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# THE SPANISH PUBLIC PENSION SYSTEM: THE QUEST FOR FINANCIAL SUSTAINABILITY AND EQUITY*

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As in many developed countries, population ageing is stressing the finances of the Spanish public pension system. Many studies have documented the sources of the increase in pension expenditures and the limitations of revenues from social security contributions to meet such an increase. Looking into the future, dependency ratios are expected to rise further, while, in the absence of additional changes to the system's sources of revenue, pension replacement rates will decline significantly from the current levels. In this context, this paper aims to contribute to the debate on the situation of the Spanish pension system through an analysis of its recent evolution and up-to-date forward-looking projections that include the impact of the latest reforms. Finally, we also analyse alternative reforms that are needed to restore financial sustainability and improve equity, both within and across generations.

*Key words:* population ageing, pension systems.

*JEL classification:* H55.

How to provide sufficient and adequate pensions to the old population in a country experiencing intense population ageing and with a dysfunctional labour market that delivers low employment and productivity growth rates? What are the pros and the cons of alternative pension systems with respect to the current defined benefit, Pay-As-You-Go (PAYG) system? Under what conditions is it feasible to move from this system to others with benefits computed under defined contribution principles and/or financed by capitalization? Under which equity criteria (from both inter and intra-generational perspectives) is it desirable to do so?

When facing these questions in the Spanish context, there is a wide and long-standing literature that discusses the determinants of pension expenditures and the pros and cons of alternative pension reforms. Just as an example, the list of articles about pension issues published in *Revista de Economía Aplicada* during its first 25

(*) This paper draws from Hernandez de Cos, Jimeno, and Ramos (2017) and has been written for publication in the issue celebrating the 25th anniversary of *Revista de Economía Aplicada*.

years of existence includes Eguía (1997), Gil and Patxot (2002), Devesa, Lejárraga and Vidal (2002), Jimeno (2003), Devesa y Devesa (2008), Moral-Arce, Patxot and Souto (2008), and Domínguez-Fabián and Encinas-Goenechea (2008).

Although the implementation and the effects of pension reforms are not new matters of concern for economic analysis and research, growing deficits and the diminishing resources available from the Pension Reserve Fund registered since the crisis, galvanised interest in these issues. The economic and financial situation of the Spanish public pension system and the need to ensure its sufficiency and sustainability are nowadays one of the main topics in economic policy debates, and are likely to continue to be so for a long period.

Even though there are little fundamental advances in the theory and empirical analysis of the basic issues in the Economics of Pensions, recent developments motivate to conduct an up-to-date analysis of the situation of the Spanish pension system, in the context of the new macroeconomic scenario characterized by low interest, inflation and productivity growth rates, and by the persistently dysfunctional performance of the Spanish labour market.

This is indeed the main goal of this paper. With a survey approach and relying on the most recent results available in the literature, we revisit the current financial situation of the system (and its determinants), the outlook for pension revenues and expenditures into the future (taking into account the several estimates of the impact of the latest reforms), and alternative reform options that take into account the financial sustainability constraint and aim to improve the sufficiency and equity of pension benefits. Before doing so, it is worthwhile to revisit the basics about the several objectives that the pension system may achieve and the alternative schemes attached to each one of them.

Hence, this paper is structured as follows. Section 1 revisits the typology of public pensions systems. Section 2 describes the current financial situation of the Spanish public pension system and the future outlook given demographic and economic perspectives. Section 3 analyses the pros and cons of several reform alternatives. Finally, section 4 concludes.

## 1. Public pension systems: Objectives, benefits and funding

### *1.1. Objectives: Universal versus contributory pillars*

Pension systems may aim at fulfilling several goals. The primary one is to provide income security at old age, while other ends involve poverty relief and redistribution [Barr and Diamond (2006)]. This multiplicity of objectives has led to the configuration of (the first pillar of) modern public pension systems into two schemes: social assistance and social insurance benefits[1]. The former comprises social benefits funded by the general government and granted to segments of the population without direct contributions to pension schemes, hence it targets poor people. The latter corresponds to benefits given to participants in insurance schemes, where contributions to the program give rise to benefits that substitute labour earnings.

(1) This terminology has been put forward by OECD (2013).

There are two basic mechanisms to link benefits with past contributions. First, in a defined-contribution scheme, benefits are determined by the contributions and the returns on those contributions, which can be either actual or notional. In the first case, the contributions are invested and the savings accumulated are used to finance pension benefits at retirement. In the second case, the contributions are credited to a notional account whose return is set by the government. At retirement, the accumulated notional amount is converted into benefits following actuarial and economic principles. And second, a defined-benefit scheme sets benefits according to the worker's wage (contributions) history. These benefits are guaranteed regardless of the return on those contributions.

There are mainly two ways to finance social insurance schemes: either by savings or by taxation (or by a combination of both). These sources of financing translate into two types of social insurance systems: fully funded schemes and pay-as-you-go systems. In a fully funded scheme savings are invested in financial assets, whose returns credit the future benefits of the system. In a pay-as-you-go (PAYG) system the state taxes the working population and transfers the resources to current retirees, who are promised of a pension during retirement financed by the future working population.

In the context of the goals and funding sources aforementioned, the configuration of current public contributory PAYG systems concerns at least three dimensions: i) the size of the system, i.e. the replacement rate that public pensions should provide, ii) for a given level of public expenditure, the level and composition of the funding sources, which must ensure that the system is financially sustainable, and iii) the degree of income redistribution within and across generations, i.e. the inter and intra-generational equity of the public pension system.

Following this characterisation, Table 1 provides a summary of the main components of the Spanish public pension system, which are: i) a relatively high accrual rate (1.82%)[2], ii) computation of benefits as function of contributions during the last 20 working years (gradually to be increased to 25 years by 2023), with contribution bases being revalued in line with inflation, as in the majority of OECD countries[3], iii) indexing of pensions conditional upon the financial equilibrium between the system's expenditure and revenue, with ceilings and floors set in place, iv) a relatively high maximum pension (about 165% of the average wage), v) statutory retirement age at 65 years and six months, for both women and men, gradually to be increased to 67 years by 2027, which conceivably will rise effective retirement age to levels more in line with those observed in most EU countries, v) retirement schemes with pension reductions depending on the length of the early retirement period leading to an effective retirement age of 64 years, and vi) a replacement rate, defined as the average pension to the average wage by employee, significantly higher than that of the OECD (49.5%, compared with 42.1%).

(2) The accrual rate is the percentage of the regulatory base of the pension obtained for each year of contribution. In Spain, the rate is 2.3% between 15 and 37 years' contributions, as shown in Table 1. It is somewhat lower when compared with the average for other years in other countries, as pointed out in the text.

(3) In some cases, there is a mixed system of revaluation via price inflation and wage growth rates.

Table 1: Characteristics of various countries pension systems

| | Public pension expenditure (a) 2013 | Statutory retirement age (b) 2013 | Effective retirement age (b) 2014 | Dependency ratio (c) 2013 | Replacement rate (d) 2013 | Accrual rate (e) 2013 | Pension system type (f) |
|---|---|---|---|---|---|---|---|
| Belgium | 11,8 | 65,0 | 61,9 | 36,3 | 42,5 | 1,5 | defined benefit |
| Bulgaria | 9,9 | 63,7 | 63,8 | 45,1 | 34,2 | 1,1 | defined benefit |
| Czech Republic | 9,0 | 62,7 | 63,1 | 40,3 | 42,8 | 2,2 | defined benefit |
| Denmark | 10,3 | 65,0 | 65,6 | 36,3 | 42,5 | — | defined benefit |
| Germany | 10,0 | 65,3 | 65,1 | 37,6 | 44,6 | — | points system |
| Estonia | 7,6 | 63,0 | 64,4 | 47,5 | 30,4 | 0,6 | defined benefit (points) |
| Ireland | 7,4 | 65,0 | 64,9 | 28,0 | 27,9 | — | fixed benefit |
| Greece | 16,2 | 67,0 | 64,4 | 36,6 | 65,6 | 2,2 | defined benefit |
| Spain | 11,8 | 65,0 | 62,8 | 28,9 | 59,7 | 2,3 | defined benefit |
| France | 14,9 | 65,8 | 60,8 | 43,9 | 51,3 | 1,8 | defined benefit |
| Croatia | 10,8 | 65,0 | 62,4 | 42,8 | 30,8 | — | points system |
| Italy | 15,7 | 66,3 | 62,4 | 39,6 | 58,8 | 1,9 | notional account |
| Cyprus | 9,5 | 65,0 | 64,9 | 23,3 | 64,4 | 1,4 | defined benefit (points) |
| Latvia | 7,7 | 62,0 | 64,6 | 43,6 | 27,7 | 1,1 | notional account |
| Lithuania | 7,2 | 62,8 | 62,8 | 46,8 | 35,1 | 0,5 | defined benefit |
| Luxembourg | 9,4 | 65,0 | 60,2 | 45,9 | 51,3 | 1,8 | defined benefit |
| Hungary | 11,5 | 62,0 | 63,0 | 41,6 | 40,8 | 2,1 | defined benefit |
| Malta | 9,6 | 62,0 | 62,0 | 30,9 | 48,3 | 1,9 | defined benefit |
| Netherlands | 6,9 | 65,1 | 65,5 | 35,0 | 35,9 | 2,0 | fixed defined benefit |
| Austria | 13,9 | 65,0 | 62,5 | 39,9 | 41,2 | 1,2 | defined benefit |
| Poland | 11,3 | 65,3 | 63,9 | 34,0 | 47,9 | 1,0 | notional account and defined benefit |
| Portugal | 13,8 | 65,0 | 64,3 | 37,1 | 61,8 | 2,0 | defined benefit |
| Romania | 8,2 | 64,7 | 64,0 | 39,7 | 37,0 | — | points system |
| Slovenia | 11,8 | 65,0 | 62,5 | 43,2 | 33,8 | 1,5 | defined benefit |
| Slovakia | 8,1 | 62,0 | 61,6 | 34,2 | 45,7 | 1,2 | points system |
| Finland | 12,9 | 66,0 | 63,6 | 39,2 | 52,1 | 2,9 | defined benefit |
| Sweden | 8,9 | 67,0 | 65,8 | 38,8 | 42,1 | 1,0 | notional account |
| United Kingdom | 7,7 | 65,0 | 64,9 | 31,5 | 36,4 | — | fixed benefit |
| Norway | 9,9 | 67,0 | 65,6 | 33,6 | 47,0 | 0,9 | notional account |

a. As a percentage of GDP.

b. Corresponding to men.

c. Number of pensioners relative to the population aged 15-64 years.

d. Defined as the ratio of average pension to average wage. Note than in some countries with a comparatively low replacement rate, such as the United Kingdom, the Netherlands, Sweden or Denmark, the weight of private pensions is greater than in other countries.

e. Rate at which pension rights accrue.

f. Retirement pensions, main system.

Source: 2015 Ageing Report.

## *1.2. Funding: The budget constraints*

### 1.2.1. PAYG systems

Importantly, the budget constraint of the contributory PAYG pension system renders the relationship between replacement rates or pension adequacy and financial sustainability as a trade-off, inasmuch as adequacy is determined by pension expenditures while sustainability relies on the system's revenues.

The following simple conceptual framework illustrates this trade-off. Pension expenditure is given by:

$$g = d\ b\ \alpha / e,$$

where g is the ratio of public pension expenditure to GDP, d is the ratio of the number of pensions to the working-age population, e is the employment rate, b is the ratio of the average pension to the average wage, and $\alpha$ is wages as a share of GDP[4].

The pension system's revenues are given by the following expression:

$$i = \tau\ \alpha$$

where i is the ratio of public pension system revenue to GDP, and $\tau$ is the effective tax rate of social contributions.

Then, in order for the budget constraint to be exhausted, expenses must equal revenues (g = i), which determines the replacement rate at which the system is in equilibrium:

$$b^* = \tau\ e/d$$

This static condition underlines the trade-off between the availability of the public pension's system resources and its adequacy. The maximum pension replacement rate that balances the system at all times depends on the taxes used to finance it (social security contributions), demographic factors, and the employment rate. Adequacy (measured as the ratio of the average pension to the average wage at any given moment in time, b*) may be higher when the employment rate and available resources (e and $\tau$) are higher, and lower when the demographic factor (d) is higher.

The budget constraint above applies to any PAYG system, either defined benefit or defined contribution. The important differences between both regimes in this regard are twofold: i) while in the defined benefit system the substitution rate is the result of the rules about accrual rates, period for the computation of benefits, and discounts for early retirement, under defined contribution systems, the resulting sub-

(4) This decomposition is the result of the following identities:

$$\frac{PE}{Y} = \frac{NP}{L}\frac{AP}{\frac{Y}{L}} = \frac{NP}{WAP}\frac{WAP}{L}\frac{AP}{W}\frac{WL}{Y}$$

Where PE is pension expenditure, Y is GDP; NP is the number of pensions; WAP is the working-age population; L is the number of people in employment; AP is the average pension; and W is the average wage.

stitution rate comes from purely actuarial criteria, applied to all contributions paid during the working life and expected longevity at time of retirement, and ii) incentives for labour supply along the working life are different and, hence, yields different employment rates depending on which contributions are more important for the computation of benefits under the defined benefit system.

As always in Economics, variables are not independent among themselves and policy interventions affect many of them simultaneously. Obviously, keeping the replacement rate (b*) at its current level by increasing social security contributions at the same rate that the dependency ratio may not feasible since it is likely that the employment rate will be negatively affected, [see Daveri and Tabellini (2000) and Abbritti and Weber (2018)]. This is why economic analysis of the financial situation of pension systems and evaluation of alternative reforms need to be performed in general equilibrium models of the kind that we survey below[5].

### 1.2.2. Fully-funded systems

Under a fully-funded defined contribution system the main variable determining benefits is obviously the rates at which contributions are capitalised and annuities computed, which closely follows the real interest rate[6]. There is the presumption that capitalisation can yield a higher substitution rate than PAYG since this rate is typically higher than the growth rate of the wage bill.

This view is however controversial. First, both systems (PAYG and fully-funded) are subject to similar macroeconomic (non-insurable) risks, since lower population and productivity growth reduces the rate of return of financially sustainable PAYG systems and the permanent component of the return to capital (the so-called "natural rate of interest")[7]. Second, the risk and the intermediation costs involved under the fully-funded system are significantly higher than in PAYG.

## 2. Recent reforms and long-term projections of the Spanish public pension system

The pension system has recently experienced two important reforms aimed at adapting it to the sharp increase in the dependency ratio projected for the future (see Section 3.2 below). These reforms have a lot of bearing on its current situation and are crucial to understand the projected evolution in the long run.

(5) As discussed by Jimeno *et al*. (2008), there are several approaches to project pension expenditure in the long run. First, aggregate accounting consists of making a certain set of assumptions about the evolution of several key demographic and economic variables, and then using accounting identities to infer expenditures and revenues. Second, the simulation of life-cycle profiles relies on projecting eligibility and benefits of a large sample of individuals. This approach, being able to account for the large degree of heterogeneity of pension determinants and outcomes, is usually performed to compare the distributional consequences of alternative pension schemes. Finally, general equilibrium models allows simulating the endogenous reaction of agents to the reform. This means that numerous economic variables can be simulated, such as households' decisions on leisure, work and retirement, labour market developments, financial decisions, the pension reserve fund, minimum pensions, etc.

(6) In the case of Spain, private pension funds and plans have a very limited scope.

(7) See Jimeno (2015).

First, in 2011 the government introduced significant changes to retirement eligibility requirements, such as a phased-in increase in the legal retirement age, from 65 to 67; a gradual lengthening of the period considered to calculate the regulatory base of retirement pensions, from 15 to 25 years; and the obligation to have contributed to the system for at least 37 years in order to have access to 100% of the pension. These measures, which came into force in 2013, were complemented by additional changes adopted in the same year on the eligibility requirements for partial and early retirement, linking such eligibility to the increase in the retirement age.

And second and more importantly, in late 2013 a new far-reaching pension reform was approved. It consisted on the introduction of two novelties: a new mechanism to calculate the annual revaluation of pensions (starting in 2014), and a sustainability factor for retirement pensions (starting in 2019). The revaluation index uncouples annual pension updates from CPI increases, which had previously been linked, and sets the annual increase in pensions on the basis of a formula derived from the balance between the system's revenue and expenditure, although such revaluation cannot be lower than 0.25% nor higher than the sum of 0.5% to the CPI increase. The sustainability factor, which will be implemented in 2019, will automatically link the initial retirement pension amount to life expectancy changes at 67[8].

The introduction of these elements placed Spain among the group of EU countries that have automatic adjustment mechanisms or sustainability factors for the public pension system, by linking the revaluation of pensions to the factors that determine the financial equilibrium of the system, and the amount of starting pensions to the life expectancy. The system was thus equipped with automatic tools to absorb economic and demographic shocks arising, for example, from population ageing. Moreover, part of the cost associated to the demographic pressures was passed on to current generations, linking explicitly the contributory pensions to the resources available at each point in time. As discussed below, these changes have far-reaching consequences on the financial sustainability, adequacy and redistribution of the pension system.

### *2.1. Current financial situation*

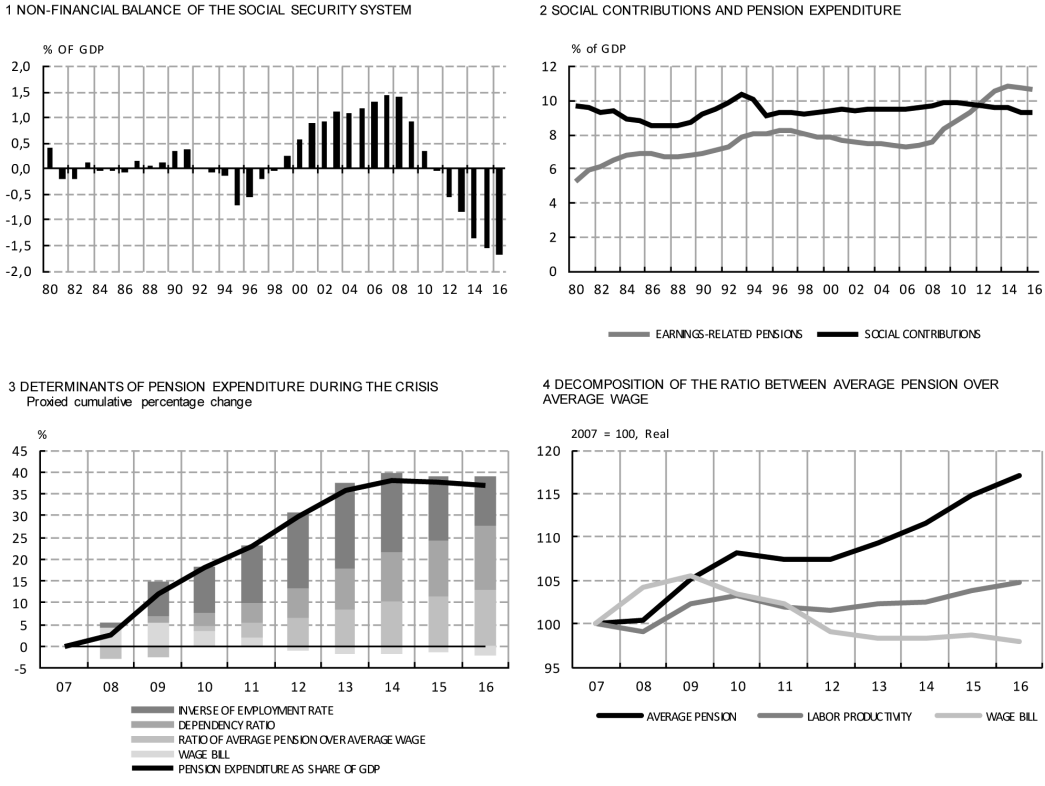
As for the current financial situation, the Social Security System's accounts have deteriorated significantly in recent years[9]. Specifically, widening deficits have been registered since 2011, reaching 1.7% of GDP in 2016. This contrasts with an average positive balance of 1.1% of GDP registered in the period 2000-2008 and the balanced budget observed in the 1980s and the early 1990s (see Chart 1.1). The deterioration in the pension system's non-financial balance observed since the start of the decade is due to revenues remaining relatively stable while expenditure has been rising (both expressed as a share of GDP). Indeed, contributory pension spending rose from 7.6% in 2008 to 10.7% in 2016 (see Chart 1.2).

As laid out in Section 2, pension expenditure as a share of GDP depends on three types of factor. One is demographic: to the extent that pension expenditure is fundamentally linked to retirement pensions, this expenditure is greater the larger the

(8) For a description of the mechanisms introduced by the 2013 reform, see Ramos (2014).

(9) The Social Security System is defined as a series of schemes through which the State guarantees people within its scope adequate protection against certain defined contingencies, such as retirement, illness, disability, accident, survival, etc.

Chart 1: TRENDS IN THE SOCIAL SECURITY SYSTEM




Sources: Social Security and National Accounts.

relevant age group is relative to the working-age population (i.e. the higher the dependency ratio). The second factor is related to the state of the labour market: the smaller the proportion of the working-age population in employment (i.e. the lower the employment rate), the smaller the GDP, and therefore, the higher pension expenditure will be when expressed in GDP terms. The third factor has to do with the ratio between the average pension and average productivity in the economy, which is the product of the ratio between the average pension and the average wage (the pension replacement rate) and wages as a share of GDP (the labour income share). Thus, the higher the pension replacement rate, the greater the pension expenditure. Similarly, for any given employment and replacement rates, this expenditure will be greater the higher the wage share of GDP[10].

(10) For any given employment and average wage, a higher share of wages in GDP implies lower apparent labour productivity.

Using this decomposition it can be observed that the increase in pension expenditure since the onset of the crisis is due, in approximately equal measure, to an increased demographic pressure (i.e. a higher dependency ratio), a higher replacement rate (the ratio of the average pension to the average wage), and a deterioration of the labor market (see Chart 1.3).

In recent years, moreover, the average pension has grown significantly faster than the average wage or the CPI. This effect is partly due to pension revaluation and partly to other factors, such as the substitution effect, which includes the fact that the pensions of new retirees joining the system tend to be higher than those of pensioners who die. Moreover, part of this increase in the replacement rate is due to lower productivity growth, which averaged 1.6% in real terms, compared with average pension growth of 1.8% (see Chart 1.4).

With regard to income, social contributions are the Social Security System's main source of funding, followed by transfers from the central government to cover non-contributory pensions and minimum pension top-ups, which have been financed entirely from general taxes since 2013. In GDP terms, income from social contributions are defined as the product of the effective rate of social security contributions and the wage share of GDP. As mentioned before, the ratio of social security contributions to GDP has remained relatively constant at around 9.4%, with a drop of a few tenths of a percent during periods of crisis. This is a result of an increase in the effective rate of social security contributions and a decrease in the wage share of GDP.

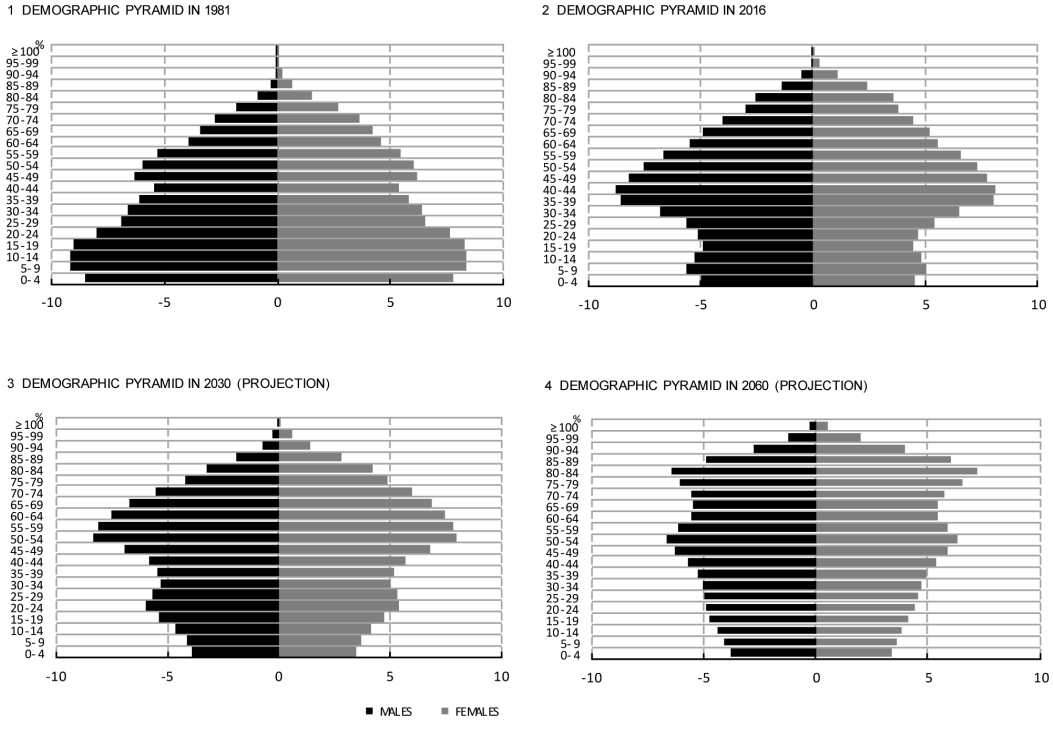
### *2.2. The demographic scenario*

Beyond the short-term situation, the Spanish public pension system faces major challenges arising from the demographic scenario. Indeed, the profound demographic transformation experienced in recent decades, characterised by a sharp fall in the birth rate and an increase in life expectancy, has substantially changed the structure of Spain's demographic pyramid, which has narrowed at the base and widened at the top (see Charts 2.1 and 2.2).

Moreover, according to the demographic projections available, Spain is one of the countries where the weight of the retirement-age population will increase the most. For instance, the 2016 projections by the National Statistics Institute (INE), predict that the ageing process will step up in the coming decades. On one hand, the birth rate, which in 2015 stood at 9.0 births per one thousand persons, is expected to decline to 6.6 births in 2030 and to 5.6 in 2060. On the other, life expectancy, which has risen substantially in recent decades, is expected to continue to do so in the future, at possibly higher rates. Specifically, today's 65-year-olds are expected to live almost 8 years less than those who will be 65 in 2060. Finally, migration projections point to a small net inflow of persons until the end of this decade, in contrast to the strong inflow of working-age immigrants that came to Spain during the economic boom.

The combination of these three factors, together with the weight of the baby boomers (those born between the late 1950s and the mid-1970s), who will reach retirement age from the second half of the upcoming decade, will speed up the process of transforming Spain's demographic pyramid into what will increasingly look like an inverted pyramid (see Charts 2.3 and 2.4), putting a high degree of pressure on the public pension system. Indeed, according to these projections the ratio of number of

Chart 2: DEMOGRAPHIC CHANGES AND PROJECTIONS, SPAIN




Source: Instituto Nacional de Estadística.

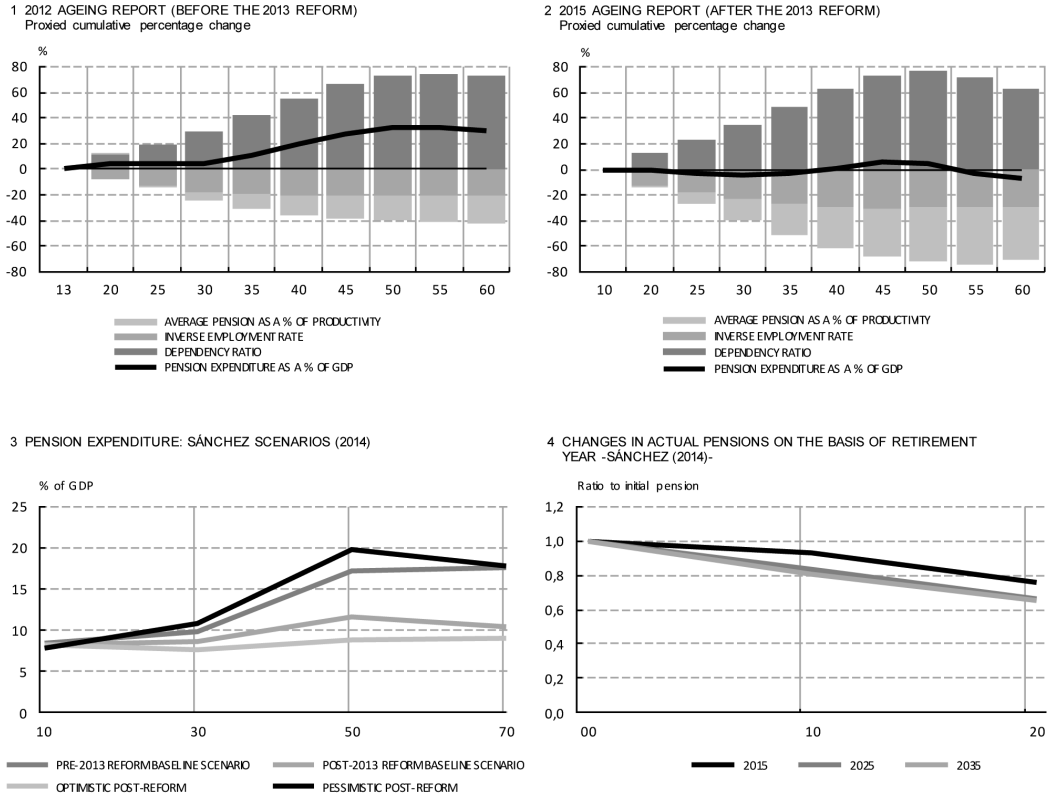
pensions to working age population (i.e. the demographic factor) would grow from 30.7% nowadays, to 42.7% in 2035 and 64.3% in 2050[11]. This, according to the formula derived in section 2, implies an increase of close to 4 and 11 percentage points in the share of pension expenditure over GDP in 2035 and 2050, respectively.

### *2.3. Looking into the future: Long-term projections*

The available estimates of the 2011 reform suggests that, though it considerable reduced the projected pension expenditure in the long-run, it did not ensure the sustainability of the system were the demographic projections to be confirmed and absent new spending cuts or revenue increases. For example, the 2012 Ageing Report, produced by the European Commision, estimated that pension expenditure would change from accounting for 10.1% of GDP in 2010 to 13.7% in 2060 (see Chart 3.1), i.e. an increase of 3.6 points of GDP, as compared with the estimate prior to the re-

(11) These ratios are obtained by multiplying the ratio of 67+ people to 16-66 times the current ratio of the number of pensions to retirement-age population (1.068).

Chart 3: PENSION EXPENDITURE SCENARIOS




Sources: 2012 and 2015 Ageing Reports and In-House interpolation on the basis of Sánchez (2014).

form, of nearly 8 percentage points. Also, De la Fuente and Doménech (2013) estimated a saving of 33% in 2050 relative to the projected expenditure without the reform. Conde-Ruiz and González (2013) used microsimulation techniques to calculate savings of 29%, while Banco de España (2011) put this figure at 43%.

The long-run scenario of the Spanish pension system changed dramatically as a result of the 2013 reform towards improving significantly its expected financial health. For instance, the 2015 Ageing Report projects that pension spending will remain stable during the projection horizon, which extends until 2060. Specifically, the report projects pension spending reaching 11.8% of GDP in 2013 (base year), 11.9% in 2040, 12.3% in 2050 and 11.0% in 2060 (see Chart 3.2).

Regarding general equilibrium models, the comprehensive studies by Sánchez (2014) and Díaz Giménez and Díaz Saavedra (2016) offer the results of different simulations based on overlapping general equilibrium models calibrated for the case of

Spain. As mentioned before, by taking into account the complex interdependencies of a wide array of economic variables, they provide a broader scope analysis (e.g. the distributional consequences of the reform) and are hence preferred in this context.

Both studies coincide in pointing out that the introduction of the sustainability factor and the new revaluation index have improved considerably the system's long-term financial sustainability, without incorporating additional revenue increases, in a scenario where inflation would return to values close to the ECB's target, around 2%, and the aforementioned revaluation indices and sustainability factor would reach full effectiveness[12]. For instance, in the baseline scenario of Sánchez (2014) the reform implies savings in 2050 amounting to 5.5% of GDP (with respect to the pre-reform scenario). However, it is worth noting that the system does not achieve a full financial equilibrium in that year, rather it incurs a deficit of more than 2% of GDP. This happens because, as noted above, the revaluation of pensions cannot be lower than 0.25% or higher than the result of adding 0.50% to the CPI increase, which limits the automatic pension expenditure adjustment mechanism. Therefore, adverse macroeconomic scenarios, in particular those associated with inflation rates below 2%, could still cause imbalances in the system, as illustrated by certain scenarios considered by this paper, see Chart 3.3. Regarding the baseline scenario of Díaz Giménez and Díaz Saavedra (2016), the pension deficit in 2050 is reduced from 12.2% to 0.6% of GDP, hence the reform, according to the benchmark simulation, largely render the system financially sustainable.

The mechanism to stabilise pension expenditure at levels similar to the current ones is achieved through a substantial reduction of the replacement rate. Under the post-reform baseline scenario of the Sánchez's simulation, the actual pension of a person retiring in 2015 is projected to be 7% and 24% lower 10 and 20 years, respectively, after retiring (see Chart 3.4). To this, one would add the operation of the sustainability factor, which would reduce the initial pension by approximately 10% in 2030 and 20% in 2050. Likewise, Díaz-Giménez and Díaz-Saavedra (2016) estimate that average pensions in 2050 will be approximately 30% lower than average pensions under the regulatory period prior to the 2013 reform. As for the projections of the 2015 Ageing Report, it finds that around 35%-50% of the increase in expenditure arising from population ageing can be countered by the assumed macroeconomic scenario, while the impact of the 2013 reform on the replacement rate neutralises the rest of pressures on pension expenditure, thus remaining constant as a percentage of GDP. It does so though by means of a substantial decline in the replacement rate (see Chart 3.3). Indeed, based on the estimates of this report, Spain would experience one of the sharpest declines in the replacement rate between 2013 and 2060 (approximately 20 percentage points).

Furthermore, the scenario opened up by the 2013 reform has deep welfare implications across cohorts. For example, Sánchez (2014) argues that, in absence of the reform, the population aging would have been suffered mostly by the future generations. Hence, the reform, by reducing the generosity of current pensions, transfers part of the burden to current generations of older workers. Moreover, he finds that

(12) They also find that the 2011 reform did enhance the financial sustainability of the system, yet it alone was not sufficient to guarantee its equilibrium in the long term.

all the gains from the reform are reaped by the future cohorts, specifically those that in 2010 are still to arrive in the labor market, while those already retired in 2010 pay a very small part of the costs, the burden being largest for cohorts retiring around 2040. Díaz Giménez and Díaz Saavedra (2016) find also large welfare implications across generations. Their simulations show that the households born between 1950 and 1970, young disabled workers who are alive at the time of the reform, and future cohorts bear the highest welfare costs.

Finally, De la Fuente, García Díaz and Sánchez (2017), the most recent and ambitious attempt at characterizing the financial situation of the Spanish pension system, conclude that the two main driving forces of the worsening financial position of the pension system in Spain are population ageing and low productivity growth, which kept wage growth subdued. They also conclude that the 2013 reform may contain the increase in pension expenditures but only if pension benefits diminish in real terms during the retirement period.

### *2.4. The trade-off between adequacy and sustainability*

The results of the literature presented above underline the trade-off looming over the Spanish pension system: absent additional revenues, the current rules and the financial equilibrium constraint imply that achieving financial sustainability relies on a significant drop in the replacement rate, thus undermining the adequacy of public pensions.

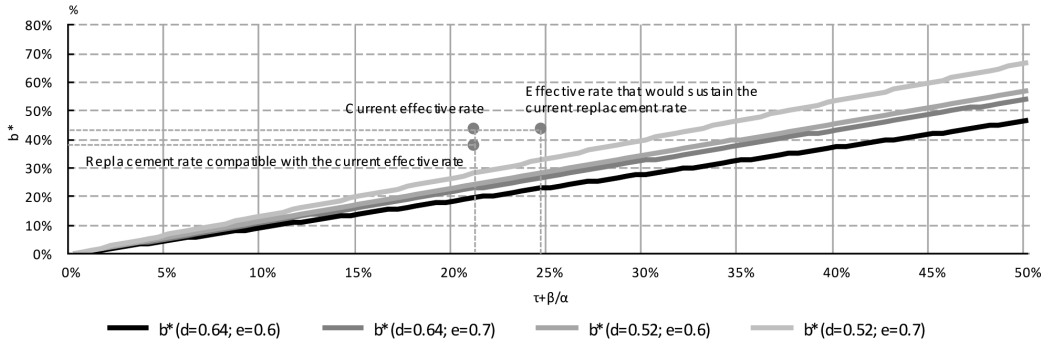
This trade-off can be further illustrated with a simple exercise (see Chart 4). We compare the situation prevailing in 2015 with the combinations of revenues and pension replacement rates that would be feasible in 2050, given the projected demographic factor (d = 64%) combined with two alternative employment scenarios (e = 60% and e = 70%), and on a scenario of a lower dependency ratio, associated, for example, with a further increase in the retirement age (d = 52%).

The chart shows that even on the most optimistic scenario the effective rate that would balance the system given the current replacement rate would fall a long way short of balancing it in 2050. Thus, on all scenarios, maintaining the current replacement rate in 2050 would require a significant increase in the system's resources. Moreover, the chart also shows that the current effective rate is below the rate that would balance the system at present, such that, given this effective rate, the replacement rate should be approximately 6 percentage points lower for the system to be in equilibrium. Alternatively, the replacement rate could be maintained with an effective rate approximately 4 percentage points higher.

In short, the simulations of the previous section as well as this simple back-of-the-envelope calculation shows that, even on relatively favourable scenarios, maintaining the current replacement rates over the long term would require a significant increase to the system's resources.

It should be noted, however, that a decline in the pension replacement rate does not necessarily mean that the absolute value of the pensions will be lower. Sufficient average wage increases could enable positive growth rates in the average pension while pension replacement rates decline. Indeed, given the duration of the calculation period for the regulatory base of pensions and retirement, the higher the wage growth rate (which, in principle relates in the medium term to the productivity growth rate), the lower the replacement rate, even if pensions increase at the pace productivity grew over

Chart 4: Replacement rate to ensure sustainability (2050)




Sources: In-House calculations.

the working lives of retirees[13]. For example, in a situation where the calculation period for the regulatory base of a pension is 25 years of working life (as will be the case in 2023), assuming a 20-year retirement period without revaluation of pensions in line with wage growth, the average replacement rate during the entire retirement period would be 80% of the pension rights generated in connection with the latest wage if annual productivity grew at a rate of 1%, but would be 65% of such an amount if the annual productivity growth rate were 2%. In short, higher productivity growth rates would allow retirement pensions to be higher even when their replacement rate were lower, thereby improving the standard of living of retirees even though their income relative to working age population cohorts would decrease[14].

(13) If wages grow at a constant rate, e.g. wt = (1+γ)wt-1, where γ is the productivity growth rate, the regulatory base of the retirement pension relative to the wage in the first retirement period (t) would be:

$$b_0 = \frac{1}{25}\sum_{s=1}^{25}\frac{W_{t-s}}{W_t} = \frac{1}{25}\sum_{s=1}^{25}(1+\gamma)^{-s}$$

The average replacement rate over the retirement period would be:

$$\frac{1}{20}b_0\sum_{s=0}^{19}\frac{W_t}{W_{t+s}} = \frac{1}{20}b_0\sum_{s=0}^{19}(1+\gamma)^{-s}$$

It is assumed that the calculation period for the regulatory base of the retirement pension such as that which will be reached in 2023 in Spain, is the last 25 years of working life. A 20-year retirement period is assumed. This calculation does not take into account the possible impact of the pension ceiling, which could lower the replacement rate calculated previously by several percentage points. Additionally, an upturn in productivity growth gives rise to an additional transitory decline in the replacement rate during the period in which the cohorts that experienced lower productivity growth over their working life begin retirement.

(14) These calculations assume that pensions are revalued on the basis of the inflation rate. Otherwise, the aforementioned replacement rates would be lower, by approximately 6.5 pp and 5 pp, respectively, per inflation point.

In the next section, we provide an in-depth discussion of reform alternatives that concern the pursuit of both financial sustainability and adequacy.

## 3. Reform strategies to restore sustainability and adequacy

Given the conditions above, any pension reform strategy has to take a stand on the following issues:

1. What is the desired size of the system, in terms of the public expenditure intended to be devoted to providing pensions, which of course conditions its capacity to provide an adequate income to replace wages and to act as a mechanism insuring against longevity and other covered contingencies?
2. How to fix the level and composition of the system's funding sources to ensure that the system is financially sustainable?
3. How to distribute the adjustments in revenues and expenditures associated to the measures designed to address the two questions above across and within generations?

### *3.1. Reforms to curb rising expenditure or to change the funding sources*

The projections presented in the previous section illustrate how, under the adverse demographic scenario outlined by the latest available projections, strict application of the recent reforms, on the assumption that the system's revenue remains basically constant over the projection period, would imply that keeping expenditure levels stable would require a significant reduction in the replacement rate. This reduction would be achieved via the sustainability factor, which would reduce the initial pension received by new cohorts of pensioners in line with life expectancy, and, above all, via the pension revaluation index, which would imply a cut in pensions' purchasing power until the system's financial equilibrium is restored.

In a context in which it is decided that the system's resources should not be increased, there are other mechanisms that could generate the same reduction in the pension replacement rate, while increasing the extent to which the system is contributory, i.e. making the relationship between the contributions individuals pay and the benefits they receive closer. The contributory principle may be desirable, firstly, because it has positive effects on workers' participation in the labour market, which has a positive impact on the system's revenue and creates an incentive for them to extend their working life, and, secondly, because it facilitates pension saving decisions. One possible option would therefore be to further increase the number of years of contributions included in the calculation of the regulatory base for the retirement pension[15], for example, by extending the calculation period to the individual's whole working life. Applying this measure would bring the Spanish system closer to that in a number of other European countries, such as Finland, Poland, Portugal and Sweden. Nevertheless, in the absence of other adjustment mechanisms, the reduction in expenditure obtained by this parametric reform is limited[16].

(15) The 2011 reform extended the period used to calculate the amount of the reference value of the pension (the "regulatory base") from 15 to 25 years gradually at a rate of one month a year between 2013 and 2022.

(16) See, for example, Sánchez (2014).

With the same aim, the percentage of the full pension to which the minimum contribution period gives entitlement (currently set at 50%) could be reduced, as could the rate at which this initial percentage rises with each additional year of contributions, thereby increasing the number of years needed in order to obtain 100% of the full pension. The current legislation assumes that the majority of pension rights are generated in the first 15 years of an individual's working life (creating entitlement to 50% of the pension, while the following 15 years generate an entitlement to a further 34%) such that the adjustment to these parameters may make benefits more proportional to the number of years of contributions. In any event, it should be noted that the 2011 reform has already made the requirements stricter[17].

Expenditure could also be curbed by further raising the retirement age. Following the recent reforms, the statutory retirement age will gradually rise to 67 years, although the effective age is around 64 years, as a result of the impact of early retirement. Raising the statutory retirement age can be justified by individuals' longer life expectancy, their joining the workforce later, the reduced physical demands of most jobs today, and people's better health at more advanced ages.

Thus, any additional measures discouraging early retirement and allowing individuals to extend their working lives beyond the age of 67, following on from some of the measures already adopted in recent years, would have positive effects on financial sustainability, reducing the need for substantial cuts in the retirement pension replacement rate. Indeed, some countries have opted to build in an automatic link between life expectancy and the permitted retirement age in their sustainability mechanisms (see Table 2). By way of illustration, as can be seen in Tables 3 and 4, raising the effective retirement age to 70, for example, would make it possible to reduce the dependency ratio by 12 points, compared with that associated with a retirement age of 67 years, which would enable pension spending to be reduced by between 2 and 4 points of GDP in 2050, depending on the scenario considered[18]. For these purposes, however, the wide range of variation between different individuals' working lives needs to be borne in mind. Systems allowing more flexible retirement at different ages are therefore superior to those not allowing earlier (or later) retirement, or which impose penalty (or accumulation) factors differing from those resulting from purely actuarial calculations that depend on contributions made over the course of the individual's working life and differences in life expectancy and age at retirement.

The reforms alluded to above can be implemented by adjusting the current unfunded defined-benefit system's parameters rather than modifying it. Nevertheless,

(17) This established that 37 years' contributions will be necessary to qualify for 100% of the regulatory base of the pension, whereby the first 15 years of contributions entitle pensioners to 50%, while the remaining 50% is obtained on a proportional basis with between 15 and 37 years' contributions, using a month-by-month calculation. In this case a transitional period has also been set, commencing in 2013 and concluding in 2027. It is further established that, in the event of gaps in contributions, those relating to the first 24 months will be topped up with the minimum contribution base, and those exceeding 24 months, with 50% of the base. This contrasts with the current legislation, where all gaps are supplemented with the minimum base (except in the schemes for the self-employed and domestic staff).

(18) Sánchez (2014) presents an evaluation of the 2011 pension reform, which basically affected these parameters, and shows that these parametric reforms are insufficient to entirely eliminate the expenditure growth caused by demographic change.

extending the period over which the pension's regulatory base is calculated to include the individual's whole working life, equalising the rate at which pension rights accrue according to contributions paid, and applying the sustainability factor introduced by the 2013 reform individually (rather than applying it by cohorts as envisaged in the reform), are elements bringing the public pension system closer to the alternative chosen by some countries that have made reforms to their pension systems in recent decades, such as the *individual notional defined-contribution accounts* system.

Table 2: Automatic adjustment mechanisms in various countries

| Country | Sustainability factor | Automatic adjustment mechanism | Benefits linked to life expectancy | Retirement age linked to life expectancy |
|---|---|---|---|---|
| Denmark | X | | | X |
| Germany | X | X | | |
| Greece | X | | | X |
| Spain | X | X | X | |
| France | X | | X | |
| Italy | X | | X | X |
| Cyprus | X | | | X |
| Latvia | X | | X | |
| Netherlands | X | | | X |
| Poland | X | | X | |
| Portugal | X | | X | X |
| Slovakia | X | | | X |
| Finland | X | | X | |
| Sweden | X | X | X | |
| Norway | X | | X | |

Source: 2015 Ageing Report.

Table 3: Population projections by age group and related dependency ratios

| | 2050 | 2035 | 2016 |
|---|---|---|---|
| Number of persons | | | |
| 16-64 | 22.992.139 | 27.225.548 | 30.262.643 |
| 16-66 | 24.092.281 | 28.579.049 | 31.213.084 |
| 16-69 | 25.911.500 | 30.552.931 | 32.611.027 |
| 65+ | 15.608.868 | 12.775.829 | 8.701.380 |
| 67+ | 14.508.726 | 11.422.328 | 7.750.938 |
| 70+ | 12.689.507 | 9.448.446 | 6.352.996 |
| Demographic factor | | | |
| 65+/16-64 | 72,5% | 50,1% | 30,7% |
| 67+/16-66 | 64,3% | 42,7% | 26,5% |
| 70+/16-69 | 52,3% | 33,0% | 20,8% |

Sources: Instituto Nacional de Estadística (2016) and In-House calculations.

Table 4: ILLUSTRATIVE SIMULATIONS OF PENSION EXPENDITURE UNDER ALTERNATIVE SCENARIOS

| Percentage | Scenario | Pension expenditure as a % of GDP | Demographic factor d | Replacement rate b | Employment rate e | Wage bill α | Effective rate of social contributions sustaining pension expenditure (a) |
|---|---|---|---|---|---|---|---|
| Current situation | | 10,7 | 31,0% | 43,9% | 55,8% | 43,9% | 21,2% |
| | | | | | 2050 | | |
| Current replacement rate | | | | | | | |
| Unfavourable employment | 1 | 22,6 | 64,3% | 43,9% | 60,0% | 48,0% | 47,1% |
| Very favourable employment | 2 | 19,4 | 64,3% | 43,9% | 70,0% | 48,0% | 40,4% |
| 1 + lower dependency ratio | | 18,4 | 52,3% | 43,9% | 60,0% | 48,0% | 38,3% |
| 2 + lower dependency ratio | | 15,8 | 52,3% | 43,9% | 70,0% | 48,0% | 32,8% |
| Reduced replacement rate | | | | | | | |
| Unfavourable employment | 3 | 12,9 | 64,3% | 25,0% | 60,0% | 48,0% | 26,8% |
| Very favourable employment | 4 | 11,0 | 64,3% | 25,0% | 70,0% | 48,0% | 23,0% |
| 3 + lower dependency ratio | | 10,5 | 52,3% | 25,0% | 60,0% | 48,0% | 21,8% |
| 4 + lower dependency ratio | | 9,0 | 52,3% | 25,0% | 70,0% | 48,0% | 18,7% |
| Pension expenditure 12% of GDP | | | | | | | |
| Unfavourable employment | 5 | 12,0 | 64,3% | 23,3% | 60,0% | 48,0% | 25,0% |
| Very favourable employment | 6 | 12,0 | 64,3% | 27,2% | 70,0% | 48,0% | 25,0% |
| | | | | | 2035 | | |
| Current replacement rate | | | | | | | |
| Unfavourable employment | 1 | 15,0 | 42,7% | 43,9% | 60,0% | 48,0% | 31,3% |
| Very favourable employment | 2 | 12,9 | 42,7% | 43,9% | 70,0% | 48,0% | 26,8% |
| 1 + lower dependency ratio | | 11,6 | 33,0% | 43,9% | 60,0% | 48,0% | 24,2% |
| 2 + lower dependency ratio | | 9,9 | 33,0% | 43,9% | 70,0% | 48,0% | 20,7% |
| Reduced replacement rate | | | | | | | |
| Unfavourable employment | 3 | 8,5 | 42,7% | 25,0% | 60,0% | 48,0% | 17,8% |
| Very favourable employment | 4 | 7,3 | 42,7% | 25,0% | 70,0% | 48,0% | 15,2% |
| 3 + lower dependency ratio | | 6,6 | 33,0% | 25,0% | 60,0% | 48,0% | 13,8% |
| 4 + lower dependency ratio | | 5,7 | 33,0% | 25,0% | 70,0% | 48,0% | 11,8% |
| Pension expenditure 12% of GDP | | | | | | | |
| Unfavourable employment | 5 | 12,0 | 42,7% | 35,1% | 60,0% | 48,0% | 25,0% |
| Very favourable employment | 6 | 12,0 | 42,7% | 41,0% | 70,0% | 48,0% | 25,0% |

Note: d, b, e and α are defined in Section 1.2.

a. The current values is the effective rate of social contributions, calculated as revenues from social contributions as a percentage of compensation of employees less social contributions. The effective rate sustaining pension expenditure would be 24.4%.

Source: In-House calculations.

This system has a number of advantages. Firstly, it makes the relationship between individuals' contributions and their pensions closer. Secondly, it reduces the negative impact of a drop in contributions at ages close to retirement on pension rights. Thirdly, the way pension rights are defined and benefits calculated takes place under more transparent conditions, creating incentives for the labour supply and complementary savings. Moreover, it automatically incorporates a sustainability factor to the extent that benefits are calculated as the annuity corresponding to the amount of accumulated contributions and life expectancy at the time of retirement, which also introduces more transparency and flexibility in decisions about when to retire. And this can all be achieved while still setting pension floors and ceilings to accommodate the degree of intra-generational distribution considered desirable[19].

In any event, it should be noted that the adoption of a notional defined-contribution accounts system of this type would necessarily be a gradual process, and would not eliminate the trade-off between the public pension system's sufficiency and available resources alluded to above. To satisfy the financial sustainability condition, the notional defined-contribution accounts system requires precise calculations adjusting (notional) returns on accumulated contributions in individual accounts and the annuities constituting the retirement benefits in the prevailing demographic and macroeconomic scenario.

Another possibility would be to restrict the concept of contributory pensions to retirement pensions, which would continue to be funded from social security contributions, while other pensions (basically survivors' pensions) would be funded from general taxes. This model would allow retirement pensions to remain contributory, while general taxes would be used to pay for other types of pension. Nevertheless, it should be noted that this measure would mean increasing general taxes or reducing other budgetary expenditure in order to be able to pay for those pensions transferred to central government from the social security fund.

Using general taxes to finance pensions raises at least two types of issue, however. One concerns the political economy facet of the pension system. An unfunded contributory system rests on transfers of income between different generations of workers and its essence is that there is a direct and transparent relationship between income and benefits that is separate from the redistributive role of general taxes and the political debate to which this redistribution is subject. The system's contributory components may be considered to be smaller in the case of non-retirement pensions (survivors' benefits and family allowances), however, which, as discussed, could justify taking these benefits out of the contributory system.

One issue that arises when resorting to general taxes to pay for pensions is the dilution of the pay-as-you-go principle when the pension system is not only paid for by intergenerational transfers. Increasing general taxes in order to pay for pensions would affect the population as a whole, including pensioners as well as workers. Thus, depending on how these taxes are distributed across the various age groups, it could happen that an increase in general taxes intended to pay for income for the retired population could largely fall on the very population whose income it was in-

(19) See Jimeno (2003).

tended to protect. In effect, while an increase in the tax burden on wages is equivalent to an increase in the effective rate of social security contributions, if a share of these additional resources to fund pensions come from increased tax pressure on other income, including that from capital gains and monetary transfers such as pensions, even though the value of pensions remains unchanged, the population over the retirement age would see their net income reduced by the impact of higher taxes. In other words, this measure at least partially resembles a cut in the replacement rate[20].

Finally, as regard social security contributions, it is worth bearing in mind that, for reasons of economic efficiency, in a globalised world, with freedom of movement of capital and labour, the tax rate of social contributions cannot be much higher than it already is. One way of raising the effective rate of social contributions without changing statutory rates is to eliminate the floors and ceilings on the contribution base. Eliminating these limits would mean equalising the effective rate for social security contributions with the statutory rate and, consequently, increasing this effective rate by approximately 8 pp. This relatively large increase would raise labour costs, which could have significant negative consequences for employment and productivity. Finally, this measure could also raise future pension expenditure by increasing the regulatory base, which is the reference value used to calculate pensions, although this effect could be mitigated if the maximum pension is kept constant. However, if this is the case, it would lower the replacement rate and undermine the contributory principle for individuals accumulating pension rights exceeding the maximum pension. Additional revenues and social security contributions could also be obtained by curbing the use of rebates and exemptions. The empirical evidence on the impact of rebates shows that they cause a substantial deadweight component and displacement effects.

### *3.2. Increased savings*

Against the background of a significant rise in the dependency ratio and reductions in the pension replacement rate, it might also make sense to extend the role of retirement saving to complement the resources of the public contributory system with the accumulation of financial assets supplementing future public pensions. In fact, a significant number of countries already have a relatively strong funded pillar to supplement the public pay-as-you-go pillar. However, it should be borne in mind that the funded system has its pros and cons. In particular, it is less vulnerable to demographic factors, making it potentially a good strategy in terms of risk diversification compared to the current pay-as-you-go model. However, the funded model is more sensitive to inflationary crises, and to financial market instability, as the experience of recent years has shown. Therefore, any steps in this direction need to be accompanied by the definition of better prudential systems to guarantee transparency and the protection of beneficiaries.

In any event, implementing a funded system is complex and requires detailed prior analysis of issues such as the length of time needed to implement it, whether

(20) The relevant replacement rate from the individual's point of view is the ratio of their pension to their final salary, net of taxes in both cases. Whether this replacement rate rises or falls will depend on the differential effect of the tax increase on wages and pensions.

it is voluntary or compulsory, the returns that can be offered in a scenario of demographic stagnation and sluggish productivity growth, or how the costs associated with implementing this change are to be shared out between different generations. This analysis goes beyond the scope of this paper.

### *3.3. Pension reforms and distribution*

The distributive consequences of the public pension system are very important and are not limited to intergenerational income transfers or the varying contributions to general taxes made by the different age brackets discussed above. Benefit calculation formulae that vary according to income levels also have repercussions for intragenerational inequality in ways that affect social equity. Thus, the existence of welfare benefits and floors and ceilings on contributory benefits, reduces intra-generational inequality. Moreover, the current formulae for calculating benefits in the existing system, which place greater weight on the years and contribution bases in the later stages of the individual's working life, increases the inequality between each generation of pensioners, given that employment and wage inequalities are much wider among workers close to retirement than among young people starting out on their careers[21].

Consequently, any reform strategy, whether opting to curb expenditure restraint or boost income, makes it necessary to take into account the distributive consequences of changes to the parameters of the public pension system. In particular, in a purely contributory system in which benefits are calculated on the defined benefits principle, benefits are higher for those individuals who completed a longer working life and earned higher wages. Pay-as-you-go funding implies income transfers from younger cohorts to older ones, while tax funding implies transfers from higher income individuals (to the extent that the income tax system is progressive) to the retired population.

There are two issues that need to be taken into account regarding intergenerational income transfers. First of all, to the extent that at a certain point in time the retired population took its saving and labour supply decisions in the light of certain expectations of benefits, making the burden of spending adjustment fall solely on that generation would imply reducing their levels of income and welfare disproportionately. On the other hand, making the whole weight of the reform fall on future generations of workers by raising intergenerational income transfers would also mean disproportionately reducing that generation's income and welfare levels, which could also respond to these increases by reducing the labour it supplied.

In the case of the most recent reform (2011 and 2013), for example, the available estimates, which assume that there would be no additional changes to taxes or spending parameters, indicate that the bulk of the cost of the adjustment would fall on those generations born between 1960 and 2000, and in particular the generation born in the 1990s[22].

(21) The rates at which pension rights accumulate are higher at ages close to retirement, as the regulatory base depends on the contributions made in the last 25 years of the individual's working life, and the penalties applied in the case of early retirement do not follow actuarial principles precisely. These rates also depend on wage variability, given the combination of floors and ceilings on both contribution bases and pensions.

(22) See Sánchez (2014).

## 4. Concluding remarks

The substantial growth in the population of retirement age relative to the working-age population brought about by improvements in longevity implies serious challenges for the Spanish public pension system. The reforms introduced in recent years have sought to address them by progressively raising the retirement age, defining a sustainability factor linking initial pensions to future trends in life expectancy, and introducing a new pension indexation mechanism that is conditional upon the system's financial position being in equilibrium. Although these reforms have shored up the system's sustainability considerably, adapting it to a progressively older population remains a major challenge. Specifically, in the absence of additional changes to the system's sources of revenue, the main adjustment mechanism is via a cut in the average pension, which, in the context of marked growth in the dependency ratio, will lead to a substantial decline in the pension replacement rate, accompanied by a major risk of the retired population's losing purchasing power in the event of an unanticipated rise in inflation. This would be a consequence of the new revaluation index, which could lead to systematic reductions in pensioners' real income if inflationary scenarios of this kind materialise.

In this context it is first of all essential to define the pension replacement rate the public system aims to guarantee so as to be able to analyse whether the system's revenues are sufficient to ensure its sustainability. The implications for intergenerational equity of the decisions made should also be made clear.

The conclusion that can be drawn from the existing analyses is that maintaining the system's current replacement rates, which are high in comparison with those of other countries, would demand a considerable increase in the system's revenues. If it were therefore decided that new revenues should be found to finance the desired level of spending, it seems reasonable that funding sources other than those currently being drawn upon should be sought, given that social security contributions are already high, and raising them could have a negative impact on the demand for labour.

If it is decided that replacement rates should be reduced, the pros and cons of implementing this through a cut in initial pensions rather than changing the indexation of existing pensions, and the role the retirement age should play in the adjustment, need to be studied. Moreover, in this case the intended role of other forms of insurance and savings mechanisms to back up pensions from the public pay-as-you-go pension scheme in the future, such as those already implemented in other countries, should be defined.

In any event, recent reforms increase the uncertainty over future developments in pension levels, whether by application of the sustainability factor or the revaluation index, such that it needs to be implemented in the most transparent way possible in order to give the public the necessary information about the sufficiency of future pensions and allow individuals to make optimal savings decisions.

Moreover, following a series of reforms the Spanish public pension system retains a wide variety of contributory features, such that the rates at which pension rights accrue varies depending on the age at which contributions are made and variations in wages over the course of the individual's working life. This ultimately means that retirement pensions are highly dependent on individuals' job performance in the later

years of their working lives. Thus, one potentially attractive avenue of reform –which has been followed by a number of other European countries aiming to simultaneously make the system more transparent and strengthen its contributory aspect – is to make the transition towards individual notional defined-contribution accounts. However, this approach does not resolve the basic questions of how generous the system should be and how it should relate to the resources used to pay for it.

Finally, beyond the adjustments made to the pension system, the challenges of population ageing need to be tackled as part of a broad economic policy strategy. First of all, it is essential to continue fiscal consolidation and meet the deficit and debt targets set in the Stability and Growth Pact (at European level) and the budgetary stability laws (at national level), so as to ensure the public finances are better placed to address the issues raised by population ageing. Secondly, from the macroeconomic standpoint, the system's fiscal sustainability problems could be alleviated by the economy's making favourable progress in terms of employment and productivity. In this regard, Spain's room for improvement is considerable and calls for structural reforms in various areas, such as the labour market, and goods and services markets, as well as education and training of workers. A long-term view needs to be taken to analysing the sustainability of the pension system, and this is perfectly compatible with the fact that many of the reforms needed to improve employment, and above all, the economy's productivity, can only take effect over a relatively long period.

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RESUMEN

Como ocurre en muchos países desarrollados, el envejecimiento de la población está generando presión sobre las finanzas del sistema público de pensiones español. Muchos estudios han documentado las fuentes del incremento del gasto en pensiones y las limitaciones de los ingresos por cotizaciones de la Seguridad Social para hacer frente a dicho incremento. Mirando hacia el futuro, se espera que las tasas de dependencia aumenten todavía más, mientras que, en ausencia de cambios adicionales en las fuentes de ingresos del sistema, las tasas de reemplazo disminuirán significativamente desde los niveles actuales. En este contexto, este artículo intenta contribuir al debate sobre la situación del sistema público de pensiones español, mediante un análisis de su evolución reciente y de las proyecciones más actualizadas, que incluyen el impacto de las últimas reformas. Finalmente, también se consideran otras estrategias de reforma que son necesarias para restaurar la sostenibilidad financiera y mejorar la equidad, tanto dentro de cada generación como entre generaciones.

*Palabras clave:* envejecimiento poblacional, sistema de pensiones.

*Clasificación JEL:* H55.