of an alternative pension scheme. Their employment allowed them to benefit from a reduction in contribution rates, both for employees and for employers. This option was followed by many companies, with around 15% of the working population covered by this form, but it is no longer available and is becoming extinct.

As of 2015, both the *basic retirement pension* and the *employee retirement pension* were consolidated and are the same for all types of employees, both private and public. Notwithstanding any transitional arrangements that may survive, the differences between the pensions of both types of employees are essentially determined by the second pillar (supplementary company pension schemes and additional benefits for public employees, respectively).

Contributions

In the first pillar pension system, the contribution depends on the level of income. The normal percentage is 18.3% (9.15% paid by the company), with a ceiling for incomes exceeding 230% of the average salary of the Japanese economy. Minimum and maximum monthly salary limits are used to calculate contributions, which are adjusted for the increase in the national average salary.

Retirement age

The retirement age for access to the basic pension element is 65 years, with a minimum contribution period of ten years. The age of access to the second element of the pension, in addition to the basic pension, is also 65 years with a minimum contribution of at least one month, provided that the pensioner is eligible for the basic pension. However, there is currently a transitional system for the retirement age for access to this second component, and this will be fully implemented in 2025 for men and 2030 for women.

Also, early retirement is possible from the age of 60, but is strongly penalized (6% less per year earlier), and this age is gradually being increased to 65 years for both the basic pension and the employee pension. In addition, it is possible to postpone retirement with a bonus of 8.4% per year (for those born before 1942; for everyone else it is tabulated between 12% and 88%, depending on the retirement age). Vested rights continue to accumulate after 65 years.

Furthermore, since the 2006 reform, it is possible to combine collecting a pension with paid work, as long as total income does not exceed 480,000 yen per year; after this limit, half of the excess would be reduced from the income-related pension (Pillar 2), while the basic pension will be fully collected (Pillar 1). Therefore, it is intended to encourage workers not to collect their pension (although they can still do so) until age 70, bearing in mind that, if the retirement becomes effective at age 65 with 40 years of contributions, the pensioner would receive 100% of the basic pension. However, deferring retirement to age 70 could increase the amount to 142% of the pension.

Qualified years and contributions relevant to the calculation of the pension

The amount of the basic pension is fixed each year and, in 2020, amounted to 781,700 yen (6,416 euros) per year. Its amount is revised each year in April, depending on the development in salaries until the pensioner reaches the age of 67, and on the basis of prices from the age of 68. In order to be entitled to the full amount it is necessary to have contributed for 40 years, with a reduction in the case of lower contribution periods[82]. For its part, the income-linked pension element is calculated based on a formula that considers the contribution bases over the entire working life[83] (there is a ceiling to the salaries that are taken as the basis for contributions).

Applicable pension limits (maximum and minimum pensions)

Under this first pillar, there are ceilings for basic pensions that vary according to retirement age and contribution time. The maximum annual pension (fulfilling the retirement assumption at 65 years and having contributed to the system for 40 years) was 781,700 yen in 2020 (which can be increased if the retirement age is chosen to be deferred), while the lower limit with 60 years of age and 25 years of contributions would be 547,190 yen per year[84].

Pension revision mechanism

The pension is revised once a year, based on the CPI in Japan. This method of indexing was introduced in 2000, since prior to the reform (1973 regulation) the process was based only on increases indexed to the average disposable income of active workers, regardless of the age of the beneficiary. In this sense, and after the reforms, the basic pension is indexed to net salaries until the pensioner turns 67, and after the age of 68 it is indexed to the CPI.

Future increases in life expectancy

Japan's pension sustainability strategy is to extend the retirement age as much as possible, penalizing premature benefits and encouraging their delay. In the case of the basic pension, the scheme of bonuses to increase the average effective retirement age to 75 years is being considered.

Pillar 2

The main employment supplementary social insurance instruments under the second pillar of the Japanese pension system in its current configuration have their origin in two laws, adopted in 2001. The first is the *Defined Benefit Corporate Pension Act*, which established two types of plans, one based on a fund-type legal arrangement, involving an equal number of company and worker representatives, and a contract-type arrangement with an entity that can be a trust bank or a life insurance company that manages it.

The second notable legal provision in that year was the *Defined Contribution Plan Act*, which allowed the possibility of establishing such plans, both employment and individual, for the first time. In the case of occupational (employment) defined contribution plans, an authorized management entity must be contracted to comply with the information requirements of asset management, beneficiary data and the payment of benefits, in accordance with the agreement signed between the employer and the employees.

Defined Benefit Corporate Pension Act

The objectives of the Defined Benefit Corporate Pension Act of 2001 were to unify the regulations and tax provisions of defined benefit plans while improving the security of retirement income for plan participants. Specifically, the law provided for a greater variety of fund designs than were available under the existing Employees' Pension Fund (EPF) system, and imposed stricter funding rules for employee benefits than those of the previous TQPP (Tax Qualified Pension Plan). In addition, the law defined the fiduciary obligations of pension plan sponsors for the first time, including enhanced disclosure requirements for plan operations to pension plan participants. The law also introduced rules for transferring rights and obligations from one type of pension fund to another, including conversion from a defined benefit plan to a defined contribution plan.

The 2001 Act regulates three different categories within the defined benefit plans:

- *Contract-type DB plans*, similar to the previous TQPP plans, but under stricter regulation concerning the requirements of the existence of funds to support commitments, the obligations of management entities and transparency requirements. Under these provisions, a minimum number of participants is not necessary and the transfer of assets to another plan is possible.

- *Fund-type DB plans*, similar to the previous EPF plans, but without the possibility of partially replacing the social security coverage that existed in those plans (reducing social security contributions). Such plans require a minimum of 300 workers and administration by a board of directors and an assembly of delegates.

- *Balance sheet cash plans* where commitments are not outsourced, but each employee has a dummy account on the employer's balance sheet. The account figures are based on the notes for the employees' contributions based on their agreed salary and working conditions, as well as the guaranteed capitalization interest rate specified in the plan.

Defined Contribution Plan Act

The Japanese government supported the adoption of the Defined Contribution Plan Act in 2001 for several reasons. First, unlike defined benefit plans, this law gave employers more options for retirement plans, including limiting their pension obligations under the new defined contribution plans. Second, Japan's increasingly mobile workforce seemed compatible with the portability of individual accounts. Third, it was thought that defined contribution plans would encourage people to focus on retirement planning in anticipation of the planned reduction in social security benefits previously approved in 2000. Finally, the Japanese government hoped that the introduction of defined contribution plans could stimulate the flow of assets from individual retirement accounts into Japanese financial markets.

The provisions of the new law established two types of defined contribution plans: (i) a *corporate plan* (requires that the regulatory rules of the plan be approved by the majority of

workers or their representatives), and (ii) an *individual plan*, the latter for both self-employed workers and other people who wish to contribute, provided they are enrolled in social security. Contributions are tax deductible, both for employers and the self-employed, within certain limits, and the income generated by investments is exempt from taxation. Benefits must begin to be collected upon reaching the age of 70, but may be received from the age of 60 under certain conditions.

Prior to the reform in the beginning of 2000, Japanese employers generally used three types of retirement systems for employees. First, since 1952, but virtually extinct today, *book reserve plans* (BRPs) were established, consisting of the traditional way of providing severance indemnification to departing workers in the form of a lump-sum benefit. It was an unfunded pay-as-you-use method with reserves classified as liabilities on the company's balance sheet. The changes to the tax code in 1952 provided incentives for companies to establish an internal account (or BRP) for their severance program, allowing companies to make regular contributions to their BRP plan with favorable tax treatment. However, since companies had no legal obligation to reserve funds to compensate for accrued liabilities with employees and the loss of the tax-deductible status as of 2020, it is a scheme that has received practically no funds.

Japan's second corporate pension system, *tax qualified plans*, was established in 1962 and abolished in 2012. These plans were funded by employers and voluntary employee contributions, although they were unusual. Under this scheme, employers could deduct their contributions from corporate taxes; employer contributions were either a specific amount or a percentage of payroll; they were deductible as a business expense, thus being one of the most popular private retirement packages in Japan. After a period of high growth in investment and employment that began in the late 1980s, the Japanese business sector entered a prolonged depression in 1992 that lasted more than a decade. Lower profitability of the plans, lower contributions from the participants and the accumulation of deficits resulted in the inviability of *tax-qualified retirement pension plans* due to lack of sufficient funds for the protection of all plan participants. In addition, the rights and responsibilities of employers and members of the plan were not clearly defined. For these reasons, the 2000 pension legislation determined that a new tax-qualified pension plan could not be established and that existing ones should be converted into the new defined benefit or contribution plans or liquidated in 2012. They could also be converted into mutual retirement subsidy schemes for smaller enterprises.

Finally, in 1966, *the employees' pension fund* (EPF) system was established, the proposed reform of which in 2020 is based on gradually extending the eligibility of part-time workers and other short-term workers to join the program. *Employees' pension funds* are independent legal entities that are administered by a management committee, comprising an equal number of employer and employee representatives. This committee decides whether to manage the assets of the fund internally or to hire management from a trust bank or a life insurance company. Assets can also be subcontracted to the Pension Fund Association, the association of all employee pension funds.

Pillar 3

The personal pension plans that would fall under the third pillar are based on direct contracts between participants and managers. They enjoy the tax breaks established by the Defined Contribution Plan Act (2001) discussed in the previous section, in order to promote retirement planning in anticipation of the planned reduction in social security benefits previously approved in 2000, as a result of increased pressure on the sustainability of the public pension system due to the advanced aging of the Japanese population. Contributions are tax deductible, within certain limits, and the income generated by the investments is exempt from taxation. Benefits must begin to be received by the age of 70, but may be received starting from the age of 60 under certain conditions.

3.10.3 Assessment of previous system reforms

The Japanese pension system was first introduced in the late 19th century, during the Meiji period, when a public system for "white-collar" groups was established that focused on

state coverage of the army, navy and public officials. Later, in 1920, it expanded to a larger number of public workers, mainly from the countryside, known as "blue collar." However, a comprehensive pension system for national government employees was only established in 1949, under the name "Kyosai Nenkin" (Mutual pension).

On the private side, in 1942, the first Self-Employed Pension Insurance Act was enacted under the name "Rodosha Nenkin" (Worker pension), where both the premium to be paid and the benefit to be obtained from the pension in proportion to salaries were established. In 1944, it was amended by the Employees' Pension Insurance Act, providing coverage to a greater number of private sector employees. In 1954, through the Employees' Pension Insurance Act, it was amended again under the name "Kosei Nenkin" (Employee pension) from an income-related pension to a two-tier benefit system, which includes fixed-rate benefits that included salaried workers.

However, it was not until 1961, when the National Pension Act was passed, that universal pension coverage was created for all residents of Japan under the name "Kokumin Nenkin." This remains in force today, albeit under various modifications, and highlights the reforms of 1985 through which the social security and pension system was designed, consisting of three pillars: (i) basic national pension (flat rate); (ii) compulsory additional occupational pension (depending on the payment of contributions and income level); and (iii) private pension as a savings system (this also included a disability pension and orphans' pensions).

3.10.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

Firstly, public pensions, both the basic element and the parameter-based element, are managed through an allocation system, so the contributor does not assume financial risk at this stage. These risks remain, in any case, on the public sector side. As regards the funds accumulated from contributions made to supplementary pension systems (second pillar) by active workers and those of the sponsors that have contributed to them, they are the property of the worker, who assumes the financial risk of the assets in which they are invested.

Furthermore, in defined benefit plans such as cash plans, in which it is the employer's own balance sheet that covers the pension commitments made with its employees, the materialization of risks of both a financial and demographic nature falls on the employer as the plan's sponsor. In these cases, however, workers are exposed to the risk of bankruptcy of the sponsoring company.

Demographic and unemployment risks

For the coverages offered by the public pension system, demographic and unemployment risks are assumed by the public sector, following an allocation system. For coverages provided under defined benefit plans or funds managed internally in the employer's balance sheet, the demographic risks in the accumulation phase are for the sponsoring company that assumes the commitments under the plan. Along with financial risks, these can be transferred to an insurance company; however, estimates of obligations under defined benefit plans involve factors such as the turnover rates of workers leaving the company without vesting before retirement or the estimates of salaries of active workers to consider when determining the benefit, the risk of which remains in any case with the sponsoring company that assumes the commitments of the plan.

In defined contribution plans, demographic and unemployment risks that can lead to insufficient funding to supplement their public pension with reasonable replacement rates fall on workers.

Inflation risk

The public pension element of the basic pension is an annuity that is updated at least every year by inflation, so the risk of inflation is assumed by the State. The parameter-based element depends on the average contribution salary during working life. There is no explicit indexing for inflation in the Japanese system, so the risk is borne by the employee. However, the average salary to be considered is subject to a corrective factor that takes into account,

among other factors, the age of the person who retires, which can compensate in whole or in part the risk of inflation assumed by the worker in this accumulation phase.

For defined benefit plans, it depends on the formula used to calculate them; if they consider the most recent salary of the active worker, the risk is assumed by the sponsoring company, and if they are fixed amounts, it will depend on whether clauses have been agreed for the revision of these amounts based on price developments. As for defined contribution plans, the risk of inflation lies with the worker, who must obtain the corresponding coverage through the return on their investments.

Post-retirement period (distribution phase)

Financial risks

In the case of Japan, in public pensions and to the extent that they follow an allocation system, the financial risks are borne by the public sector. The assets, in which the funds accumulated by the contributions made to the supplementary defined contribution systems of the second pillar are invested, are held by the pensioner, who therefore assumes the risk of the investment. This risk can be transferred to an insurer by acquiring a life annuity in exchange for a premium, in which case the counterparty risk with the insurance company is assumed. In defined benefit plans, the bankruptcy of the sponsoring company could jeopardize the benefits of pensioners.

Demographic and unemployment risks

By following an allocation system in the coverage offered by the public pension system, demographic and unemployment risks are borne by the public sector, both in the pre- and post-retirement stages, which could lead to certain problems in terms of budgetary sustainability should they materialize. In coverages provided under defined benefit plans, demographic risks (both idiosyncratic and aggregate or systematic) fall on the sponsoring company that assumes the commitments under the plan; in the case of idiosyncratic risk, the smaller the company the greater the risk. In any case, these risks, together with the financial risks, can be transferred to an insurance company.

In the case of defined contribution plans, the demographic risk is assumed by the pensioner. In cases where the accumulated funds are converted into a life annuity by payment of a premium, demographic risks (both idiosyncratic and aggregate or systematic) would be assumed by the insurance company.

Inflation risk

As indicated above, in April of each year, the amount of public pensions is revised based on the CPI. However, the public pension element of the basic pension is fixed each year and its amount is revised based on salary development until the pensioner reaches the age of 67, and in relation to prices from the age of 68. Therefore, the risk of inflation in the distribution phase is borne by the public sector. With regard to payments from life annuities for those persons who have decided to convert the funds of the defined contribution plans into this type of income, the risk will depend on agreed terms for income growth and on the development of inflation.

3.11 South Korea

3.11.1 Regulation of the current pension system

The regulation of South Korea's public pension system is covered by the National Pension Act (No. 3902 of 1986) and its successive amendments, which state that the National Pension Plan should contribute to the stabilization of public support and the promotion of national welfare, providing pension benefits for old age, disability and death.

With regard to the supplementary pension system, the Employee Retirement Benefits Security Act (No. 7379) of 2005 is designed to contribute to ensuring the stable livelihoods of workers in their old age, indicating the issues necessary to establish and operate a retirement benefit plan for workers. This law introduced employment pension plans and rules on the basic structure and salient issues of pension plans. It applies to all companies or workplaces employing workers, except for businesses employing only relatives living with their employer and employment activities within households.

3.11.2 System description

Pillar 0

South Korea's social assistance program, known as the *National Basic Livelihood Security System* (NBLSS), is designed to cover all low-income people who meet the corresponding requirements, providing supplementary benefits to ensure that beneficiaries reach the minimum income guaranteed by the government. It is a non-contributory social benefit financed by the State out of general income, which offers cash benefits and medical, housing, education, childbirth, funeral and self-sufficiency benefits. The right to participate in the plan is determined by an assessment of the means of living of beneficiaries and their immediate families. The system was introduced in 2000, and was reformed in 2015.

Two other major public aid programs complement the National Basic Livelihood Security System: (i) the *basic pension*, and (ii) the *pension and allowance for people with disabilities*. Funding for these programs comes from state and local governments. To receive these benefits, people seeking either form of assistance must apply to local governments.

South Korea introduced the Basic Pension in 2014 as a supplement to the National Pension Service, and as a replacement for the Basic Old-Age Pension. The Ministry of Health and Social Welfare offers a monthly allowance to persons over 65 whose income, including the pension they may be collecting, is below a certain limit. Rights to this supplement are subject to the age requirement of the person requesting it, and the minimum income and wealth limits are fixed each year (also considering those of their partner).

Pillar 1

In South Korea, the share of the pension under this compulsory pillar consists of a public pension (*national pension*) calculated on the basis of parameters related not only to the salary received during the working life of the pensioner, but also to the average salaries of the sum of all persons covered in the country.

Contributions

The current contribution rate for the general scheme of employees is 9% of their salary. Both the employee and the employer contribute 4.5% each. The contribution is calculated by multiplying the insured's standardized average monthly salary by the contribution rate. The standardized average monthly salary range is adjusted each year, with the minimum and maximum fixed in July[85]. The standardized average monthly salary is a basis for the calculation of contributions and is also an important factor in the calculation of the amount of pensions.

There is a monthly cap to the contribution bases for the national pension of 5,030,000 won (KRW), and a maximum monthly pension contribution to be paid by the employee of 226,350 won (these amounts are reviewed annually in July) for the period from July 2020 to June 2021[86]. In addition, employers must allocate an amount of approximately 8.3% of the salary to meet their obligation in South Korea to pay employees at the time of retirement an amount equivalent to one month's salary per year worked. However, the legislation does not oblige the employer to outsource this commitment, but rather allows an internal fund on the company's own balance sheet to be established. It is also possible to outsource it to a pension fund, an insurance company, an asset management company or to a financial institution. As this is voluntary outsourcing by the employer, it is discussed in more detail under the second pillar of this paragraph[87].

Retirement age

The legal retirement age[88] for the South Korean National Pension Service is gradually increasing to 65 years starting in 2033. It is currently 62 years of age. Early retirement is also possible from age 57, and this age is gradually rising to 60.

Working career-related factors: qualified years, relevant contributions and pension calculation

The retirement pension in South Korea is calculated by applying a target replacement

rate to the average amount of the worker's salaries, taking into account the worker's entire working life. The target replacement rate in 2020 was 44% after 40 years of contributions, and is declining by 0.5 percentage points to reach 40% in 2028. The pension benefit is calculated as half of the target rate, multiplied by the average lifetime salaries of the individual valued on the basis of nominal salary growth, and half of the average of the salaries of the insured group measured during the previous three years and valued in accordance with prices (value A), the latter being a basic element of the contributions of the contributory system. The maximum pension thus calculated cannot exceed 100% of individual income. Pensions currently being paid are indexed to prices. People over the age of 60 do not contribute and, from then on, no more pension rights are earned. There is a ceiling on pensionable salaries of around 206% of the value A[89].

Applicable pension limits (maximum and minimum pensions)

The limits applicable to pensions are regulated under Article 53 of the National Pension Law (maximum amount of the pension), which provides that the monthly pension shall not exceed the greater of the following two amounts: (i) the average amount of standardized monthly salaries for the last five years of the insured period, which shall be adjusted based on the year prior to the commencement of pension payments in accordance with Article 51, paragraph 1)2, adjusted based on Article 51, paragraph 2; and (ii) the average amount of the standardized monthly salary during the insured period, which is adjusted on the basis of the year preceding the start of pension payments under Article 51(1)2, adjusted under Article 51(2).

Pension revision mechanism

In South Korea's pension system, benefits are adjusted annually based on changes in the Consumer Price Index for the prior year.

Future increases in life expectancy

South Korea has a reserve fund to deal with potential imbalances that may occur between contributions and benefits under its pension system, the third largest in the world in terms of accumulated funds after Japan and Norway. The National Pension Service Investment Management (NPSIM), launched in 1999 for the purpose of professionally managing the South Korean National Pension Fund, has become a global institutional investor with assets under management of 752 trillion won at the end of June 2020 (633 billion US dollars).

The governance for the administration and investment of this fund is strictly specified in the National Pension Act. According to the Act, the main program of the NPSIM, including investment plans and performance evaluation, is discussed and approved by the Management Committee of the National Pension Service Fund ("Fund Management Committee") which, as the supreme decision-making body, is composed of representatives of employers, employees and insured persons and appropriate government agencies. While the Minister of Health and Welfare is responsible for managing and investing the fund, the actual administration is subcontracted to NPSIM, and executed by NPSIM through professional investors.

Every year, the Ministry of Health and Social Welfare draws up the Management Directive for the National Pension Fund, which comes into force after its finalization by the Management Committee of the National Pension Fund. It complies with Article 103 of the National Pension Act, especially with regard to investment and fund management. The Directive helps investment managers to implement investment policies and strategies and to achieve management objectives, as a declaration of the investment policies of the National Pension Fund[90].

Pillar 2

The second pillar of the pension system in South Korea consists of pension plans and a system linked to severance payment (*the severance payment system*). As discussed above, employers must allocate approximately 8.3% of their employees' salary to satisfy the obligation to pay them a lump sum equivalent to one month of the base salary for each year of service. The base salary is calculated as an average of three-month pre-retirement salary. However, the legislation does not oblige the employer to outsource this commitment, but allows it to be outsourced as a contribution to a pension plan, among other options.

In addition, in 2005, the *Employee Retirement Benefits Security Act* introduced employment pension schemes. In order to establish the plan or to change to a different plan, the employer must receive the consent of the union representing the majority of its workers, and if there is no union, the employer must receive the consent of the majority of its workers.

Retirement pension plans are governed and managed by individual contracts between employers and trustees. The employer concludes a contract with the retirement pension trustees after obtaining workers' consent. Only qualified entities, such as banks, insurance companies, securities companies and others that are authorized and registered with the Financial Services Commission (FSC) to provide trust services can provide pension services.

There are two types of pension plans: (i) the *Defined Benefit Retirement Pension Plan*, and (ii) the *Defined Contribution Retirement Pension Plan*. Benefits from these plans are provided as a lump-sum payment on retirement, or as an annuity.

Defined benefit plans are based on a formula that often includes years of service and a percentage of salary. The sponsoring employer bears the risk of ensuring that benefits are available at the time of retirement. To this end, it will accumulate minimum reserves calculated by multiplying the reserves of standard obligations by the coefficient prescribed by the presidential decree of the law, which has been higher than 80/100 since 2016. The amount of benefits is equal to or greater than 30 days' average salary for each consecutive year of service.

In *defined contribution plans*, the level of contributions an employer must make to pay benefits is predetermined. Plans provide individual accounts for members. The employer who has established the plan shall pay contributions in cash, amounting to one twelfth or more of the total annual salaries of a pension holder, into the account of the pension holder. The pension holder assumes the risk in this plan type.

The *individual retirement pension plan* (IRP) is created to deposit and manage the lump sum paid by pension holders according to their choice or the contributions paid by the employer or pension holder. The benefit level and contribution level are not defined in this plan.

Employer contributions are recognized as expenses. In the case of defined benefit plans, the amount reserved internally is recognized as expenses up to the limit determined by the Company Tax Act. Taxes on investment returns differ until retirement.

Defined benefit plans can usually be converted to defined contribution plans, but the conversion of defined contribution plans to defined benefit plans is not allowed. Upon the death of the plan participant, benefits may be passed on to any surviving spouse or other family members.

Pillar 3

Employees covered by a defined contribution plan or an individual retirement pension plan may pay additional contributions at their own expense, in addition to employer contributions. Additional contributions to individual retirement pension plans may not exceed 18,000,000 won per year (2018)[91]. Since June 1994, a personal pension plan could be contracted on a voluntary basis in South Korea.

3.11.3 Assessment of previous system reforms

The public pension system in South Korea consists of the National Pension Service (NPS), introduced in 1988, and a series of special public pension plans for government employees (introduced in 1960), the military (1963) and private school teachers (1975).

The National Welfare Pension Act was supposed to be implemented in 1974, but its introduction was postponed indefinitely following the oil price crisis of 1973. Finally, the National Pension Service was implemented in 1988 to secure retirement benefits for Korean citizens. This is a defined benefit program, combining revenue-related and redistributive elements. It provides compulsory social security coverage through old age, disability and survivor pensions. The National Pension Service administers the program under the supervision of the Ministry of Health and Welfare.

All residents of South Korea between the ages of 18 and 59, regardless of their income, are covered by the National Pension Plan. Foreigners between the ages of 18 and 59 who reside in the country are also covered, with some exceptions. Even if they meet the general rules for coverage, public employees, military personnel, private school teachers, specially designated employees working for post offices, who are covered by separate pension plans, and national pension beneficiaries aged between 55 and 59 are excluded.

In South Korea, there are other pension schemes for public sector employees, which were introduced previously and operate independently of the National Pension Service. The *Government Employees Pension Plan* was introduced in 1960. It guarantees the social protection of government employees and their surviving spouses through retirement pension benefits, survivor and disability pensions or other one-off payments. The benefits are paid out from the funds made up of contributions from government employees (9%), employer contributions from state and local governments (9%), and the benefits obtained from the management of the funds. If there is a case in which annual income cannot cover the year's expenses, the deficit will be additionally covered by state and local governments to ensure the stable disbursement of the benefits expected.

The *Teachers' Pension Scheme* was introduced in 1973 and launched in 1975. It provides a life annuity and other miscellaneous benefits in the event of retirement, death, occupational illness and disability of private school personnel. The pension fund is financed by a fixed rate of contributions from school staff, school institutions and the government, as well as by the fund's operating profits. The government makes partial contributions through school management institutions. Contribution rates have increased progressively from 16% in 2016 to 18% in 2020. In the case of teachers, the employee pays 9%, school institutions 5.3% and the State 3.7%. For all other personnel, the rate is 9% for the employee and 9% for the school.

The *Military Personnel Pension Plan* began in 1960 as part of the Government Employee Pension Plan, but then separated from this in 1963. Most military personnel retire much earlier than other public officials, with shorter contribution periods and longer benefit periods.

Compulsory and other voluntary insurance are available under the National Pension System (NPS). Compulsory insurance is further subdivided into *workplace-based insurance* and *individual insurance*. The difference between the two is the way in which contributions are made to the system. While the contribution for workplace-based insured persons is shared by the employer and the employee, the contribution for individual insured persons applies fully to the insured person. Minors under the age of 18 working in an NPS-covered place may participate in the National Pension System as an "insured at the workplace," with the consent of their employer. The category of individual insured persons includes self-employed persons, persons 27 years of age or older without any income, and persons without income between 18 and 27 years of age who have paid at least one month of contribution.

Furthermore, those voluntarily insured pay all the contributions themselves and are subdivided into *voluntarily insured persons* and *voluntary and continuous insured persons*. Voluntarily insured persons include the following categories: (i) a person without any income whose spouse is an insured person or a beneficiary under a public pension; (ii) a person without any income who is less than 27 years old and has never paid any contribution; (iii) a person protected by the National Basic Life Security Act; and (iv) retirees entitled to benefits under the Government Employees Pension, Military Personnel Pension, Private School Teachers' Pension and Specially Designated Post Office Employees Pension.

Insureds lose their insured status at the age of 60. However, those who want to continue to contribute to the system to meet the minimum period for obtaining an old-age pension, or to increase the amount of pension benefits, can continue to participate in the National Pension. For this case there are *voluntary and continuous insured persons*. Also included in this category are foreigners who have reached the age of 60, or employees with special occupations, such as miners or fishermen under the age of 60 who are entitled to old-age pensions. *Voluntary and continuous insured persons* are in turn divided into *voluntary and continuous insured persons at the workplace*, *individual voluntary and*

continuous insured persons and *other voluntary and continuous insured persons*.

The National Pension Service has been expanding its coverage to different segments of the population throughout its history, through different amendments to the Law. In this regard, in January 1992, coverage was extended to workplaces with five or more employees; in July 1995, coverage was extended to residents in rural areas and, in April 1999, to residents in urban areas.

Among the amendments to the National Pension Act, the 1998 amendment, which introduced several major policy changes in the National Pension Service, is worth mentioning. The average income replacement rate was reduced from 70% to 60%, and retirement ages adjusted from 60 to 61 years in 2013. Thereafter, one year will be added to the retirement age every five years, up to 65 years in 2033. The minimum required to qualify for the pension was also reduced from 15 years of service to 10 years. A split pension benefit system was introduced: in the case of divorce of a couple married for at least five years before the retiree turned 60, pensions are divided between the retiree and the ex-spouse.

In 2007, there was another major reform that reduced benefit levels by lowering the replacement rate. For example, the benefit level was immediately reduced for an average salary earner with 40 years of participation in 2008, from 60% to 50%, and will be revised each year by 0.5 percentage points to finally reach 40% in 2028. Finally, the reform introduced the *Basic Old-Age Pension Scheme* to alleviate the poverty of older people who did not have the opportunity to join the National Pension Plan because of its short history; this plan that was replaced in 2014 by the Basic Pension.

3.11.4 Risk analysis

Pre-retirement period (accumulation phase)

Financial risks

The South Korean National Pension Service is a defined-benefit system that combines income-related and redistributive elements, and in which the insured does not assume the financial risk, which remains on the public sector side. As noted above, in retirement pension plans, the employer assumes the financial risk in defined benefit plans and the insured assumes it in defined contribution plans and individual retirement plans.

The challenges facing the South Korean National Pension Service in managing its large Pension Fund Reserve, which as of June 2020 amounted to 752 trillion won, include the fund's increasing impact on the domestic financial market and the prolonged trend of low interest rates. In this regard, in order to utilize private sector experience and diversify the sources of benefits, it is partially outsourced to external asset managers for the management of the fund. In addition, the National Pension Service has been investing overseas in order to minimize the impact that the excessive assets of the national economy would have on the domestic market, and to improve yields under the principles of public benefit and liquidity. Foreign investment began in 2001, with investments in Korean foreign-currency bonds, and has since been diversified by asset class. The NPS is currently investing overseas in real estate, private capital, infrastructure and hedge funds, as well as equities and fixed income.

Demographic and unemployment risks

In South Korea's public pension system, demographic and unemployment risks are also borne by the public sector, which could lead to sustainability problems in the future. In employment pension plans, the demographic risks in the accumulation phase fall on the sponsor of the plan for defined benefit plans, while in defined contribution plans it is assumed by the insured.

Inflation risk

In calculating the amount of the pension, one of the factors taken into account is the average income of the insured, measured over the previous three years and valued in relation to prices, with the State assuming the risk of inflation.

Post-retirement period (distribution phase)

Financial risks

In the South Korean public pension system there is an imbalance between low contributions to the National Pension Plan and high

benefits, making the system financially weak and vulnerable. The financial risks in this distribution phase are borne by the State through a redistributive system of defined benefits.

In retirement pension plans, the employer assumes the financial risk in defined benefit plans and the insured assumes it in defined contribution plans and individual retirement plans. The latter may transfer the risk to an insurer or other financial entity authorized to perform such transactions when obtaining a life annuity.

In retirement pension plans, the amount of benefits depends on the last monthly salary before retirement and not on an average of lifetime salaries, as is the case with the NPS. To the extent that the final salary is higher than the average lifetime salary, this way of calculating benefits increases the financial burden on retirement pensions.

Demographic and unemployment risks

As in the accumulation phase, demographic and unemployment risks are borne by the public sector, due to a redistributive system of defined benefits.

Inflation risk

While the NPS uses the consumer price index to index benefits, employment pension schemes depend on salary growth for indexing. Therefore, the risk of inflation in the public pension system is on the public sector side, while retirement benefits are more influenced by changes in labor market conditions and less by price behavior.

4. Indicator of pressure on pension systems

As can be seen from the analysis carried out throughout this study, pension systems are permanently exposed to pressure for reform. There are multiple factors that influence this pressure, which can be grouped into two large blocks. The first would include those factors that have their cause in deficiencies of the system related to *adequacy* of pensions, meaning those that could generate situations that would prevent pensioners from maintaining a certain standard of living after retirement. The second block concerns those factors that affect the medium- and long-term *sustainability* problems of pension systems.

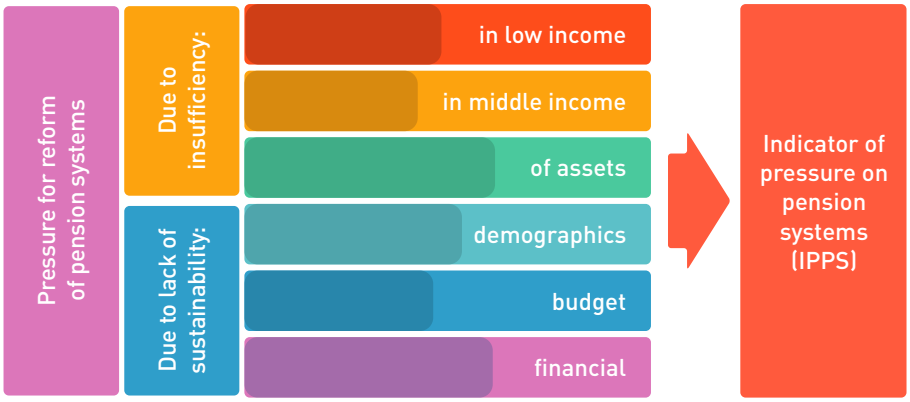
Thus, as a supplement to the analysis of the 11 reference models in the previous section of this report and in order to provide a more global perspective on the problems facing retirement pension systems around the world, this section presents the results of a summary indicator developed by MAPFRE Economics. This allows us to measure, for a set of 45 countries, the pressure for reform to which their respective systems are exposed.

It should be noted that this summary index, the *indicator of pressure on pension systems* (IPPS), is not intended to express an opinion on the goodness or relevance of the design of pension systems, since this would involve a high degree of subjective assessment, but rather to quantify the pressure to which the various pension systems are subjected, taking into account a set of factors that can be measured and that are indicative of potential problems of sufficiency and/or sustainability, and that, as a result, increase the pressure for their reform.

4.1 Construction of the indicator

As indicated above, a set of factors grouped into two blocks have been considered in the construction of the IPPS. Firstly, as regards the indicators associated with the *adequacy* of pension systems, the indicator is based on three ratios:

Chart 4-a
Construction of the indicator of pressure on pension systems (IPPS)



Source: MAPFRE Economics

Adequacy indicators

- Pressure from insufficiency of pensions in low incomes.
- Pressure from insufficiency of pensions in middle incomes.
- Pressure from shortage of assets in retirement plans.

And secondly, as regards the indicators associated with the medium- and long-term *sustainability* of pension systems, the IPPS considers the following ratios:

Sustainability indicators

- Demographic pressure.
- Pressure from high replacement rates of public pensions.
- Pressure from ratio of public debt to gross domestic product (GDP), corrected by country risk rating.

For each of these six factors, a specific, scaled indicator has been developed, so that the increased pressure toward pension reform is associated with a value of 100 in each of the specific indicators. Therefore, the summary indicator (IPPS) is a weighted average of the specific indicators, attributing the same weight to the different factors when calculating the weighting.

Adequacy indicators

Within the first block, from the factors related to potential *adequacy* problems affecting the pressure for reform of pension systems, three indicators have been included based on information published by the Organization for Economic Co-operation and Development (OECD). Two of these are based on *gross replacement rates* for the various pension systems, one *for low incomes* and the other *for middle incomes*[92], so that the lower the replacement rates, the greater the pressure will be for reform of the system. The third *adequacy* indicator considered relates to the *volume of assets accumulated in specific retirement plans*[93], so that a higher volume of assets reduces pressure for system reform.

Sustainability indicators

Moreover, the second block includes factors related to *sustainability*. The first of the indicators in this block is demographics, the trends of which directly affect the workforce and the percentage of people who reach retirement age. The trends predicted over the coming decades through to the end of the century move unambiguously toward increasing pressure for pension reform, especially in systems where the allocation elements have a greater weight.

This demographic indicator has been constructed on the basis of *the status of the workforce in relation to the population over 65 years of age in 2020* (support ratio 20–64/65+) and the *average annual percentage of the foreseeable decline of this ratio over the next 30 years* (2020–2050). This indicator, and its evolution over time, is critical in assessing the sustain-ability of retirement pension systems, as it is directly related to their main source of funding (workforce contributions) and the number of pensioners, especially in those systems where the burden of the pillar of public pensions based on an allocation system is greater. This latter circumstance is considered through the two additional factors included in this block.

The second indicator considered in this block is *the replacement rate from the public pension element*, so that the higher the replacement rate for that public element, the greater the pressure for reform of the system related to its sustainability, taking into account demographic developments that tend to reduce the ratio of the labor force for each retiree.

Finally, the third indicator considered concerns the financial capacity of governments to cope with the financing of the pension system in the event that contributions may not be not sufficient to cover the expenditure of ongoing pensions, thereby incurring a budget deficit from its pension system. Thus, the lower the financial capacity, the greater the pressure for reform stemming from its sustainability. This third indicator has been built on two factors. The first is the *ratio of public debt to GDP*, and

the second is the *credit rating of country risk*. This latter factor can correct the first, so that with a similar public debt/GDP ratio, the country with the better credit rating has less pressure, as it is easier for it to finance a possible budget imbalance in its pension system[94].

4.2 Indicator results

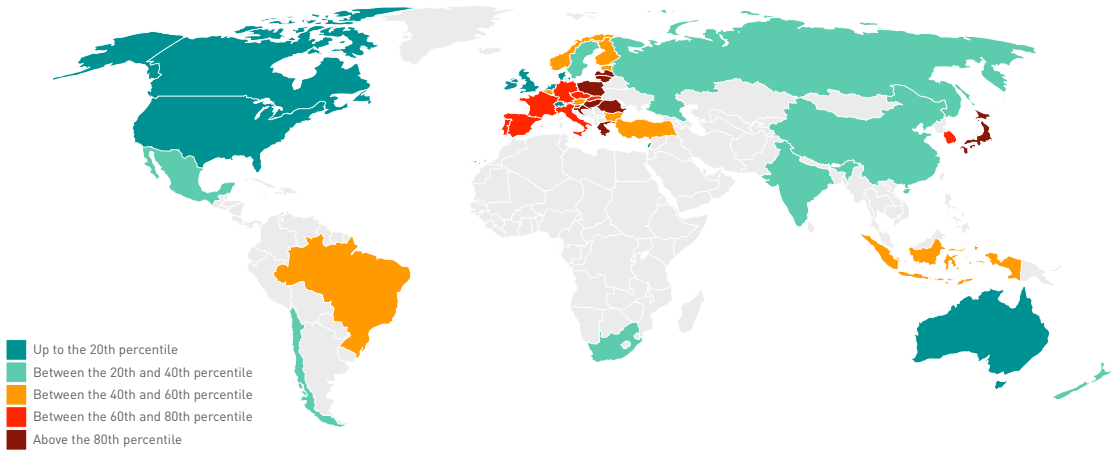
Table 4 shows the result of the *indicator of pressure on pension systems* (IPPS) for a total of 45 countries for which all the required information could be collected, as well as the values for the six indicators used in its construction. Similarly, Chart 4-b illustrates the different levels of pressure related to IPPS at the global level, highlighting the regions of the world that present a more acute problem in this regard.

As can be seen from this information, the country which is currently least under pressure for the reform of its pension system is Denmark, both in terms of *sufficiency*, by achieving high pension replacement rates for their retirees (even above 100% for lower incomes), as well as due to the high level of assets they have in retirement plans (which in 2019 accounted for 219.7% of GDP), and in terms of sustainability, by presenting relatively low related indicators of public pension and financial spending that offset the negative effect of the relatively high indicator of demographic pressure in this country. The analysis is very similar to that of the Dutch pension system, the second system with the lowest pressure on the list. The United States also has a low level of pressure for reform, standing at position 42.

At the top of Table 4, showing greater pressure for reform, are the pension systems of Greece and Poland (1 and 2 in the IPPS classification), although for different reasons. In the case of the Greek pension system, the main reason lies in indicators showing a lack of sustainability, while in the Polish system the pressure lies in indicators related to pension insufficiency. In both cases, however, the low level of assets in retirement plans contributes to the fact that the IPPS results are the highest on the list.

For its part, Japan is the first of the large economies with a higher IPPS indicator, mainly because of demographic pressure (the greatest in the world), in addition to financial pressure (because of the high level of public debt relative to GDP) and the relative shortage of assets in retirement plans. While high in absolute terms, in relative terms it represented 28.6% of GDP in 2019 (significantly below the OECD average of 99.9%).

Chart 4-b
Indicator of pressure on pension systems (IPPS)



Source: MAPFRE Economics (with data from the United Nations, OECD and OEF/Haver Analytics)

Table 4
Indicator of pressure on pension systems (IPPS)

	Country	IPPS	Pressure for reform of pension systems					
			Due to insufficiency:			Due to lack of sustainability:		
			in low income	in middle income	of assets	demo-graphics	budget	financial
1	Greece	77.3	60.1	56.0	100.0	84.4	63.3	100.0
2	Poland	72.9	100.0	90.3	96.7	72.2	35.3	43.1
3	Lithuania	72.2	91.3	100.0	96.6	72.5	31.8	41.0
4	Romania	71.4	99.9	90.1	97.5	68.6	22.8	49.3
5	Slovenia	70.4	78.3	74.7	97.1	77.5	48.9	45.7
6	Japan	68.4	56.3	46.2	87.4	100.0	41.1	79.4
7	Croatia	67.5	88.5	74.1	86.7	75.3	21.7	58.9
8	Latvia	67.5	82.1	65.0	92.8	71.5	53.4	40.5
9	Hungary	67.2	68.4	45.7	97.9	69.8	67.2	54.1
10	Italy	66.3	40.6	6.6	95.4	85.6	95.3	74.5
11	France	65.7	63.6	39.1	95.6	73.8	69.6	52.5
12	Portugal	65.6	45.1	15.1	91.0	83.5	89.2	70.1
13	South Korea	65.5	69.0	77.1	87.6	77.3	47.9	34.4
14	Spain	65.2	49.2	18.7	94.4	82.1	86.6	60.4
15	Slovakia	64.1	64.3	56.6	94.6	67.0	62.3	39.7
16	Malta	62.7	56.0	75.0	78.0	74.6	52.3	40.2
17	Germany	62.4	73.0	52.2	97.0	75.2	46.3	30.8
18	Czech Republic	62.2	46.0	62.8	96.4	72.0	62.7	33.2
19	Turkey	61.9	55.0	26.8	99.0	53.5	80.8	56.5
20	Norway	61.7	75.1	63.5	95.4	61.2	46.1	28.8
21	Austria	60.6	44.1	11.5	97.6	70.4	91.7	47.9
22	Finland	60.4	67.9	45.0	73.3	74.2	67.7	34.3
23	Brazil	59.8	25.7	41.0	88.5	55.5	83.9	64.4
24	Indonesia	58.4	69.4	47.1	99.6	47.8	39.7	46.7
25	Belgium	58.0	50.0	37.5	84.4	68.8	55.0	52.4
26	Bulgaria	57.4	52.7	23.6	94.2	73.0	57.5	43.2
27	Estonia	57.1	62.1	60.8	91.9	72.2	27.1	28.7
28	Chile	56.5	92.0	87.3	63.6	58.7	2.0	35.6
29	Mexico	56.3	77.7	67.6	91.9	46.9	7.1	46.3
30	China	55.9	27.5	19.8	99.5	60.7	90.8	37.2
31	India	54.5	35.9	0.0	99.5	40.8	100.0	50.7
32	Russia	53.6	36.8	22.5	97.8	57.9	62.7	43.6
33	Sweden	52.7	70.8	49.0	54.9	66.9	45.6	28.9
34	Luxembourg	52.2	26.4	7.8	99.1	58.5	97.8	23.4
35	South Africa	51.5	76.6	57.3	57.1	34.9	25.3	57.5
36	New Zealand	49.4	19.8	43.5	86.2	60.8	58.1	27.8
37	Switzerland	48.3	72.1	68.5	28.2	69.5	27.6	24.2
38	Ireland	48.3	28.3	34.4	83.0	63.9	39.6	40.5
39	United Kingdom	47.9	48.8	54.5	44.3	65.3	31.8	42.7
40	Australia	47.4	57.9	87.8	37.8	58.8	13.6	28.6
41	Canada	43.2	49.6	32.3	27.8	62.4	47.8	39.6
42	United States	41.6	38.9	21.9	32.0	58.2	49.0	49.7
43	Israel	39.4	19.6	30.0	71.3	48.2	26.4	41.1
44	Netherlands	37.7	47.7	20.9	11.9	70.9	42.4	32.5
45	Denmark	25.2	0.0	15.1	0.4	65.6	40.0	30.1

Source: MAPFRE Economics (with data from the United Nations, OECD and OEF/Haver Analytics)

In Europe (which, along with Japan and South Korea, shows the greatest pressure on these types of reform), pension systems in countries such as Italy, France, Portugal and Spain have high indicators of pressure for reform, essentially because of demographic pressure and other indicators related to its sustainability, coupled with the shortage of assets in retirement plans.

In Latin America, Chile and Mexico show a moderate level of pressure, essentially arising from pension inadequacy indicators for low and medium incomes. In Brazil, pressure for reform is somewhat higher (although moderate, partly because some reform has been underway in recent years), and stems from factors related to budgetary and financial sustainability, as well as from insufficient assets in retirement plans.

5. Public policies and pension systems

5.1 Exogenous factors affecting the sufficiency and sustainability of pension systems

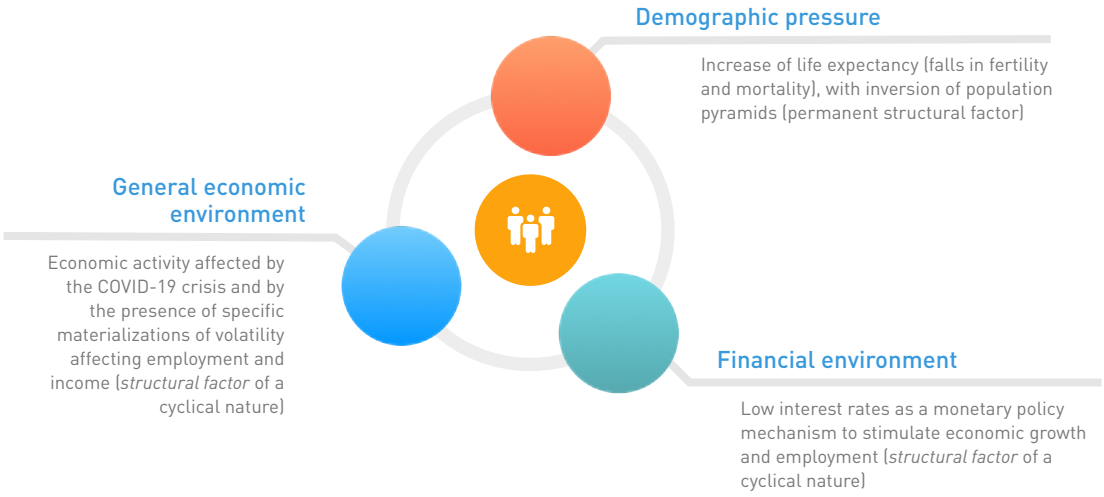
There are many factors that exert a great influence on pension systems, many of them *endogenous* in nature (derived from the system's own configuration architecture), and others *exogenous*, such as demographic, economic and financial factors, notably the interest rate environment among the latter. These exogenous factors are linked to the level of pressure to which pension systems are subjected, as they affect the elements determining their sufficiency and sustainability (see Chart 5.1).

Demographic pressure

The development in demographic trends is one of the main factors (permanent structural factor) as it directly affects the workforce and the percentage of people who reach retirement age. This is a factor that points to the sustained increase in pressure on the sustainability of pension systems, especially in those systems where the allocation components have a greater weight. This is due to the progressive and marked reduction of the relative weight of the labor force in relation to people who reach retirement age projected for the coming decades until the end of the century, a process that will affect all countries and regions of the world without exception, although more immediately and more drastically so in developed countries.

In this regard and in line with what was pointed out in our 2017 report[95], since the second half of the last century societies in different parts of the world have been presenting, with varying levels of intensity, a demographic pattern that tends to converge on a global level: the increase in life expectancy, accompanied by reductions in fertility and mortality rates. This demographic trend has resulted in significant alterations in population pyramids, which have transitioned from *expansive* pyramids (at the beginning of the 20th century), to *constrictive* pyramids (since the end of the last century). From the available population projections, a tendency to converge

Chart 5.1
Exogenous factors that affect medium- and long-term sustainability of pension systems



Source: MAPFRE Economics

toward *stationary* pyramids starting in the second half of the 21st century can be seen.

The situation caused by the COVID-19 pandemic reminds us, however, that there are certain catastrophic events (low frequency and high severity) of an unpredictable nature that can significantly alter the demographic trends described. In this case, the current case fatality rate of the SARS-CoV-2 virus, unless it suffers any mutation that significantly increases it, does not appear to be sufficient to alter the main conclusion of the increase in longevity. Furthermore, scientific advances made in the production of vaccines and the uncertainty regarding the ability of science to extend human life beyond the limits we now conceive may work in support of greater increases in longevity. Everything therefore indicates that this trend, together with the potential materialization of other risks, will affect pension spending. This implies the need for further progress in adjusting the schemes that support them, in order to make them financially sustainable in the long-term.

Economic environment

In addition to the demographic pressures associated with population phenomena (permanent structural factor), there are other structural factors with circumstantial effects such as employment, income level or interest rate environment, which contribute to making attention to the long-term sustainability of pension systems more pressing.

In this regard, the abrupt fall in economic activity caused by the lockdown and social distancing measures implemented to deal with the health effects of the COVID-19 pandemic (estimated to have led to a fall in world GDP of around 3.5% in 2020[96]) is coupled with the moderation in the pace of economic activity caused by the economic and financial crisis of 2008–2009, which together with the presence of isolated events of volatility have had important effects on employment and income levels in many societies.

Financial environment

Furthermore, there are also factors linked to the financial environment that may affect the adequacy and sustainability of retirement pension systems. Among these factors is the low interest rate environment that will last for several years in much of the major world economies. While it is a monetary policy mechanism that continues to be very useful in stimulating the growth of economic activity and employment, it also has unintended consequences on the rate of accumulation in savings and pension funds.

Other financial factors relate to the ability of governments to cope with the financing of the system in the event that contributions may not be sufficient to cover the cost of ongoing pensions, incurring a budget deficit as a result of its pension system. As indicated in this report when discussing the structure of the indicator of pressure on pension systems (IPPS), the lower the financial capacity the greater the pressure for reform related to its sustainability. These factors also include the status of the ratio of public debt to GDP and the country risk credit rating.

In general, it can be said that the result of the interaction of this group of demographic, economic and financial factors shows a trend toward the deterioration of the technical and financial foundations of retirement pension systems for which, in many cases and under their current parameters, their medium- and long-term sustainability may be questioned.

5.2 Endogenous factors: adjustment mechanisms and measures in pension system reform

From the general analysis of the reforms implemented in the reference models of this study, it follows that the effect on the medium- and long-term sustainability of pension systems produced by the above-mentioned demographic, economic and financial factors can be absorbed or corrected through a set of mechanisms and measures. Unlike the *exogenous* factors expressed, in which public intervention is carried out through economic policy (fiscal and monetary) with a more general and indeterminate influence on pension systems, public intervention on *endogenous* factors (related to the systems' own architecture and parameters) are conclusive, and are the factors on which the reforms focus.

The 11 systems selected in this study are characterized by covering, at least in their most important features, a spectrum of the different schemes that currently exist. They provide a broad enough outlook to support general conclusions and to develop a comprehensive list of the main adjustment mechanisms and measures that are being influenced by the various pension systems reforms in relation to the configuration of the different systems themselves, in order to achieve an adequate balance between their adequacy, sustainability and control of the risks to which they are exposed (mainly resulting from factors classified as *exogenous*).

Thus, in the present study, the mechanisms that appear to be the most relevant for the analysis and implementation of public policies concerning the pension problem have been identified and considered in depth. This list of mechanisms and measures revises the list presented in our 2017 study, going into detail on the measures relating to the adjustment of replacement rates through the parameters on which different pension system reforms tend to focus.

In this regard, these measures would include: (i) maintenance of a basic social support scheme; (ii) increase in the retirement age; (iii) adjustment of contribution rates; (iv) adjustment of budgetary transfers for the payment of pensions; (v) adjustment of replacement rates; (vi) creation of incentives for businesses to create and manage supplementary pension plans; (vii) establishment of tax incentives for voluntary medium- and long-term individual savings also designed to supplement pensions, and (viii) greater transparency for workers regarding the pension that they will be able to receive (see Chart 5.2).

Strengthening of a basic social support scheme

In all the reference models analyzed, including the new systems, the provision of basic non-contributory social support schemes (Pillar 0, in accordance with our conceptual framework) is an essential constant. Although they constitute non-contributory pension support in accordance with the conceptual framework set out in this study, the support they provide is considered to be an integral part of any pension system, to the extent that they grant a flow of income in retirement age to vulnerable groups of the population through cohesive mechanisms.

As countries have progressed, their societies and governments have assumed the responsibility that, regardless of the contributory capacity of the members of the community, there must be a minimum of social support for people when they reach an age when they are no longer able to rely entirely on their work for subsistence. Moreover, when this basic pillar of social support extends not only to vulnerable people, but also to a minimum for those who receive a pension based on contributory criteria, it is a way of partially mitigating the effect of the materialization of risks (demographic, economic and financial) in favor of pensioners regarding the level of their pensions.

Raising the retirement age

One tool that continues to demonstrate a high degree of effectiveness in countering the impact of risks affecting the sustainability of pension systems is the increase of the retirement age, to which the amount of pensions and replacement rates is highly sensitive. From a financial point of view, deferring the retirement age generates a double positive effect: on one hand, it extends the contribution period and, on the other, it reduces the period for receiving benefits. Virtually all the reforms analyzed make use of this instrument as an essential part of the adjustment of pension systems.

In addition, from a broader perspective, the increase in the retirement age seems to be consistent with the very phenomenon of longevity. To the extent that science's capacity for the extension of human life has been associated with the extension of its physical and intellectual capabilities, it is consistent with allowing people to continue to contribute to society longer through their labor.

Adjustment of contribution rates

Another adjustment measure observed in some of the major reforms of the pension systems analyzed relates to adjustment in contribution rates, both in allocation schemes (defined benefit) and individual account models (defined contribution). It is clear that one way of counteracting

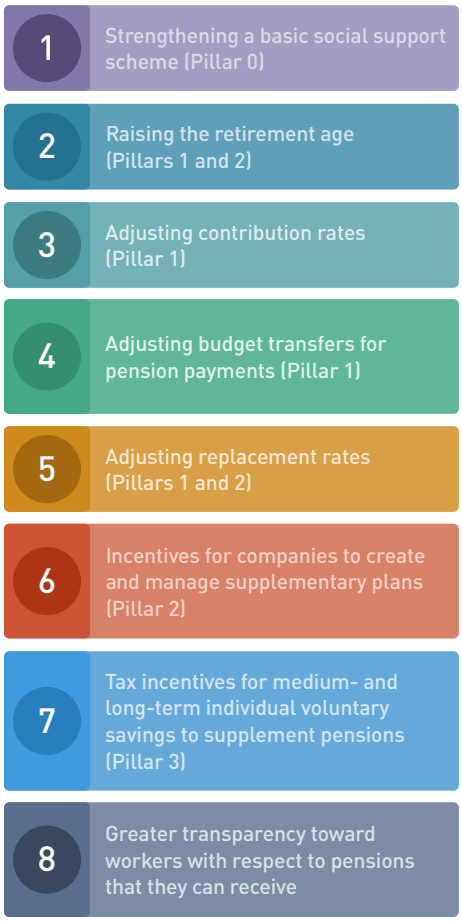
the negative effect of demographic, economic and financial risks lies in the possibility of increasing the rates applied for pension system contributions, specifically those under Pillar 1.

Of the 11 reference models analyzed, six have aggregate contributions for the first pillar above the Organization for Economic Co-operation and Development (OECD) average of around 18.4%[97]. The lowest contribution system is South Korea, with a percentage of 9%. Below average are also the systems of the United States, Chile, Brazil and Japan, notwithstanding differences in the contributions and accumulated assets of these latter systems in the second and third pillars, which are significantly higher in the case of the United States.

However, it is important to note that while the increase in contribution rates has clearly positive effects on the financing of pension systems, their implementation is limited by the growth in real salaries (when the contributions come from workers); by the performance of economic activity and the productivity levels of the economy (when contributions are supplemented by employers); or by the strength of public finances (when they receive additional support from the State). This is therefore a tool which, if improperly implemented, may generate undesirable adverse effects on the economy in general and, through this transmission mechanism, on the pension systems themselves.

In the same vein, it should be noted that several of the reforms analyzed have supplemented their adjustment measures by aligning contribution bases with real wages, by raising the maximum contribution ceilings and by extending contribution periods that serve as the basis for calculating the amount of pensions.

Chart 5.2
Summary of measures and adjustment mechanisms in the reform of pension systems



Source: MAPFRE Economics

Adjustment of budget transfers for pension payments

The financing problems of Pillar 1 defined benefit pension systems find their first pressure point in public finances. As has been raised throughout this study, in this type of pension system (defined benefit), virtually all risks are borne by the State and their materialization (in the form of demographic pressures or a drop in economic activity and employment) has an impact on public budgets, which must manage deficits created between the benefits to which the systems are bound and the contributions they receive.

However, budgetary transfers for this purpose cannot be unlimited or permanent, but only transitional throughout the implementation period of adjustments that give long-term financial sustainability to pension systems. This issue is not just about the pension problem, but one that also touches on elements associated with maintaining sound macroeconomic fundamentals. In virtually all of the reference models analyzed in this study, this principle can be seen behind the measures and adjustments made: in some cases, using these

types of budgetary transfers simultaneously with the implementation of other measures (increase in retirement age and/or contribution rates), while in others, limiting in an absolute sense the use of this mechanism to focus on the structural elements that make pension systems sustainable.

Adjusting replacement rates (parametric reforms)

In the defined benefit pension systems of Pillar 1 (allocation), the replacement rate is ultimately an important variable of adjustment through the different parameters that define the amount of pensions, apart from the supplement established through the other pillars. In defined contribution systems, the replacement rate results from the amount accumulated in the individual accounts of the workers, which is determined, in turn, by the contributions themselves and the income generated by the accumulated funds (net of commissions). So it cannot be altered by parametric reforms in the calculation of pensions beyond the greater or lesser flexibility of retirement age, the options on withdrawal of accumulated funds, or the financial and biometric variables used for the calculation of annuities, as applicable.

The decrease in the replacement rate is the direct reflection (in the form of a loss of purchasing power when reaching retirement) of the inadequacy of resources for financing pensions, both in the defined benefit and defined contribution systems. Just as in the defined benefit pension systems of Pillar 1 (allocation), the first pressure point when forced to tackle problems arising from the materialization of the risks to which they are exposed is the need to use budgetary resources to support the deficit of contributions in relation to benefits; in defined contribution systems under Pillar 1 (individual accounts) this pressure point is reflected in the drop in replacement rates (relationship between retirement income and the last nominal salary as an active worker).

The parameters that determine contributory pension in systems with allocation components in their first pillar, and which are often adjusted in parametric reforms of pension systems (in addition to contribution rates and the regular retirement age), are very numerous. The following are the most common parameters from the analysis of pension system reforms carried out in this study:

- *Revised average contribution bases or regulatory bases* (pensionable salary). The number of years considered in the calculation of the average is a parameter that can greatly influence the final amount of the pension and is always subject to review in the various reforms we have analyzed, in those systems that use it. The salary revision mechanism to correct the effect of inflation is also very significant. Finally, some systems consider only part of pensionable salaries when averaging, usually the higher salaries in order to reduce early retirement incentives. The regulatory bases are related to the contribution bases, which depend on the salary as well as on the maximum and minimum limits applicable to the contribution bases at each moment.

- *Direct application of replacement rates to regulatory bases*. This is performed in some pension systems, with different percentages for different tranches, as is the case with the US system. This gives it a redistributive nature.

- *Incomplete working careers*. In relation to working life, other important parameters are the years of contributions necessary to access the contributory pension and the years necessary to accrue the entire pension corresponding to the regulatory base, as well as the percentage of penalty for each year of contributions not made in order to reach the minimum (pension in incomplete working careers = regulatory base * percentage of penalty).

- *Pension limits*. Use of maximums and/or minimums (and supplement to minimums) and indicators used for periodic updating.

- *Parameters that are involved when the ordinary retirement age is altered*. These parameters affect the pension amount in cases of early and/or deferred retirement and pension compatibility with active work. The penalty percentages in the case of early retirements, as well as the percentages of incentives for deferred retirement or of compatibility with active work (and the obligation to continue or not continue

contributing in that period) are also relevant parameters when propounding reforms.

- *Revaluation of pensions*. The parameters commonly used are the Consumer Price Index (CPI) and, to a lesser extent, other parameters such as salary developments, GDP growth and, in some cases, indicators related to the sustainability of the system (e.g. social security income and expenditure), among others.

- *Life expectancy*. Adjustment mechanisms for increases in life expectancy for people who reach retirement age that may affect – if introduced – only new pensioners or the entire universe of retired people.

- *Point systems*. Parameters for calculating the purchase price and the value of the accumulated points for retirement (as is the case with pension systems in Germany and France).

- *Parameters related to notional accounts*. This is an instrument for adapting the amount of benefits under the first pillar to contributions made during working life (as is the case with the Swedish system), in particular the parameters related to the annual revaluation applied to the amounts credited to notional accounts, as well as the revaluation percentages, interest rates and biometric tables used to calculate the portion of the pension from notional accounts.

- *Breakdown of the first pillar*. Breaking down the first pillar of pension systems into elements to which different calculation and revaluation parameters apply (as is the case with pension systems in the United Kingdom or Japan). The first element is often referred to as a flat rate benefit, applying different revision mechanisms (e.g. the triple lock in the UK).

Incentives for companies to create and manage supplementary plans

One of the most important aspects that can be drawn from the construction of the indicator of pressure on pension systems (IPPS) and the reference models analyzed in this study is that, given the complexities associated with the implementation of adjustment measures that directly address the funding problems of Pillar 1 schemes (whether defined contribution or defined benefit), it is necessary to strengthen the role of Pillars 2 (occupational schemes) and 3 (voluntary schemes).

In a general analysis, the most successful reference models in terms of counteracting the concrete effects of the demographic, economic and financial risks that have been addressed above are those that have ultimately succeeded in better balancing the relative weight of the different pillars involved in the funding of pensions. In other words, those who on one hand have combined the benefits of intergenerational solidarity with stimuli to encourage individual savings (in Pillar 1), and on the other have achieved a better dispersion of the risks to which pension systems are exposed, while also suffusing their impact among all participants (strengthening Pillars 2 and 3).

Thus, together with the maintenance and simplification of the Pillar 1 schemes (in both their defined benefit and defined contribution variants), a first element of this strategy has consisted of generating stimuli for businesses to create and manage (either directly or indirectly through professional managers) contribution-based supplementary pension plans, and specifically defined contribution plans. These mechanisms make it possible to stimulate savings by individuals at their place of work, and simultaneously create greater awareness of the importance of medium- and long-term savings, by familiarizing workers with the purpose of the contributions that will fund their pensions.

Tax incentives for medium- and long-term individual voluntary savings to supplement pensions

As indicated in the above paragraph, supplementing the funds that will be used to finance the payment of pensions with voluntary individual savings that workers make through professional managers is an element more suitable for achieving a better balance between pillars, a better system for dispersing the risks to which the pensions systems are exposed and a mechanism that provides better prospects of sustainability and stability in the long-term.

In this regard, and depending on the reference models analyzed, tax incentives related to direct tax (income tax) are explicitly considered to stimulate medium- and long-term savings

when made in company supplementary pension schemes, or (In the forms under Pillar 3) when it is channeled to financial products intended to supplement the pensions to be received under the schemes of Pillars 1 and 2. Such contributions are, in general, deductible at the time they are made, being taxed upon receiving benefits resulting from them during retirement and subject to lower marginal rates, with certain limits on annual deductible contributions, and in other cases through deductions on returns. This tax treatment will discourage its advance distribution before retirement, implicitly (by losing rights, with the obligation to settle at the time of early distribution) or by incorporating restrictions on their liquidity before reaching retirement age, allowing only the movement of funds before that time but not their distribution.

Greater transparency toward workers with respect to pensions that they can receive

Finally, it is of the utmost importance that workers (future pensioners) have as much information as possible throughout their working life as regards the implications that the set of risks that affect, or may affect, the system (specifically in the case of Pillar 1) may have on their pension. This means increasing the transparency of pension systems, in order to create awareness among active workers in a twofold sense: on one hand, regarding the expectations they may have concerning the pension they will receive (in particular from Pillar 1) and, on the other, regarding supplementary savings mechanisms (from Pillars 2 and 3) that they can access to improve the pension they will receive at retirement. In this regard, the example of the "orange envelope" that forms part of the Swedish pension system is worth noting, which informs workers of the accumulated balance in their individual (notional) account and, consequently, about the future pension they could receive.

5.3 Empirical evidence arising from the reference model analysis

Although pension systems were born in the late 19th century and became widespread in the first half of the 20th century, it was only by the end of the last century that a first wave of adjustments took place. However, the origin of this reaction to the widening gap between the retirement age and the survival limit (which is at the same time a gap between benefits and contributions) has not disappeared. On the contrary, it has since been reinforced by the higher life expectancy of the population, coupled with the effects of the materialization of other risks of an economic and financial nature.

In general, and to varying degrees of depth and intensity, the reference models analyzed in this report have been carrying out reforms to try to handle this problem, and some of them have even carried out a second wave of reforms, not only to continue to address the effect of demographic and economic phenomena that induce financial vulnerability on their pension systems, but also to correct certain unwanted consequences produced by the first wave of reforms.

From the analysis of these reference models, a set of general conclusions can be drawn.

Underpinning sustainability

Similar to what was raised in our 2017 report, the first conclusion in the analysis of the reference models is that the demographic pressure caused by widespread improvements in life expectancy, which has been accompanied by a significant fall in fertility and mortality rates, has motivated all recent reforms to be aimed at underpinning their sustainability. This being their central objective, it is all about finding formulas that permit the maintenance of the most appropriate levels of population coverage, benefits and equity, trying to avoid the introduction of disincentives to work, and thus to continue to contribute to the system. As was suggested earlier, this objective was not always achieved with the first wave of reforms, with successive reforms becoming necessary as pressure on public accounts increases or replacement rates are manifestly inadequate.

Speed of materialization of risks and management of reforms

The speed with which demographic, economic and financial risks affecting pension systems have materialized in recent years has determined that, so far, the reforms implemented in the different systems have been essentially reactive in nature. The development in

population dynamics has introduced similar patterns of behavior, with relatively generous parametric reforms in periods when dependency rates improve. This drives the amount of pensions away from the amounts contributed over the active life of workers. However, once demographic pressure increases, reforms change in their direction and move toward measures that tend to bring benefits received closer to individual contributions, and measures aimed at strengthening the second and third pillars, introducing reforms in the welfare pillar to prevent people with incomplete careers or those who cannot access a contributory pension from falling into poverty.

Supplementary instrumental measures

In addition to the kind of measures that seek to correct financial problems with the contributory element of pensions, the reforms analyzed have also included other reforms of a more instrumental nature to support that purpose. This area includes adjustments such as reforms aimed at eliminating or reducing the existence of special systems, which introduce complexity into the system, difficulties in its control and management and the coexistence of different groups of pensioners with high dispersions in their replacement rates, which is socially disruptive. Alternatively, there are measures aimed at improving collection mechanisms, the fight against fraud and management bodies (collection and benefits), in order to reduce the levels of misuse of protection and non-compliance with the obligation to contribute.

In addition, the reference models analyzed in this study consider mechanisms to revise the value of pensions and to cover the risk of inflation that may cause them to lose purchasing power. In this context, there is also a tendency to introduce mechanisms in which indexing to indicators that measure the loss of purchasing power (the consumer price index, the wage trend index or a mixture of both) are combined with other indicators related to the system's sustainability.

Better balance between the pillars of pension systems

From the review of comparative international experience presented in this report, it is clear that in the most stable systems in terms of the absence of the need for successive reforms, the strengthening of Pillar 2 (supplementary pension schemes in the employment system) and Pillar 3 (incentive to individual and voluntary savings in financial products to supplement the pension) always assumes a relevant role. However, in order to achieve the greatest stability resulting from a better balance between pillars (and, consequently, between risks), it has been necessary to maintain significant contribution percentages over long periods of time. Deep reforms that seek a substantial change in the weight of the various pillars, and in which the contributory element of capitalization plays a significant role, have only worked when they are performed well in advance, as they must be accompanied by lengthy and substantial contributions from companies and workers.

A good example of this is the Netherlands pension system, which can be taken as paradigmatic in this regard and whose reform dates back to the 1950s. In that period, contributions through second pillar supplementary pension systems enabled an aggregate fund to accumulate, which is currently one of the largest in the world. But even in this case, the estimated impact of improvements on life expectancy has led to the introduction of certain adjustments to avoid the negative effect they may have on the system's accounts.

Other systems in which the assets accumulated in supplementary retirement plans represent a high percentage of their GDP, relieving the pressure for reform of their respective systems, are those of the United States, the United Kingdom and Sweden. Other systems such as the Danish, Canadian, Swiss or Australian can be added to this, as shown by the indicators shown in Table 4 relating to the indicator of pressure on pension systems (IPPS).

Toward long-term stability of pension systems

The current economic crisis caused by the COVID-19 pandemic has exacerbated and extended the low interest rate environment that has already been affecting the developed world since the great financial crisis of 2008–2009. As mentioned earlier, this low-rate environment is an element that, together with the demographic pressures and the problems generated in economic activity as a result of the pandemic (a global exogenous shock from

which we are only beginning to emerge at a point in the economic cycle that was already marked by the sluggish economy of the post-crisis era), has lowered effectiveness and increased uncertainty in contributory capitalization systems regarding the replacement rates that people can obtain when they reach retirement age. Based on the evidence from the reference models analyzed in this report, a better balance between elements of intergenerational solidarity and incentives for individualized saving, complemented by the strengthening of Pillar 2 (occupational schemes) and Pillar 3 (voluntary schemes), seem to indicate the right way forward. However, this path involves the implementation of measures that can only mature in the medium- and long-term.

From among the catalog of adjustment mechanisms and measures, however, the only parametric reform that does not significantly alter the balance between intergenerational solidarity and loss in the level of well-being is the extension of the retirement age. The analyses carried out show that this is the most sensitive variable when introducing parametric reforms that aim to improve the system's sustainability, as far as its first pillar is concerned. Evidence of this is that all of the reforms studied, including those of the new systems analyzed in this update of the 2017 study, are already taking steps to prolong the date of retirement and facilitate active aging beyond the retirement age. For the time being, these are ad-hoc reforms that are introduced progressively by cohorts, but the option of automatically linking retirement age to improvements in life expectancy is still proposed, although so far it has not come to fruition in any of the systems analyzed.

However, as noted previously, these measures end up being insufficient if they are not combined with others, particularly strengthening the second pillar of supplementary social provision, which shows great potential in terms of the accumulation of funds, as well as strengthening the third pillar by designing incentives for individual and voluntary savings in financial products aimed at generating income at retirement age. It should be noted that, although in the reference models analyzed the accumulation of savings for old age during active life through the third pillar is relatively low, especially in lower-income sectors, it is a long-term element that can induce a high degree of stability in pension systems and improve replacement rates significantly.

Control mechanisms

Another highlight of the international comparative analysis made in this report concerns the fact that in pension systems that introduce or strengthen the components for creating a better balance between allocation (defined benefit) and individual capitalization (defined contribution) schemes, in which risks are therefore more appropriately redistributed among the state, private entities, and the active workers and pensioners themselves, the reforms analyzed introduce public control mechanisms that try to prevent the mismanagement of risks, due to inadequate functioning of the system, from ending up in situations in which people at retirement age suffer the consequences in the form of lower replacement rates.

The development of these mechanisms is important in the evidence of the reference models analyzed, and the latest reforms tend to involve public institutions to a greater extent with them being assigned greater supervisory powers. The main measures considered include:

- The creation of public compensation mechanisms for workers who have suffered a loss in their vesting rights because of the irregular functioning of agents involved in the system, as is the case in the United States.

- Outsourcing of funds intended to cover pension commitments of companies with their workers, such as the Dutch and Spanish systems. However, this is not widespread practice, as there are still systems in which the funds supporting the commitments are allowed to be kept within the company's balance sheet, such as Japan, South Korea, the United States and others, unless it is agreed that they be outsourced, usually through collective bargaining.

- The assumption by public institutions of some of the elements of the greatest risk and that could have greater impact on retired persons (such as life annuities), so that the coverage of demographic risks, both

idiosyncratic and aggregate or systematic, rests on a public company, as in the Swedish system.

- Public control over competition and commissions charged by private entities managing capitalization funds, by creating public entities participating in the system, as in the cases of the United Kingdom, Sweden and Chile.

- Reforms aimed at eliminating or reducing the existence of special regimes for highly justified cases of particularly difficult activities (e.g. mining), which introduce complexity into the system, difficulties in its control and management and the coexistence of different pensioners' groups with high, socially disruptive dispersion in their replacement rates.

- Measures aimed at improving collection mechanisms, fraud control and management bodies (collection and benefits), with a view to reducing the levels of misuse of protection and non-compliance with the obligation to contribute.

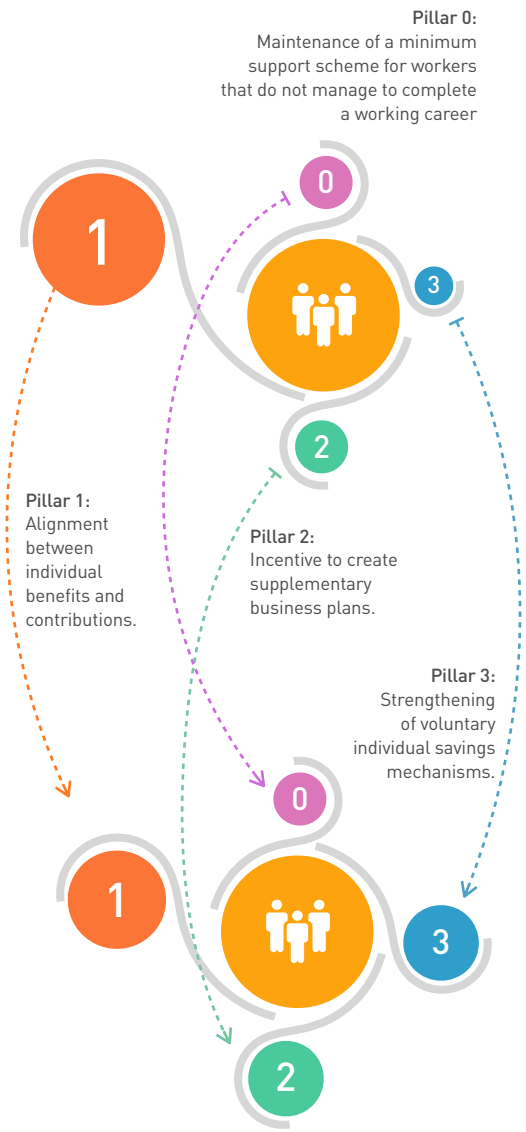
5.4. Sustainable and fairer pension systems

Pension systems are simply a mechanism that reflects a social agreement by which individual savings and intergenerational solidarity are combined in a medium- and long-term perspective, in order to protect the level of income and consumption of people when they have completed their active working life.

In this respect, the different pension systems are variants that, according to the particular foundations and characteristics of each society, combine these two elements (intergenerational solidarity and incentives to individual savings) by using technical elements to make their implementation efficient, and with the condition that they must be financially and socially sustainable in the long-term.

That's why public policies and measures aimed at addressing the sustainability challenges arising from the demographic, economic and financial risks to which pension systems are exposed can only be seen on a similar time horizon. In this way, any system whose reform is proposed with a view to generating effects in the short-term is destined to not solve the problem, and ultimately to cement the structural pressures that gave rise to it, thus increasing the probability of facing a greater economic and social shock.

Chart 5.4
Overview of the pillars in the reform of pension systems



Source: MAPFRE Economics

Based on the international comparative analysis of the reference models included in this report, it can be concluded that, given the pressure of demographic, economic and financial risks that every pension system across the globe is facing to varying degrees, the path to reform that provides the best possibilities for bringing sustainability and stability in the medium-/long-term is through creating a *better balance between the different pillars*, as a way to redistribute the risks to which these systems are exposed and, ultimately, to better absorb the impact should such risks materialize. This is the case to the extent that the effect of the materialization of these risks does not affect each pillar in the same way, as has been raised in the conceptual framework of this study. Therefore, a better combination of the relative weight of the different pillars will moderate the impact of these risks on the pension system as a whole.

As illustrated in Chart 5.4, from an instrumental point of view, the reform and adaptation of pension systems to approach the objective of creating a *better balance between their pillars* (and consequently between the related risks) can only be achieved in a medium- and long-term implementation scenario, and can be summarized in the following four public policy principles:

1) Maintenance and strengthening of a basic social support scheme (Pillar 0), i.e. minimum non-contribution-based social support aimed at those workers with incomplete careers who are therefore unable to qualify for a contribution-based pension.

2) Streamlining of a first contribution-based pillar that combines inter-generational solidarity with individual savings, thus bringing the benefits of the system in line with the individual contributions to that system. In this process, measures such as adjusting the retirement age (shown to be the measure most likely to achieve this objective), together with adjusting contribution rates, are the two essential tools.

3) The generation of incentives for companies to create and manage (directly or indirectly through professional fund managers) supplementary contributory pension plans (especially defined contributions) to complement Pillar 1 contributory pensions.

4) Implementation of incentives for medium- and long-term voluntary individual saving, which workers can channel through professional managers with financial products designed to generate an income during retirement, thus supplementing the pensions from Pillars 1 and 2.

As stated in our 2017 report, the adjustment of pension systems is perhaps the economic and social challenge most widely diagnosed by governments, specialists and society; the collective challenge on which there is a large consensus on the urgent need to take measures; and a challenge to which an adequate solution must be found for the sake of key aspects that concern not only countries' macroeconomic fundamentals but also their social stability. Paradoxically, however, it is a problem on which rather modest progress has been made, insofar as, because of its economic, financial and social characteristics, it involves enormous complexities to tackle it.

There is no doubt that existing pension systems face the need for reform and adjustment to ensure their long-term sustainability and stability. Moreover, their redesign must not only correct the financing problems resulting from the materialization of demographic, economic and financial risks, but in some cases, the systems must also address the unintended consequences of their own measures that have been implemented in the past in order to try to correct them.

The pension systems of the future must be rethought on a more structural basis. The risk-based approach that they face, proposed in our 2017 report, confirms that progress toward a restructuring that provides them with sustainability and stability in the long-term (and, consequently, greater equity) should focus on a *better balance between their respective pillars*, so that the impact of risks inherent in their operation occurring is limited and mitigated.

As noted earlier, pension systems first emerged in the late 19th century and became widespread in the world only in the first half of the 20th century. More than a century later, and after what have perhaps been the greatest

transformations in the economic structure and population dynamics in the history of the world, it has become imperative to revalue and redesign the systems if they are to remain part of the institutional infrastructure that gives cohesion to social coexistence.

The issue of pensions is, without a doubt, one of the greatest challenges for the future of our societies. It is therefore still necessary for governments to create space to consider the implementation of measures that will make them viable, which must be carried out on structural bases that will only mature in the medium- and long-term. Therefore, it is imperative that pension systems be reformed as soon as possible so that they are provided with sustainability and stability in the long-term (and, consequently, greater equity). There must also be a better balance between pension system pillars in order to limit and mitigate the impact should risks inherent in their operation materialize.

References

1/ See: MAPFRE Economics (2017), *Pension systems*, Madrid, Fundación MAPFRE.

2/ See the risk sensitivity analysis in the *defined benefit* schemes presented in: MAPFRE Economics (2017), *Pension systems*, *op.cit.*, pp. 24–25.

3/ See the exercise on risk sensitivity in the *defined contribution* schemes presented in: MAPFRE Economics (2017), *Pension systems*, *op.cit.*, pp. 27–29.

4/ See: *OECD Country profiles* (https://www.oecd.org/pensions/oecd-pensions-at-a-glance-19991363.htm)

5/ Despite originally moving toward a system similar to that of Chile, in 2008 Argentina reformed its pension system again, eliminating the individual capitalization system.

6/ See: https://population.un.org/wpp/Download/Standard/Population/

7/ Includes Europe, North America, Australia, New Zealand and Japan.

8/ Includes all regions of Africa, Asia (except Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

9/ See Boxes 2.1-b and 2.1-c in: MAPFRE Economics (2017), *Pension systems*, *op.cit.*, pp. 39–41.

10/ World Population Prospects 2019: File POP/14-B: Potential support ratio (20–64/65+) by region, sub-region and country, 1950–2100 (ratio of population 20–64 per population 65+).

11/ See: https://www.ssa.gov/benefits/ssi/

12/ See: https://www.ssa.gov/oact/cola/cbb.html

13/ See: https://www.ssa.gov/oact/cola/Benefits.html#aime

14/ See: https://www.ssa.gov/oact/cola/bendpoints.html

15/ See: https://faq.ssa.gov/

16/ See: https://www.dol.gov/sites/dolgov/files/EBSA/researchers/statistics/retirement-bulletins/private-pension-plan-bulletins-abstract-2018.pdf

17/ See: https://www.irs.gov/retirement-plans/ira-based-plans

18/ See: http://www.pbgc.gov/wr/benefits/guaranteed-benefits/maximum-guarantee.html

19/ See: https://www.pbgc.gov/wr/benefits/guaranteed-benefits/maximum-guarantee

20/ See: https://fas.org/sgp/crs/misc/95-118.pdf

21/ See: Ministry of the Economy. Federal Revenue. Pension contributions (legal entities). Retrieved from: https://receita.economia.gov.br/acesso-rapido/tributos/contribuicoes-previdenciarias-pj

22/ This is a differentiated, simplified and favored tax regime provided in Supplementary Law 123 of 2006.

23/ Fees in force since January 2018.

24/ In the previous regulations, the calculation was made on the basis of 80% of the most important contributions made since July 1994.

25/ See: National Institute of Social Security (Instituto Nacional do Seguro Social). New Social Security (Nova Previdência): confirms the principle changes. Retrieved from: https://www.gov.br/inss/pt-br/assuntos/noticias/confira-as-principais-mudancas-da-nova-previdencia

26/ See: National Private Pension and Life Federation (Federação Nacional de Previdência Privado e Vida – FenaPrevi) Open Supplementary Private Pension. Retrieved from: https://fenaprevi.org.br/conheca-a-fenaprevi/previdencia-privada-complementar-aberta.html

27/ For further details see: MAPFRE Economics (2020), *Elements for the development of Life insurance*, Madrid, Fundación MAPFRE, pp. 67–68.

28/ See: https://www.camara.cl/legislacion/ProyectosDeLey/tramitacion.aspx?prmID=9810&prmBOLETIN=9399-13

29/ See: Macías, Osvaldo (2020). *The Chilean Pension System (El Sistema de Pensiones Chileno)*. Retrieved from: https://www.spensiones.cl/portal/institucional/594/articles-14214_recurso_1.pdf

30/ See: *Compendium of Pensions (Compendio de Pensiones)*. Book II, Title IV "Joint regulation of voluntary pension savings deposits," Pension Superintendency. Retrieved from: https://www.spensiones.cl/portal/compendio/596/w3-propertyvalue-2763.html

31/ In June 2014, Chilean President Michelle Bachelet signed a bill that was not implemented to create a State Pension Fund Administrator. Also, in August 2016, the president committed herself to move to process the bill along with other measures that would introduce changes to the pension system.

32/ See: https://www.camara.cl/pley/pley_detalle.aspx?prmID=11887&prmBoletin=11372-13

33/ Individuals do not contract directly with private investment funds. The contract is between the funds and the Swedish Pension Agency, which acts as intermediary. Both the Agency and the funds are subject to financial supervision.

34/ This annual rate was expected to remain around 0.04% in 2020.

35/ 18.5% is the percentage calculated on the contribution base (salary minus worker contribution). If calculated on the salary, the total contribution is 17.21% (7% to the employee and 10.21% to the company).

36/ By way of example, in the case of ITP1 at least 50% of contributions should be invested in traditional investment funds with guaranteed interest rates. The PA 03 plan in turn requires that at least half of the funds be invested in traditional insurance.

37/ See: https://www.sns.se/en/archive/the-payout-decision-in-the-swedish-occupational-pension-system/

38/ See: https://www.gov.uk/government/publications/benefit-and-pension-rates-2021-to-2022/benefit-and-pension-rates-2021-to-2022

39/ For special cases of other population groups, the contributions can be found at https://www.gov.uk/national-insurance-rates-letters/contribution-rates

40/ For more details on contributions to employment plans see: https://www.gov.uk/workplace-pensions/what-you-your-employer-and-the-government-pay

41/ See: www.nestpensions.org.uk/schemeweb/NestWeb/public/home/contents/homepage.html

42/ See: https://www.gesetze-im-internet.de/sgb_6/

43/ Act to Improve Occupational Pensions (Gesetz zur Verbesserung der betrieblichen Altersversorgung - BetrAVG)

44/ Basic income for the elderly and those with reduced earning capacity (Grundsicherung im Alter und bei Erwerbsminderung)

45/ See: https://www.bgbl.de/xaver/bgbl/start.xav?startbk=Bundesanzeiger_BGBl&jumpTo=bgbl120s1879.pdf#__bgbl__%2F%2F*%5B%40attr_id%3D%27bgbl120s1879.pdf%27%5D__1617059010511

46/ See: https://www.bmas.de/DE/Soziales/Rente-und-Altersvorsorge/rente-und-altersvorsorge.html

47/ See example at: https://sozialversicherung-kompetent.de/sozialversicherung/zahlen-werte/1017-einnahmen-zum-lebensunterhalt-grundrentenbetraege-ab-juli-2020.html (see example)

48/ See: https://www.deutsche-rentenversicherung.de/DRV/DE/Rente/Grundrente/grundrente_node.html

49/ See: https://www.deutsche-rentenversicherung.de/DRV/DE/Rente/Grundrente/grundrente_node.html

50/ Contribution to social security in accordance with Article 226, paragraph 4 of Book V of the Social Security Code, in conjunction with Section 163(10) of Book VI of the Social Security Code (SGB VI), Article 163(10) SGB VI and Section 344, paragraph 4 of Book III of the Social Security Code in conjunction with Article 163(10) of Sozialgesetzbuch VI (Volume VI of the Social Code), that the total

social security contribution rate and factor *F* for 2020 applies to the territory of the Federal Republic of Germany as follows: the total social security contribution rate for 2020 is 39.75%; it is calculated based on the sum of the contribution rates applicable for 2020 in general pension insurance (18.6%), in legal health insurance (3.05%) and employment promotion (2.4%), as well as the contribution to statutory health insurance (14.6%), plus an average additional contribution rate of 1%. The *F* factor for 2020 is 0.7547, which is obtained by dividing the figure of 30% by the total social security contribution rate for 2020 and rounding it to the fourth decimal place.

51/ See: https://www.deutsche-rentenversicherung.de/DRV/DE/Experten/Zahlen-und-Fakten/Werte-der-Rentenversicherung/werte-der-rentenversicherung_node.html

52/ Increases are initially one month per year (standard age limit 65 to 66 years) and then two months per year from birth year 1959 (standard age limit 66 to 67 years). For all those born after 1963, the standard age limit of 67 years applies. For all those born before 1947, the age limit of 65 years is maintained. Insured persons who have completed at least 45 years of compulsory contributions for an insured employment or activity and care, as well as periods of child rearing up to ten years of age, may continue to claim an old-age pension without discount from the age of 65.

53/ There are still specific exceptions for people with severe disabilities.

54/ Until June 30, 2020, 33.05 euros West and 31.89 euros East per month. Monthly since July 1, 2020. See: https://www.deutsche-rentenversicherung.de/DRV/DE/Experten/Zahlen-und-Fakten/Werte-der-Rentenversicherung/werte-der-rentenversicherung_node.html

55/ See: OECD, *Pensions at a glance 2019*, detailed systems.

56/ 2001 Reform of the Employment Pension Act of 1974 in order to stimulate the provision of funds for the retirement pension "Altersvermögensgesetz – AvmG"

57/ Betriebsrentenstärkungsgesetz – BRSG (https://ww1.issa.int/node/195546?country=860)

58/ Starting in 2018, the establishment of a business pension for low-income employees will receive special tax incentives. The employer pays employees with a gross monthly income of up to 2,200 euros per year, 480 euros in a company pension scheme. The State reimburses the employer 144 euros. The *Riester subsidy* is also possible as part of the company's pension plan (i.e. special expenses allowance and deduction). This opens up a lucrative funding opportunity, especially for lower-income employees who only pay low taxes and can thus save less on taxes through tax incentives. See: https://www.bmas.de/DE/Soziales/Rente-und-Altersvorsorge/rente-und-altersvorsorge.html

59/ Pensions-Sicherungs-Verein AG -- PSV

60/ See: https://www.svb.nl/nl/aow/bedragen-aow/aow-bedragen

61/ See: https://www.globacs.org/location/the-netherlands/

62/ *The Dutch Pension System*. A. Lans Bovenberg and Lex Meijdam

63/ See: https://www.legifrance.gouv.fr/loda/article_lc/LEGIARTI000006759637/1948-07-01/

64/ See: https://www.aide-sociale.fr/retraite-minimum-contributif/

65/ See: https://ww1.issa.int/node/195545?country=854

66/ See: https://www.oecd-ilibrary.org/sites/b6d3dcfc-en/1/2/8/1/index.html?itemId=/content/publication/b6d3dcfc-en&_csp_=a8e95975da55b0299df9e90b37215621&itemIGO=oecd&itemContentType=book

67/ See: https://www.previssima.fr/question-pratique/retraite-de-base-comment-fonctionne-la-decote.html

68/ See: https://www.la-retraite-en-clair.fr/parcours-professionnel-regimes-retraite/retraite-salaries-prive/salaries-regime-general-calculez-retraite-complementaire

69/ See: https://www.oecd.org/els/public-pensions/PAG2019-country-profile-France.pdf

70/ See: https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000042159036/

71/ See: https://www.loimadelin.com/

72/ See: https://www.boe.es/boe/dias/2019/02/02/pdfs/BOE-A-2019-1366.pdf

73/ See: http://www.seg-social.es/wps/portal/wss/internet/Trabajadores/PrestacionesPensionesTrabajadores/10963/28393/28396/28472

74/ Articles 213 to 215 Royal Decree-Law 8/2015

75/ See: http://www.seg-social.es/wps/portal/wss/internet/Trabajadores/PrestacionesPensionesTrabajadores/10963/28393/35806

76/ See: http://www.seg-social.es/wps/portal/wss/internet/Trabajadores/PrestacionesPensionesTrabajadores/10963/28393/28396/28475#35795

77/ Obligation introduced through the first additional provision of Law 8/1987 as drafted by Law 30/1995, transitional provisions 14 and 15 of Law 30/1995 and currently regulated by Royal Legislative Decree 1/2002.

78/ The estimate of the development of the number of pensioners was an annual growth of 1.6% between 1995–2000 (7,607,000 of retirees estimated for 2000, compared with the actual figure of 7,644,320), 1% in 2000–2020 (8,831,000 estimated for 2015, compared with the actual figure of 9,360,799) and above 1% from that date.

79/ See: https://www.congreso.es/public_oficiales/L14/CONG/BOCG/D/BOCG-14-D-175.PDF

80/ See: https://www.boe.es/boe/dias/2021/02/03/pdfs/BOE-A-2021-1529.pdf

81/ See: https://www.nenkin.go.jp/international/japanese-system/index.html

82/ See: https://www.shigakukyosai.jp/en/pension/rourei/rourei01.html

83/ See: https://www.shigakukyosai.jp/en/pension/rourei/rourei02.html

84/ See: https://seniorguide.jp/

85/ See: https://www.oecd-ilibrary.org/sites/b5aacd2e-en/index.html?itemId=/content/component/b5aacd2e-en

86/ See: https://taxsummaries.pwc.com/republic-of-korea/individual/other-taxes

87/ See: http://www.iopsweb.org/resources/IOPS-Profile-Korea-2017.pdf

88/ See: International Social Security Association (ISSA). Country profiles: Korea. Retrieved from: https://ww1.issa.int/node/195543?country=893

89/ OECD. *Pensions at a glance 2019: Country profiles* - Korea

90/ Information on the National Pension Fund has been obtained from the official website of the NPS: https://fund.nps.or.kr/jsppage/fund/ifm_e/ifm_e_01.jsp

91/ See: International Social Security Association (ISSA). Country profiles: Korea. Retrieved from: https://ww1.issa.int/node/195543?country=893

92/ See: *Pensions at a Glance 2019*, OECD 2019, at: https://www.oecd-ilibrary.org/social-issues-migration-health/pensions-at-a-glance-2019_b6d3dcfc-en

93/ See: *Pension Markets in Focus*, No.17, 2020, OECD.

94/ Preparation of MAPFRE Economics with data from OEF/Haver Analytics, referring to the end of 2020.

95/ See: MAPFRE Economics (2017), *Pension systems*, Op. Cit., pp. 96–105.

96/ See: MAPFRE Economics (2021), *2021 Economic and industry outlook*, Madrid, Fundación MAPFRE.

97/ See: https://www.oecd-ilibrary.org/sites/b6d3dcfc-en/1/2/8/1/index.html?itemId=/content/publication/b6d3dcfc-en&_csp_=a8e95975da55b0299df9e90b37215621&itemIGO=oecd&itemContentType=book

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