International Business Management 10 (15): 2742-2755, 2016
ISSN: 1993-5250

Sustainability and Adequacy of the Spanish Pension System

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Abstract: In February 1908, the first official Spanish institution responsible for pensions and health care was created. Since then, the Spanish pension system has undergone many changes and has overcome many difficulties. One of the biggest challenges that the Spanish pension system has faced has been the issue of sustainability and adequacy arising from the Spanish demographic trends and more specifically from the increase in life expectancy and the low birth rate, which have caused a reversal in the structure of the population pyramid. This is why in 2011 and 2013 two important reforms took place in the Spanish pension system. This study addresses both reforms presents demographic evidence, projections, modelling and simulation affecting the future sustainability and adequacy of the system and discusses some specific problems still to be resolved. In addition, the study also deals with the question of the management of pension funds and includes a proposal for the Spanish pension system based on the current Swedish model.

Key words: Pension system, sustainability, adequacy, pay-as you-go, capitalization, pension fund, Spain

INTRODUCTION

In order to address a significant number of economic and social changes, the Spanish pension system is undergoing a process of reform. Accordingly, all the elements that form the so-called "Welfare State", including pensions, are affected by the evolution of the Spanish economy, in the context of a more integrated and globalized economy.

Regardless of these forthcoming changes in terms of an ageing population, unemployment or financial culture among others, the pension system has two main functions: on the one hand, it is a way to finance retirement through intergenerational transfers, providing a hedge against unforeseen events and, on the other hand, it is a mechanism of income redistribution to prevent poverty and economic necessity in the lowest income deciles.

More specifically, the income redistribution function played a key role in the last economic crisis. According to the Spanish Statistics Office (INE), (Living Conditions Survey (Encuesta de Condiciones de Vida, ECV Base in 2005), made and released by the National Statistics Institute of Spain. Available at: http://www.ine.es/dyngs/INEbase/es/operacion. htmlc = Estadistica_C and cid = 1254736176807 and menu = resultados and idp = 1254735976608) the average annual income in the case of retired households in 2014 was larger than that of employed people (EUR 20,720 for retired households against EUR 20, 220 for the rest of employed households; Figures are given for consumption units). The immediate consequence has been a reduction in the population over 65 years old at risk of falling under the poverty threshold (5.9% in 2014 against 10.3% in 2010). At the same time, population between the ages of 16 and 64 at risk of falling under the poverty line has increased rapidly in the last 5 years, reaching 21.2 % in 2014. Therefore, pensions offer a "welfare buffer" to prevent poverty in some social groups, consolidated by many years of development of a public system that now needs far-reaching reform.

The first pension system in Spain came from the private sector between 1870 and 1880 through the creation of private mutual funds covering various eventualities such as illness, death and retirement. This private and individualized system was financed by contributions made by both the employer and the worker under an insurance scheme. This system is very similar to that of the guilds in the Old Regime, which apart from regulating its members' activities, also offered assistance in times of difficulty, such as illness or retirement.

This voluntary private pension system impulsed the first social security regulations like the creation in 1883 of the Commission for Social Reforms, the approval of the Workers' Compensation Act of 1900 or the creation of the Institute of Social Reforms in 1903. This first reformist impulse by the Spanish Government was given by the development of a strong private system (In the early 1900s many mutual funds were foreign and linked to

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international banks operating in Spain, such as BNP Paribas, Societe Generale or Zurich) and the launch of the first public pensions in Germany. It was in February 1908 that it was created the first Spanish official institution responsible of pensions and health care.

The first public pension system (accompanied by the first public health care system) appeared in 1919 with the creation of Obligatory Social Insurance under the management of the National Insurance Institute, the predecessor of the current Social Security Institute. This first public system (which began operations in 1921) was inspired by Bismarckian principles: a capitalization system with well-defined benefits and a retirement age set at 65 years old, more or less the life expectancy in those times. The system was based on the creation of individual savings accounts with contributions from the State, the employer and the workers themselves. The funds were accumulated until the established retirement age. The first payment was fixed at 365 pesetas per year.

With the advent of the Second Republic in 1931, the primitive social security system was elevated to a constitutional status: it became an essential principle of social organization that functioned even during the Spanish Civil War. On 9th September 1939, the victorious army (led by the Dictator Francisco Franco) decided on the unification of all retirement and sickness insurances, establishing a pay-as-you-go (PAYG) public pension system with well-defined benefits. The old system based on capitalization became a PAYG system.

The new retirement policy emphasized the protection of the family in a new framework composed of two elements: a public pension combined with agreements with private mutual institutions and new public subsidies to cover orphans, widows and those in extreme poverty. The inadequacy of these public pensions allowed the creation of a parallel private system of capitalization of mutual funds managed by labour mutualities and well-defined contribution systems for self-employed workers under the regulation of the Ministry of Labour and the National Prevision Institute.

The next step was the unification of the different existing insurances into a Single Insurance under the Social Security Act of 1966. It could be said that this law is the origin of the current social security system divided into various regimes (general, self-employed, coal, sea, domestic and agricultural) and with different features depending on the relationship between contributions and benefits.

After the adoption of the Constitution of 1978, the pension system was reinforced by the extension of mandatory public contributions to all people of working age (between 16 and 64). In addition, redistributive mechanisms were established such as non-contributory pensions financed by the social security budget and, following a period of high unemployment combined with inflation (1973-1985), the unemployment subsidy.

The maturing of the Spanish pension system was finally facilitated by the progressive separation of pension spending (including its financing procedure) from other public expenses such as health expenditure (the Social Security Basis Act of 1994) and non-contributory pensions.

One of the key moments in the recent history of the Spanish pension system is the signing of the Pact of Toledo in 1995. Political parties, business organizations and trade unions agreed several reforms to maintain the pension system in the long run through specific initiatives such as fiscal stimulus to support private pension plans (in the form of taxable base reduction) or the period of time used to calculate the Regulatory Base in order to obtain a public pension.

The recent evolution of the Spanish economy has significantly influenced the current development of the pension system, setting parametric adjustment mechanisms for it to become sustainable in the long run and creating "counter-cyclical" buffers such as the Social Security Reserve Fund in 2001.

However, despite all these measures, the pension system was still inadequate thus leading to two new reforms in 2011 and 2013 with the introduction of a key element: the "sustainability factor". Notwithstanding, total expenditure on pensions is growing at the fastest rate ever (3.2% in 2015 according to the Social Security Administration) while revenues grow at under 1%.

Following this brief introduction, next section addresses the current situation of the Spanish pension system and more specifically the 2011 and 2013 reforms. Then, the article focuses on the sustainability and adequacy of the system, showing evidence from demographic projections, modelling and simulation, and on the challenges for the future. Finally, a proposal for the Spanish pension system is provided and the main conclusions of this research are reported.

MATERIALS AND METHODS

The current situation of the spanish pension system: 2011 and 2013 reforms: As mentioned in the introductory study, the Spanish pension system has been reformed several times in the last three decades. As we will describe later, these reforms are fundamentally parametric and with accountancy adjustments. The 2011

and 2013 reforms are also parametric reforms but they introduce new capital elements that are worth analysing.

As stated in the preface to Law 27/2011 on the Updating, Adaptation and Modernization of the Social Security System and outlined in the introductory section, the social security system is, undoubtedly, a central pillar of welfare in Spain. This is why in 1995 the Pact of Toledo (based on mutual cooperation of political parties) was signed, in order to commit all political and social actors to ensuring that the rights of social protection would not be eroded by short-term decisions and that both political and social actors would engage in lifelong dialogue and the widest possible consensus. Since the signing of the Pact of Toledo, the Commission of the Pact has formulated recommendations with the aim of establishing the groundwork for the public powers to make informed choices on pensions. However, there is still work to be done on pensions, while ongoing social and economic upheavals require continuous adaptation of the Spanish social security system to the socio-economic reality.

In recent years, the Spanish social security system has addressed important challenges regarding the long-term requirements arising, inter alia, from demographic trends, as it has sought to ensure the financial sustainability and adequacy of the system. The increase in life expectancy of elderly people (good news) and the low birth rate (bad news) are two issues of particular concern, because their confluence is causing a reversal in the structure of the population pyramid, increasing the number of pensioners relative to the working population, that is, significantly increasing the dependency ratio of pensioners.

According to the 2014 Spanish Statistical Yearbook, life expectancy at 65 years has risen from 12.75 years in 1951 to 22.3 in 2013. Similarly, life expectancy at 85 years of age was 7 years in 2013. Thus, it is no surprise that Spain currently has the second-highest life expectancy of any country in the world county, which in the future will result in the payment of more pensions for longer due to the ageing population. In addition, the birth rate has decreased from 2.86 in 1960 to 1.30 in 2013, which means fewer and fewer contributors to the system. If nothing changes (if neither the birth rate nor migration flows increase), it is certain that the Spanish social security system will experience difficulties, and today's younger generations will be the most affected. In addition, an exceptional circumstance is due in the coming years the retirement of the "baby boom" generation which will strongly increase the number of pensions to be paid for a lengthy period of time (2025-2060).

This demographic pyramid reversal is just one of the decisive factors prompting the 2011 and 2013 reforms of the pension system. In recent years, the Spanish economy (along with the rest of the European economies) has witnessed a significant reduction in the employment period, mainly because the increased number of years that young people spend training and studying, meaning that their access to the labour market has been delayed compared to the typical age in previous generations and the participation rate of people over 50 in the labor market is still insufficient. As a consequence of these two facts, it seems necessary to reinforce the contributory system by establishing a better relationship between the effort made via contributions throughout people's working lives and the contributory benefits to be received.

Obviously, the effects on the pension system of both the reversal in the demographic pyramid and the imbalance in the ratio contributions/contributory benefits is exacerbated in times of crisis. Therefore, it is no surprise that the latest reforms in the Spanish pension system have been taken place since the 2008 crisis.

The main changes introduced by Law 27/2011 were the increase in the retirement age (from 65-67 years old), the increase in the contribution period (from 35-37 years) and the increase in the calculation period (from 15-25 years), that is, in the contribution period on which the amount of pension to be received is based. These changes will be gradually applied. First, a transition period until 2027 is set to gradually delay the retirement age from 65-67 years old: each year until 2018, the retirement age will go up by one month. From 2018 the retirement age will increase by two months each year; in such a way that by 2027 the retirement age of 67 will be established. Second, the contribution period increases from 35 years and 3 months in 2013 to 38 years and 6 months in 2027. A transition period was also set until 2017 for the contribution period. Transitional measures were set to facilitate the adaptation to the standard, such as the possibility for individuals to retire at the age of 65 provided they have contributed for at least 38 years and 6 months (Table 1 lists the retirement ages and contribution periods corresponding to years between 2013 and 2027). Third, up until January 2013 calculation of the pension was made on the basis of the last 15 years' contributions. The new law, however, establishes a progressive increase in the calculation period, up to 25 years in 2022 (each year the calculation period increases by one year until it reaches 25 years) in order to neutralize the impact on those who are close to retirement age (Table 1).

Table 1: Number of contributed years and required age to be eligible for a pension (L2011-UAMSSS)

Year	Number of contributed years	Required age
2013	At least 35 years and 3 months	65 years
	Less than 35 years and 3 months	65 years and 1 month
2014	At least 35 years and 6 months	65 years
	Less than 35 years and 6 months	65 years and 2 months
2015	At least 35 years and 9 months	65 years
	Less than 35 years and 9 months	65 years and 3 months
2016	At least 36 years	65 years
	Less than 36 years	65 years and 4 months
2017	At least 36 years and 3 months	65 years
	Less than 36 years and 3 months	65 years and 5 months
2018	At least 36 years and 6 months	65 years
	Less than 36 years and 6 months	65 years and 6 months
2019	At least 36 years and 9 months	65 years
	Less than 36 years and 9 months	65 years and 8 months
2020	At least 37 years	65 years
	Less than 37 years	65 years and 10 months
2021	At least 37 years and 3 months	65 years
	Less than 37 years and 3 months	66 years
2022	At least 37 years and 6 months	65 years
	Less than 37 years and 6 months	66 years and 2 months
2023	At least 37 years and 9 months	65 years
	Less than 37 years and 9 months	65 years and 4 months
2024	At least 38 years	65 years
	Less than 38 years	66 years and 6 months
2025	At least 38 years and 3 months	65 years
	Less than 38 years and 3 months	66 years and 8 months
2026	At least 38 years and 3 months	65 years
	Less than 38 years and 3 months	66 years and 10 months
From 2027	At least 38 years and 6 months	65 years67 years
onwards	Less than 38 years and 6 months	67 years

BOE No. 184, 2ndAugust, 2011.

Another important issue addressed by Law 27/2011 is early retirement. In this regard, recommendation 12 of the Pact of Toledo finds that early retirement has become basically a formula of employment regulation, so its legal formulation must change, allowing early access to retirement pensions only for long careers where contribution is credited.

Two additional ways of anticipating the retirement pension with reduction coefficients are set: one for involuntary termination of employment and another for voluntary resignation by the employee. For both modalities, a contribution period of at least 35 years will have to be accredited. Additionally, also in both cases, the amount of pension will be reduced by the application of the reduction coefficients set in the law. Regarding the first modality, it will be necessary to be 61 years old, to be registered in the employment office as a jobseeker for a period of at least six months immediately preceding the application, that job extinction has occurred for economic reasons under Articles 51 and 52c) of the Statute of Workers, due to the death, retirement or disability of the individual entrepreneur or as a result of an insolvency proceeding or gender violence. In the second case, workers will have to be 63 years old and the resulting pension (amount) must exceed the minimum pension that the applicant had obtained according to their family situation.

However, as pointed out by Ayuso *et al*. (2013), the changes to early retirement came into force later, with Royal Decree-Law 5/2013, of 15th March, addressing measures to promote the continuance of older workers' working lives and active ageing. This Royal Decree, as seen below, modified some of the requirements to early (as well as partial) retirement access.

Law 27/2011 also introduced changes in the regulation of the complement to reach the minimum contributory pension, partial retirement (eventually modified by Royal Decree-Law 5/2013), contribution period during childcare, and pension funds, among others. However, the last significant innovation in the Spanish pension system is the sustainability factor of the social security system which aims to maintain proportionality between the contributions to the system and the benefits expected of it in order to ensure its sustainability. To achieve this objective, from 2027 onwards, the main parameters of the social security system will be updated according to the differences between life expectancy at 67 years old in the year in

question and in 2027. The updating will take place on a 5 year basis according to the forecasts made by the responsible official bodies.

Initially, the sustainability factor would not be applicable until 2027, but, as a consequence of the increase in the unemployment rate and the persistent economic crisis, in June 2013 the Government requested a committee of experts to design a sustainability factor and Law 23/2013, of 23rd December, which regulates both the sustainability factor as well as the pension revaluation index came into force.

According to the preface of Law 23/2013, the sustainability factor adjusts the initial pension so that the total amount to be received throughout the life of a pensioner who is due to accesses the pension system within a few years (by which time the life expectancy at the retirement age will have gone up) will be equivalent to that received by a pensioner whose retirement takes place earlier (for this purpose, the estimated life expectancy at both times is related). This way, the proportionality between contributions and expected benefits from the system is maintained, ensuring the present and future receipt of appropriate and adequate pensions as mandated by Article 50 of the Spanish Constitution. In other words, the sustainability factor mitigates the risk factor associated with increased longevity and adjusts intergenerational equity, although only with respect to pensions, in order to maintain the mid- and long-term the financial equilibrium of the pension system.

The sustainability factor will be applied for the first time in 2019, so that pensioners have enough time to be informed about this key new element of the pension system. To calculate the sustainability factor, the mortality tables for pensioner population provided by the social security system are used and the age of 67 years is taken as a reference. The expression of the Sustainability Factor (SF) is as follows:

$$SF_t = SF_{t-1} e^{*}_{67} \quad (1)$$

Where:

$Sf_t = Sf_{2018} = 1$

t = 2019, 2020

e^{67} = A value computed on a 5-year basis representing the annual change, in a 5-year period, of life expectancy at 67 years old obtained from the mortality tables referenced above. For the period 2019-2023, inclusive, the value of e^{67} will be $^{67} = (e_{67}^{2012}/e_{67}^{2012})^{1/5}$, with e_{67}^{2012} and e_{67}^{2017} representing life expectancy at 67 years old in 2012 and 2017, respectively. For the period 2024-2028, inclusive, it will be $e_{67} = (e_{67}^{2017}/e_{67}^{2022})$ and so on

As mentioned above, together with the sustainability factor, Law 23/2013 introduced the pension revaluation index in order to guarantee not only the sustainability of the pension system, but also the adequacy of the pensions, as mandated by Article 50 of the Spanish Constitution. From 1997, the consumer price index was used as the tool for the yearly update of pensions. However, the demographic problems and the economic crisis called into question the utilization of such an index for this purpose, opening the doors to the use of other indexes based on the rate of increase of salaries, economic growth rate, and contribution to the social security system, among other factors.

The expression for computing the pension revaluation index (PRI) is as follows:

$$PRI_{t+1} = \bar{g}_{R,t+1} - \bar{g}_{CP,t+1} - \bar{g}_{SE,t+1} + (t+1)\left(\frac{I^{*}_{t+1} - E^{*}_{t+1}}{E^{*}_{t+1}}\right) \quad (2)$$

where t+1 represents the year for which the revaluation is being computed;$g_{R,t+1}$ $g_{CP,t+1}$ and $_{SE,t+1}$ represent the moving average of 11 values of the per-unit relative variation of the social security system income, the number of contributive pensions in the social security system and the substitution effect, respectively, centered at t+1 (the substitution effect is defined as the per-unit annual relative variation of the average pension in the social security system in a year without revaluation); $I_{t+1}$and E_{t+1} are the moving average of 11 values of the income and expenses of the social security system, respectively, centered at t+1 and α is a parameter taking values between 0.25 and 0.33 to be revised on a 5 year basis.

It is of note that the percent revaluation of pensions, $100PRI_{t+1}$ cannot be either lower than 0.25 or greater than inflation.

We end this study with a few words about some of the measures included in Royal Decree-Law 5/2013, of 15th March, to promote the continuance of the working lives of older workers, learning throughout life, employment opportunities for older workers, and active ageing. The Royal Decree addresses these issues through measures in the field of early retirement, partial retirement

and compatibility between work and retirement (as well as other measures not directly related with the pension system such as the fight against fraud and employment policies). These measures allow the recommendations of the EU Council of 10th July 2012 regarding sustainability of the pension system to be met.

Regarding the compatibility between work and retirement, those workers who have agreed to retire upon reaching the legally-established age, with a long contribution period, will be allowed to reconcile full or part-time employment with the payment of 50% of the pension, with limited contribution to the system. As for early retirement, the measures adopted by Law 27/2011 were insufficient to ensure the viability of the system in the long run by allowing a gradually greater spacing between the legal retirement age and the age at which it is possible to access early retirement, encouraging, in certain cases, decisions to exit the labour market early. This is why the regulation of early (and partial) retirement in Law 27/2011 was modified. Although this regulation should have come into force on 1st January 2013, its implementation was suspended for three months:

- In order not to have consecutive regulations on the same subject in a short space of time and
- Due to the inability of the social security managing bodies to meet the deadlines for adapting management procedures to the scheduled changes

Following Ayuso *et al*. (2013), until January 2013, workers could take early retirement at the age of 61, provided they met a set of requirements including having been fired and having contributed to the system for more than 30 years. Early retirement entailed a reduction in the pension, which decreased in line with the number of contributing years.

Individuals who had contributed to the social security system for between 30 and 34 years witnessed their pension reduced by 7.5%; individuals who had contributed for between 35 and 37 years experienced a 7% reduction; those who had contributed for between 38 and 39 years saw a reduction of 6.5% and there was a reduction of 6% for those with 40 years of contributions. With Royal Decree 5/2013:

- The top early retirement pension will be the maximum pension reduced by 0.50% per quarter or fraction of quarter prior to the standard retirement age
- The minimum age for early retirement was set at four years below than the legal standard in cases of involuntary termination of employment and two years below in cases of voluntary resignation of the employee
- With regard to voluntary retirement, the number of years of contributions had to be increased from 33 to 35. In both modalities of early retirement, pension reduction coefficients were modified. In the case of early retirement for involuntary termination, a reduction coefficient is applied (per quarter or fraction in advance) ranging from 1.875% for workers with fewer than 38.5 years of contributions to 1.5% for those with 44.5 or more years of contributions

As for partial retirement, the most important change is that the number of required contributing years increased from 30-33 and the minimum age of workers wishing to apply for it rose from 61-65, with a transitional period ending in 2027. If contributing time exceeds 36 years and 6 months, an individual worker can partially retire at the age of 63. The percentage reductions in working hours are limited and the contribution rate increases for both the employer and the employee, from 30-50% in 2013, increasing annually by 5% until it reaches 100%. A summary of the details of modifications in requirements for accessing early and partial retirement can be seen.

Demographic projections, modelling and simulation: As stated in the previous sections, the current key issue of the Spanish pension system is its financial sustainability as well as its adequacy, in light of the slumping fertility rate and rising longevity of the Spanish population. Therefore, it is no surprise that a significant amount of the recent literature on the topic focuses on models to gain insight into the future Spanish age pyramid, from which cash inflows and outflows of the pension system will be appraised.

The recent demographic projections provided by the Spanish Statistics Office for the period 2014-2064 (Fig. 1 and Table 2) clearly indicate the progressive ageing of the Spanish population, which will have pervasive consequences for both the sustainability and the adequacy of the social security system in the future. According to such projections, the percentage of the population aged 65 years and over which currently stands at 18.2% would reach 24.9% in 2029 and 38.7% in 2064. Specifically, the Spanish Statistics Office estimates that 11.3 million people aged 65 and over will reside in Spain in 2029 (2.9 million in 2014). In 50 years (in 2064) this group will consist of 15.8 million people (the total population estimated in the country is 40,883,832). It is

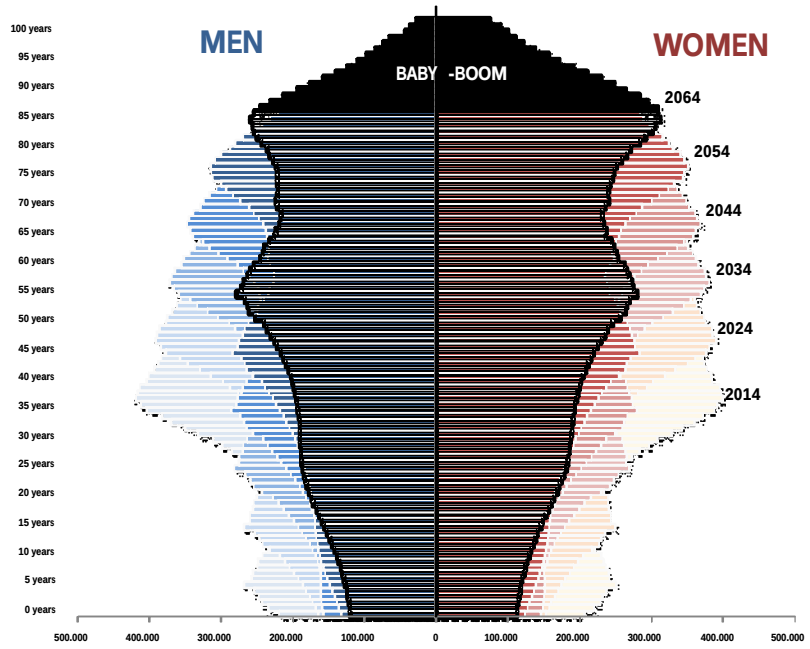

Fig.1: Population by sex and age. Spain 2014-2054

Table 2: Projected resident population in Spain in 2029 and 2064, by age group

Group of age	2014	2029	Increment2014-2029	2064	Increment2014-20
0 - 4 years	2,320,408	1,538,899	-781,508	1,183,906	-1,136,502
5 - 9 years	2,478,051	1,683,643	-794,408	1,268,878	-1,209,173
10 - 14 years	2,267,636	1,939,731	-327,905	1,403,355	-864,281
15 - 19 years	2,140,719	2,346,235	205,516	1,584,732	-555,968
20 - 24 years	2,374,582	2,603,060	228,479	1,762,097	-612,484
25 - 29 years	2,747,345	2,478,517	-268,828	1,862,348	-884,997
30 - 34 years	3,453,158	2,344,638	-1,108,520	1,900,872	-1,552,286
35 - 39 years	4,030,930	2,477,885	-1,553,046	1,955,583	-2,075,347
40 - 44 years	3,857,831	2,703,299	-1,154,532	2,079,058	-1,778,773
45 - 49 years	3,689,432	3,271,994	-417,439	2,284,925	-1,404,507
50 - 54 years	3,333,708	3,775,515	441,807	2,588,052	-745,656
55 - 59 years	2,878,297	3,592,907	714,610	2,705,302	-172,995
60 - 64 years	2,492,775	3,402,779	910,005	2,475,500	-17,275
65 - 69 years	2,328,239	3,031,281	703,042	2,270,596	-57,643
70 - 74 years	1,810,582	2,549,479	738,897	2,309,811	499,229
75 - 79 years	1,652,850	2,085,393	432,543	2,400,333	747,483
80 - 84 years	1,403,770	1,727,781	324,011	2,696,784	1,293,014
85 - 89 years	825,438	1,058,223	232,785	2,713,332	1,887,894
90 - 94 years	333,187	589,589	256,403	1,934,964	1,887
95 -99 years	75,270	237,579	162,309	1,130,629	1,055,359
100 years and over	13,551	46,480	32,929	372,775	359,224
Total	46,507,760	45,484,908	-1,022,852	40,883,832	-5,623,929

Spanish Statistics Office, Population Projection for Spain, 2014-2064

also worth noting that, focusing on the 5-year age groups, the largest at present is 35-39 years. In 2029, it is predicted to be 50-54 and in 2064, 85-89 years. An important consequence of this demographic trend is that the dependency ratio, the ratio of the 'population aged 65 years and over and 14 years and under' to the 'population aged between 14 and 64' will rise from 52.1% in 2014 to 59.2% in 2029 and to 95.6 in 2064. If we restrict the dependency only to the population aged 65 years and over, the corresponding dependency ratio would rise from 27.6 in 2014 to 39.6% in 2029 and to 75.7% in 2064. Interestingly, the population aged 100 years and over (13,551 in 2014) is set to reach 372,000 in 50 years.

The intensity of the relative ageing of Spain's population is being accelerated by a declining birth rate that fails to be offset by positive net migration. A pervasive consequence of the decline in the birth rate is that in 2029 there will be some 1,576,000 fewer children

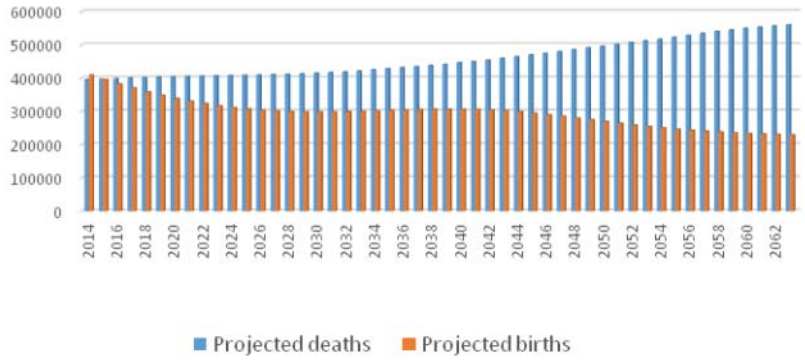

Fig. 2: Number of births and deaths of Spanish residents projected over the next 50 years

under 10 years old than in 2014 (a reduction of 32.8%) and 2.3 million fewer than in 2014 (a decrease of 48.9%). These figures mean that if we restrict the dependency ratio only to the population aged 14 years and under, it decreases from 24.6% in 2014 to 19.6% in 2029 and to 19.9% in 2064. Fig. 2 shows the number of births and deaths of Spanish residents projected over the next 50 years.

Regarding net migration, in 2014 the immigration flow reached a level of 332,522 immigrants, 15.4% >5 years ago. However, 417,191 people left the country to live abroad that year. As a consequence, 2014 is the fifth consecutive year in which Spain has registering a negative migration balance. Under the assumption of a constant flow of immigrants and an emigration propensity, also constant by age, both held at the level of 2014, Spain would lose more than 275,000 inhabitants by 2020 due to its population exchanges with foreign countries. However, this trend is predicted to reverse from 2021, resulting in a net population gain due to migration of nearly 2.5 million people in the next 50 years.

Thus, the reversal of the demographic pyramid is not a new phenomenon, but in recent years it has been masked by the successive waves of immigrants arriving in Spain, whose birth rate is significantly higher than that of the Spanish population. Unfortunately, the offsetting of the declining birth rate via migration seems unlikely to continue in the very near future, at least until 2021.

If the demographic projections by the Spanish Statistics Office turn out to be fairly accurate, the sustainability and adequacy of the Spanish pension system will be compromised and policy measures are thus needed to tackle the daunting demographic development of the country over the next 50 years.

Are the projections by the Spanish Statistics Office reliable? It is difficult to say with any certainty but we can state that they are in line with the projections by the United Nations Population Division and with the very recent projections by Rostan *et al.* (2015), which use a method borrowed from the signal processing discipline based on the Burg method. This method first fits a pthorder autoregressive model to the input signal by minimizing (least squares) the forward and backward prediction errors while constraining the autoregressive parameters to satisfy the Levinson-Durbin recursion and then uses an infinite impulse response prediction error filter.

Since, there seems to be a consensus as to the unfavorable demographic evolution in Spain over the next 50 years, it can be concluded that the reforms introduced in the pension system in the recent past years were necessary. Nevertheless, now the question is whether they are enough to ensure the sustainability and adequacy of the system in the near future.

According to the projections by the United Nations Population Rostan *et al.* (2015) the answer is “no”, though projections by Rostan *et al.* (2015) are a little bit less pessimistic than those by the United Nations and their projections result in more workers, more soon-to-become-workers and fewer retirees than those of the United Nations. In the long term, they even estimate a clear rebound of the fertility rate (in 2035), which they state will reach 1.6 at the end of the century versus 1.30 projected by the United Nations. According to the recent research by Cordoba and coauthors the answer is “clearly no”. They estimate (Generalized Least Squares estimation) a dynamic model for the social security system’s income and expenditure on pensions . The model aims to capture the inertia of both income (via workers’ contributions to the system) and pension spending. The model includes the lagged response as an explanatory variable. From this modelling approach, they find a clear upward trend of total expenditure on pensions which is not matched by income growth, such that that they date the bankruptcy of the pension system to 2019, by which time the pension reserve fund will be exhausted. From then, the only solution will be the public deficit, an undesirable measure from whichever economic perspective.

Therefore, the above research suggests new reforms to be made to the pension system. Cordoba and coauthors suggest a series of measures including:

- Raising the standard age for retirement to at least 70 (with the exception of some groups like miners, police, military, etc.)
- An increase in contributions paid by workers
- A specific increase in direct and indirect taxation directly aimed at funding the gap between income and pension system expenditure
- Establishing a specific quota for non-working renters with a very high income level who do not contribute to social security
- The introduction of a mixed pension system for the new generations, so that the contribution will guarantee a subsistence pension and the complement will go to private pension funds

We would like to draw particular attention to measure and our proposal is to extend it to the voluntarily non-working population because the ratio of the 'population under the age of 18 plus population over the age of 65' to 'working population' is extremely high and in our opinion, Spain cannot afford the high percentage of young people and population aged between 35 and 65 years (especially women) who voluntarily decide not to participate in the labour market, thus neither directly contributing to the financing of the public expenditure nor contributing to economic growth. Measures to boost the birth rate and encourage skilled immigration are also key factors for the future sustainability of the pension system.

We want to end this section with a word of caution about the adequacy of Spanish pensions, especially of the minimum pension. Gimenez and Saavedra (2015) find that between 2015 and 2050, the 2011 and 2013 reforms will reduce the real value of the average pension by 33%, with a reduction of 41% for the minimum pensions. More specifically, the minimum pension will reduce from EUR 783 (in 2015) to EUR 457 (in 2050), in real terms. Obviously, this reduction seriously affects the adequacy of the pensions, especially of the minimum pension. It must be taken into account that currently 30% of pensioners receive this minimum pension and this percentage is expected to rise to 48% in 2050. The authors simulate exempting minimum pensions from the pension revaluation index introduced by the 2013 reform and making their real value a constant share of per capita output instead. They find that a hypothetical future parametric reform of the Spanish PAYG pension system that excludes the minimum pensions from the application of the pension revaluation index and that makes their real value a constant share of per capita output, encourages workers to work shorter hours, to retire earlier and to consume less, but also results in very few households becoming worse off and large aggregate welfare gains. Thus, their results pose the following dilemma. What should we do make the economy more efficient or make its households better off? We do not have the answer to such a dilemma but if the pension revaluation index has such pervasive consequences, a new reform of the pension system addressing the specific topic of adequacy is necessary.

If a new reform is needed, it should be implemented as soon as possible because the worst-case scenario for pensions will take place from 2030 onwards, when a huge collective of long life expectancy baby-boomers will reach retirement age.

Challenges for the future: Sustainability and adequacy are the key goals for the Spanish pension system in the long run. However, there are some challenges that should be taken into account. In this section, we focus on the problems in terms of financing the social security system, taking into account the ageing modelled in the previous section and the role of the Pension Reserve Fund in the current pension system. We will also focus on the situation of the private pension industry in Spain because any Any modification of the actual PAYG system has a large impact on the Spanish economy, especially on the relationship between national saving and total investment. Also, the saving decisions of households and firms can be modified in order to provide more funds for their private pension funds.

The financing of the social security system: The 2016 General Budget has brought some changes in the social security system. Among other issues, the government plans to move the spending on pensions for widows and orphans from the social security budget to the general budget, an amount totalling more than EUR 23 billion for 2016. The exclusion of certain expenditures from the social security budget is not new. In 1994, the government approved the exclusion of health expenditure while the Minister of the Treasury recommended paying into a private pension fund in order to complement the public pension.

One of the best indicators of potential future problems in the pension system is the ratio 'number of contributors' to 'number of retirees'. This ratio reached its lowest value in 1996: 2.26 contributors per pensioner. Also, 1996 was the year that witnessed the biggest ever crisis of the social security system, this despite the "Pact of Toledo". In 2001, the Government decided to move non-contributory pensions from the social security budget to the general budget which now totals nearly

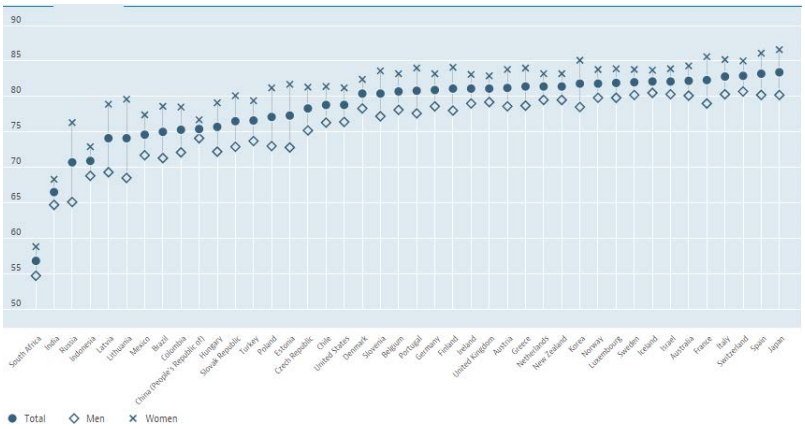

Fig. 3: Life expectancy at birth in the OECD countries (2013)

EUR 20 billion. This was the last change until 2011 with the new system of pension calculation. In spite of excluding pensions for widows and orphans, the deficit of the social security system may reach 1.5% of GDP in 2015, far exceeding the latest government estimates (in 2014, the deficit closed at 1.06% of GDP).

The last decision (excluding widow and orphan pensions) was made at a time of financial difficulties in the social security system due to problems such as an ageing population, low economic productivity and high unemployment (more than 21% of the active population). Among these problems, the greatest one that the pension system faces is ageing. It is a long-term problem with a different impact depending on the public or private nature of the pension system.

The economic crisis has demonstrated the urgent need to improve the design of well-defined contribution plans in an ageing environment. PAYG public pensions have not escaped the impact of the crisis as they have been affected by another mechanism: unemployment. There is reduced income, fewer people contributing and there are higher expenses mainly due to the ageing population.

An ageing population is the result of a decline in fertility rates and increasing life expectancy. The first factor can be understood as a temporary effect but the increase in life expectancy is permanent. On the one hand, falling fertility rates means a smaller cohort entering the labour market than those reaching retirement age. According to Boldrin *et al.* (2005), 50% of the reduction in birth rates in Western countries is explained by the growth of PAYG system. Families do not need to have children because when parents reach retirement, the State will finance their post-working life (Santacruz and Bernal, 2015). On the other hand, barring an extreme event such as a war or a pandemic, the increase in life expectancy is permanent. Fig. 3 shows the life expectancy at birth in 2013 released by the OECD. Note that Spain has the second-highest life expectancy at birth (it is also has the third-highest life expectancy at the age of 65) wich makes ageing a crucial problem for Spain.

In light of this problem, some OECD countries including Spain as explained above, have linked retirement age to life expectancy (sustainability factor).Other countries such as France have linked the minimum number of years of contributions to qualify for a minimum pension to life expectancy. This link has to be established automatically whenever there is a deviation from the life expectancy assumed in the actuarial calculations, rather than being based on political agreements.

As a consequence of the exceedances of life expectancy compared to the initial assumptions, most OECD countries with PAYG systems have promoted well-defined contribution plans in order to complement the public pension system (e.g. Germany, France, Poland, Sweden). They have also established mechanisms to promote higher taxes and higher tax periods, especially in the capitalization plans. If people live longer, the only way the only way to achieve a sustainable pension system to get it is to contribute more money or contribute for longer periods.

The mechanisms used include involving workers in mandatory defined contribution pension systems (eg. Sweden) or incentivizing them to save.For example, public supplementary contributions (Germany), self-regulation (United States) or the establishment of a private voluntary participation system.This option has been introduced in the United States, Italy, New Zealand and the United Kingdom. In parallel, many countries are making an effort to improve communication and financial education.Such is the case of “orange envelopes”These “orange envelopes” are letters that the Swedish Government

sends to people in order to inform them of how much they have contributed and how much they will receive as a pension with these contributions. or "notional accounts" in Sweden, or "booklets" in Chile.In addition, future retirees are given information with examples about how much they will receive when they reach retirement if they continue contributing as they have done up to that point. Similarly, examples are given of how much their future pension will increase by if they contribute a little more.

The role of the pension reserve fund: One of the key elements in the most recent history of the Spanish pension system was the creation of the Social Security Reserve Fund in 2001. This instrument is intended as a "countercyclical buffer" in order to cover public pensions when social security is in deficit. In times of economic expansion, the successive surpluses of the social security budget go towards financing the Reserve Fund, whose assets must be qualified as "risk-free" with top-quality ratings.

After some years of continuous surpluses in the social security system, the last contribution to the Reserve Fund occurred in 2010. That year marked the moment when the Kingdom of Spain lost the highest credit rating by Moody's, the year of the largest deficit in its economic history (11.4% of GDP), the largest job losses throughout the crisis and the first adjustment plan after the first bailout of Greece.

Despite this situation, social security recorded a surplus that allowed for a provision of EUR 1.74 billion to the Reserve Fund, resulting in maximum total funds of EUR 52.559 billion. Since then, the outflows have been far greater than the inflows via dividends and coupons of the financial instruments from the Fund's investments. In three years there have been net outflows of EUR 33.951 billion. This huge amount of net outflows has been used to finance extraordinary payments such as pensions in July and December (extraordinary payments in summer and at Christmas).

The "decaying" role of the Reserve Fund is not only financing pensions. In recent years, the Reserve Fund has been used to buy government debt. In the boom years, the leitmotiv was the need to invest in "safe assets" with a return that, at least, compensates inflation. However, since 2010 the Reserve Fund has been used by the Spanish Treasury in times of trouble to cover debt repayments. Since the end of 2015, the Reserve Fund has been fully-invested in Spanish securities, having sold all the foreign bonds (German, French and Dutch). The Fund Management Committee decided that only sovereign bonds of these countries would be part of the portfolio with a weight that should not exceed 55% of the total invested.

This situation suggests that the Reserve Fund is becoming "Japanized". This means that the Spanish Government is following in the footsteps of the Japanese Government in order to press its Sovereign Fund (the largest pension fund in the world worth USD 1.1 trillion under management, of which 64% is invested in Japanese government bonds) to buy more government debt. However, there is a clear difference between these two funds: the Japanese fund is much more diversified than the Spanish one and takes more risks, with a high percentage of its assets invested in the Japanese stock market, which has resulted in higher profitability since early 2015.

Pension funds: management, fees and inflation target: In light of the scenario described above, different alternatives can be implemented in order to establish a complementary private pension system (Caminada and Goudswaard, 2005). The main approach is to accumulate savings over time in pension funds, giving rise to a private system complementary to public pensions.

Pension funds were established in Spain by Act 8/1987 of 8th June on Plans and Pension Funds. Since the 1982 Act, pension funds have in fact been collective investment institutions of a financial nature. They have all the characteristics of a collective investment institution as well as some aspects relating to their origin in the insurance market. For example, the management and legal conditions come from actuarial techniques, with an obvious bias towards safety and long-term investment.

Since 1982, pension plans, assets under management and the number of participants, have grown significantly (Fig. 4 and 5) thanks in part to the tax benefits that have been implemented over time. Both when the pension fund is endowed with personal contributions as well as when it is the employer who contributes the money on behalf of his employee, the tax framework concedes a tax benefit in the form of a reduction of net income in the case of pension plans with firm contributions, or as a reduction in the overall tax base in other pension funds up to a limit (Santacruz and Bernal, 2015).

Certainly, tax benefits have prompted many participants to pay into pension funds, leaving aside other decision variables such as management fees, changes in expected inflation, the fiscal treatment of reimbursements in retirement (it is considered a "salary"

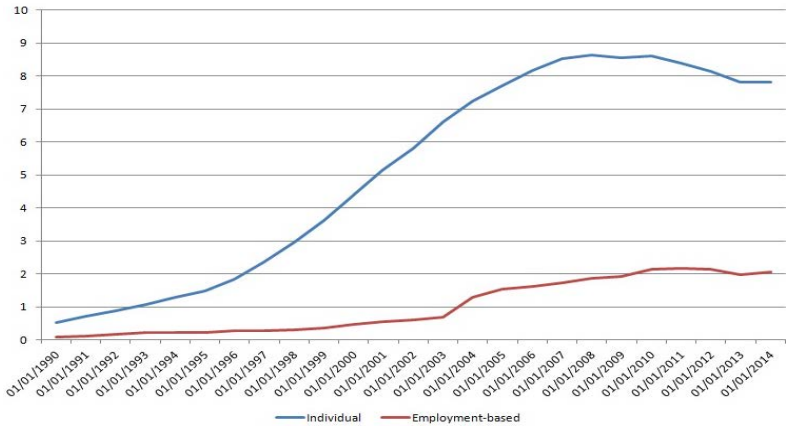

Fig. 4: Number of participants in pension plans in Spain (in millions)

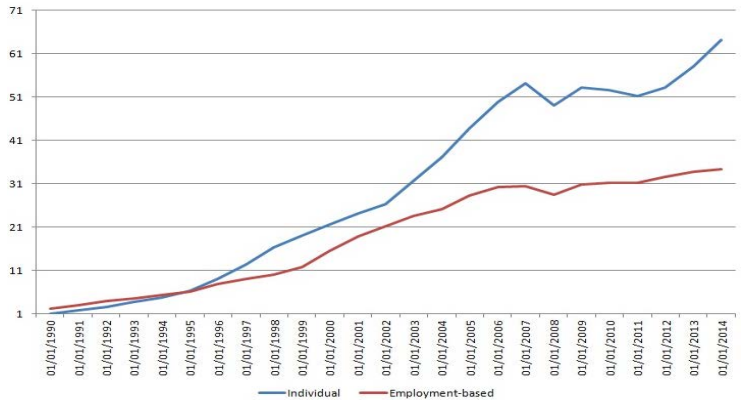

Fig. 5: Total wealth of pension funds in Spain (in EUR billions)

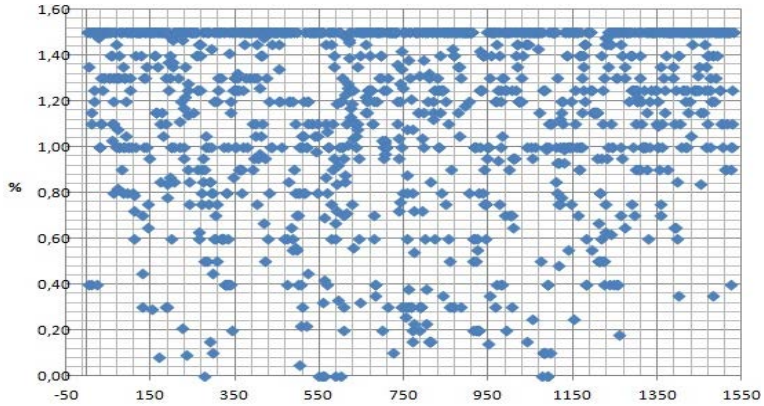

Fig. 6: Distribution of management fees in Spanish pension funds

income and therefore it increases the likelihood of moving into a higher tax bracket in a progressive tax system such as the current personal income tax system) or the historical performance of the pension plans (Santacruz and Bernal, 2015).

Management fees can be considered as a proxy measure to evaluate the results of pension funds management. Taking a sample of 1,530 pension plans in 2014, the most common maximum annual fee is 1.5% (all fees are charged over the accumulated wealth) while the most common maximum annual administration fee is 0.1% (Fig. 6). So, the most frequent maximum expenditure for a contributor to a pension plan is 1.6% annually (Fernandez, 2015).

In light of this evidence, the probability of a "substitution effect" between public pensions and private savings is quite low. Higher fees and low profitability cause an evident decline in global savings.

RESULTS AND DISCUSSION

Our proposal for Spain is based on the current pension system in Sweden. Given the current situation of the Spanish pension system and the need for reforms, we believe that implementing a Swedish-style pension model will, in the future, provide adequate pensions for Spanish citizens and enable the system to deal with shocks such as increasing life expectancy and the ageing of the population.

The starting point of the Spanish pension system is quite similar to Sweden in the late 90s when it started designing its reform. The reform of the Swedish system was made by consensus among all social and political groups. The process was driven by a group of experts in pensions who produced a draft that was discussed and approved by Parliament. All political parties agreed to implement the reform regardless of which party was in government at the time.

There is a basic PAYG public pension for all Swedish people, with social contributions as the main source of retirement financing.In this framework, there is a clear relationship between what workers contribute and the pension they will receive at the time of retirement. This is the famous "notional well-defined contribution system". Each individual has a personal account (notional) which indicates what one contributes. Every year, workers receive a report through an "orange envelope", as we described above, detailing how much they have accumulated and what this accumulation pension entitles them to. Pensions are linked to life expectancy, so one retires later if life expectancy in national mortality tables increases, meaning that this is an automatic mechanism.

At the same time, as the introduction of the "notional" accounts, the Swedish State introduced a new supplement based on a mandatory private pension with well-defined contributions. Precisely, 2% of the social security contribution goes to these accounts. Pension funds that manage these funds can be private or public, but the key is that they are clearly regulated. Pension funds offer different investment strategies that individuals can choose.For those not willing or able to choose a strategy, there is a default option. As expected, this default strategy is the least riskiest, but it has a low yield potential.

Sweden started with the same system as the current Spanish system and introduced all of the following aspects: notional system in the PAYG pensions (restoring a clear and simple link between what one saves and what one is entitled to as a pension), a complementary mandatory private pensions system alongside the public system, state regulation of pension funds and annuities, but these funds are managed and always have a default option for private management strategies.

In addition and regardless of this improvement, other characteristics applied in other OECD countries can also be introduced. For example, the complementary private pension system could be not compulsory but rather voluntary with automatic default enrollment and the possibility to opt-out, as is the case with the National Employment Savings Trust (NEST) in the UK (Booth and Niemietz, 2015).They can be used based on matching contributions (both the employer and the State, such as in the UK or New Zealand) or to help those with low incomes for saving in defined contribution plans (e.g., Riester incentive plans in Germany). Finally, there should be a default investment strategy based on the society's life cycle.

Other approaches to reform might include, on the one hand, replacing the current PAYG system with other one based on capitalization, in which employer and employee must contribute to a pension plan that can be individual or employment-based. The main problem is how to compensate the working population above 40-45 years old that had been contributing to the public system. In Chile, the contributions of these people were compensated by the issue of "acknowledgment bonds" as Sovereign debt (Balmaseda *et al*., 2006).

However, a pure capitalization system is not free of risks. There are risks from the financial market relating to the profitability of the portfolio returns in comparison to the market return (beta effect), interest rates, exchange rates, volatility of financial markets, inflation or the costs of management (fees).

On the other hand, another possibility is to maintain the PAYG system with additional funding adjustments (parametric and non-parametric) such as reducing the wage replacement rate, indexing it to the consumer price index reduced by a percentage in order to reduce the actual growth of the amount of pensions, and modify the rules for calculating pensions, requiring >25 years of contribution to receive a pension. It would also be interesting to review early retirement and other mechanisms that play a part in the rigidity of the labour supply.

CONCLUSION

The Spanish pension system is at a crossroads after many years of expansion of the Welfare State and successive economic crises. The pension system has changed completely since the appearance of the first

private insurance mechanisms or the advent of the first public pension regime at the beginning of the 20th century. Over the years, the public initiative has gained effective weight over other private pension schemes in the context of an overall movement towards extending health care, education, social services and dependence.

This extension of a public hedge over the retirement period has been modified due to the emergence of certain financial problems such as permanent budget deficits since 1985. The possibility of having an unsustainable system drove political parties, business organisations and trade unions to sign a historical Pact to make pensions a priority for any Government.

This Pact and the reform of the Social Security General Act in 1994 were the starting point for the reforms to the pension system. Most of them have been parametric in nature, such as the modification of the period used to calculate the regulatory base or the retirement age. In the case of the social security budget, the aim has been the exclusion of some specific expenses, carrying them over from the social security budget to the General State budget. Examples of such moves include health spending, non-contributory pensions and pensions for widows and orphans.

Continuing this process, the reforms of 2011 and 2013 have played a key role in terms of sustainability and adequacy. In this regard, the PAYG system is currently governed by the "sustainability factor" which is composed of two different aspects: on the one hand, a parametric formulation in order to include life expectancy as a correction factor and, on the other hand, a zero-deficit component along the business cycle in order to maintain the system in accounting equilibrium.

After this key reform, the pension system faces some challenges such as the financing of the social security system or the role of the Pension Reserve Fund, whose monetary resources are half what they were in 2010. Also, regarding private pension funds, we highlight the current problems with regard to management fees or active/passive management. Finally, we suggest possible reforms based on the Swedish model.

ACKNOWLEDGEMENTS

This research has been partially funded by the Financing Program of Research Activities of Research Groups of the University of Castilla-La Mancha (UCLM). Research Group: Applied Economics and Quantitative Methods, UCLM (GI20153152).

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