IMPACT OF AGEING POPULATIONS ON PUBLIC PENSION EXPENDITURE

COUNTRY FICHE

SPAIN

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CONTENTS

1. DESCRIPTION OF THE PUBLIC PENSION SYSTEM

1.1. The pension system

The public social security system is based on two schemes: basic social assistance scheme (non-contributive system) and labour-market-based social security scheme (contributive system).

The basic social assistance is granted to people with income below the tax-exempt minimum income in the personal income tax. The benefit is means-tested and no previous contribution is required. The scheme is managed by the central and regional governments. It was introduced in 1999 and it is gradually substituting the previous assistance scheme that is being phased out.

The labour-market-based social security scheme is a mandatory public system, financed as a pay-as-you-go system. It covers the self-employed and employees in the private and public sector. It is administered and managed by the Social Security (INSS) except for the military and the central government employees whose pensions are administered and managed by the state (Clases Pasivas del Estado, CPE). Pensions from the INSS are financed by contributions from employers and employees and by state transfers when necessary. Pensions from the CPE are financed by contributions from the employees and from the state. Pension benefits are taxed as labour income.

Private pension plans are voluntary and cover both individual and occupational pension funds (62 and 38 percent of total private pension plans, respectively, in 1998). They are funded and usually contribution-defined schemes. The occupational private pension schemes are agreed in the wage bargaining framework. They are usually financed by employers and employees. The pension funds derived from private pension plans have to be administered and managed by an authorised financial entity outside the companies. Private pension benefits are also taxed as labour income. Contributions to private pension schemes enjoy a favourable tax treatment. In 1998, over 3 million people were covered by private pension plans.

1.2. Eligibility requirements

Eligibility requirements for old age pensions under the Contributive Public Pension System (INSS) are 65 years of age and 15 contribution years. Under the Contributive Public Pension System (CPE) for the military and central government employees, the eligibility requirements for old age pensions are 65 years of age and 15 years of contributions. Since 1997, civil servants can retire after the age of 65 up to 70 on a voluntary basis.

Under the INSS scheme, there exists a possibility of early retirement with reduced pension benefits for workers 60 and older which have been contributing since before 1967. Under the CPE scheme, early retirement is possible at 60, provided workers have contributed for at least 30 years or more.

Under both schemes, disability pensions requirements take into account the level and the cause of disability, the age of the worker and whether or not the worker is currently employed and contributing.

Under INSS, widow(er)s, orphans and relatives of workers and of old age or disability pensioners are eligible to survivors pensions. In the case of active, contributing workers, contribution requirements are different according to the cause of death. In the case of pensioners, no period of contribution is required. Under CPE, widow(er)s, orphans or relatives of deceased workers are beneficiaries of survivors pensions.

1.3. Calculation method for pension benefits

The calculation method for pensions managed by INSS is earning-based. The pension benefit is related to the number of years of working life. In particular, only if the worker has contributed at least 35 years, he/she obtains the full so-called regulatory base (RB). Differently, if the number of years of contributions is equal to the minimum required (15 years), the worker takes only 50 percent of the RB. The percentage increases by 3 percentage points for each additional year of contributions until 25 and by 2 percentage points for each additional contribution year afterwards. Until recently, RB was calculated dividing by 140 the contribution base (CB) for the 120 months prior to retirement. The contribution base (CB) is the monthly earned income. There are minimum and maximum CBs. The minimum CB is similar to the minimum wage. The maximum CBs are being phased out. CBs corresponding to the 24 months just prior to retirement are computed in nominal terms. The remaining CBs are adjusted according to the evolution of the Consumer Price Index (CPI). The reference period for the calculation of RB is gradually increasing and, starting from 2002, it will be 180 months whereas the denominator of the formula will increase from 140 to 210.

There are minimum and maximum pension benefits. In 1998, the maximum pension benefit was 24,415 euros per year. Minimum pension benefits for people which have contributed less than 15 years depend on pensioner age and household composition.

In the case of early retirement the pension benefit is reduced by 8 percent for every year or fraction of year before 65. If the worker has contributed for at least 40 years the percentage is reduced to 7 percent.

The amount of disability pensions varies according to the level of disability. Concerning full permanent disability, the pension amounts to 55 percent of RB, which can be increased by 20 percent when the worker is 55 and cannot work. However, the computation of the RB is not the same as for old age and depends on the type of disability . Conversely, for absolute permanent disability the pension benefit amounts to 100 percent of RB.

Regarding survivors pensions, the pension benefit for the widow(er) amounts to 45 percent of the deceased spouse’s RB. For the orphans, it is 20 percent of RB. However, in general, the total pension benefit for the family cannot exceed 100

percent of the RB. For other relatives, the pension benefit amounts to 20 percent of the RB, but it can be increased to 45 percent if there are no widow(er)s nor orphans.

For pensions managed by CPE, the calculation method is different. RB is fixed and depends on which group (listed from A to E) the civil servant belongs to. The pension benefit depends on the number of years worked. If the working life is at least 35, the worker gets the full RB. This method is applied also for early retirement and for disability pensions. In case of permanent disability occurred while working, RB is multiplied by 2. For survivors, pensions are calculated as: 50 percent of the deceased spouse's RB for the widow(er); 25 percent of RB for a single orphan; 10 percent for each orphan when there are more than one plus an extra 15 percent to share among them; 15 percent for other relatives.

Pension benefits are indexed to expected inflation. If actual inflation is above the expected one, the difference is paid to all pensioners.

1.4. Average age at retirement and average replacement rate

Under the INSS, the overall (old age and early retirement) average age at retirement was 62.4 in 1998.

The average retirement age for old age pensions in 1998 was 65.3. The average retirement age for early retirement was 60.9, whereas the average retirement age for disability pensions was 50.3.

The estimate of the average replacement rate for old age pensions in 1998 was 65 percent of the average contribution base (CB).

1.5. Recent reforms

Important reforms were introduced in 1997 (based on the 1995 Pacto de Toledo) in order to place public pensions on a more sustainable footing:

- The reform set a clear separation of the different financing sources of the Social Security. As a result of this separation, contributive pensions are financed by contributions from employers and employees, in contrast with non-contributive pensions, which are financed by transfers from the State. Currently, supplements to obtain minimum pensions are the only non-contributive pension expenditure still financed by contributions.

- The replacement rate has been set equal to 50 percent of RB if the number of contribution years is 15. This basic replacement rate increases by 3 percent for any additional year of contribution between 15 and 25, and by 2 percent for any additional year of contribution between 26 and 36 years. Thus, the replacement rate has been set equal to 100 percent of RB if the number of years of contributions is equal or above 35.

- The number of reference years taken into account to determine the regulatory base (RB) was increased by one as an annual basis until 2002. Thus, in 2002 the number of reference years will be 15.

- In 2000, a Social Security Reserve Fund was created. The initial fund amounted to 0.1 percent of GDP (100 billion pesetas). In 2001, it will be increased by 90 billion pesetas and there is a commitment in the Updated Spanish Stability Programme to further increase this Reserve Fund up to 1 percent of GDP in 2004.

Further reforms are currently under discussion.

2. THE PROJECTION MODEL

2.1. Coverage of the pension projections

The concept of public pensions used in the projections includes all kind of contributive public pensions and part of non-contributive public pensions, according to the following definitions:

Contributive Public Pensions:

- Old age and early retirement pensions
- Disability pensions
- Survivors pensions

Non-contributive Public Pensions:

- War pensions
- Other non-contributive pensions

Old age and early retirement pensions: includes all age pensions for 65 and more years old persons plus old age pensions for 60-64 years old persons (early retirement pensions). It includes public pensions for private sector employees, public sector employees, the self-employed and minimum pensions. It also includes the SOVI pensions (pensions for persons having contributed before 1967 to old mutual pension schemes)

Disability pensions: includes all disability public pensions for private sector employees, public sector employees, the self-employed and minimum pensions. Since 1997, disability pensions for persons older than 64 years are considered by the Social Security administration (INSS) as old age pensions. However, in order to maintain homogeneous time series they are considered in the projections as disability pensions.

Survivors pensions: includes all survivors public pensions for private and public sector employees, the self-employed and minimum pensions.

War pensions: includes civil war (1936-1939) injury and survivors pensions. The total amount of these pensions are declining and will vanish with time.

Other non-contributive pensions: includes the remains of former public pension schemes to be extinguished, and means-tested assistance pensions.

Table 1
Public pension expenditure in 1998

Scheme	Percent	Percent of GDP
Total	**100.0**	**9.9**
Contributive Public Pensions:	**95.6**	**9.4**
Old age and early retirement pensions	52.6	5.2
Disability pensions	23.9	2.3
Survivor pensions	19.1	1.9
Non-contributive Public Pensions:	**4.4**	**0.4**
War pensions	1.3	0.1
Other non-contributive pensions	3.1	0.3

As said before, the projections include all contributive public pensions and war pensions (part of the non-contributive public pensions). This means that the projections include 97 percent of total public pension expenditure. The "Other non-contributive pensions" have not been included in the projections due to the difficulties to estimate their future evolution.

On the legal side, the projections incorporate the reform of the public pension system approved in 1997, as a consequence of the application of the Toledo Pact Agreements in the Law for the Consolidation and Rationalisation of the Social Security System. The measures envisaged in this law are described in Part 1 of this Country Fiche. They are progressively implemented up to 2002; no further changes in legislation are assumed afterwards.

2.2. Description of the model

Three independent models have been used for the projections:

Model 1. A model for simulating public pension expenditure administered by the Social Security (INSS), including old age and early retirement pensions for private sector employees, the self-employed and their corresponding minimum pensions.

Model 2. A model for simulating public pension expenditure administered by the Social Security (INSS), including disability pensions for private sector employees and the self-employed.

Model 3. A model for simulating public pension expenditure for public sector employees administered by the State (CPE), including old age and early retirement pensions, disability pensions, survivors pensions, minimum pensions, and war pensions.

The remaining pension expenditure: survivors pensions for private sector employees, the self-employed and the corresponding minimum pensions, has been projected maintaining its 1998 weight relative to total pension expenditure.

The relationship between public pension expenditure estimated by the models in the projections and the distribution of total public pension expenditure showed in Table 1 can be seen in Table 2 and Table 3.

Table 2
Public pension expenditure in 1998

Scheme	Percent	Percent of GDP
Total	**100.0**	**9.9**
Contributive Public Pensions:	**95.6**	**9.4**
INSS public pension system	86.2	8.5
CPE scheme	9.3	0.9
Non-contributive Public Pensions:	**4.4**	**0.4**
INSS public pension system	2.7	0.3
Assistance pensions	0.4	0.0
CPE war pensions	1.3	0.1

Table 3
Public pension expenditure in 1998

Scheme	Percent	Percent of GDP
Total	**100.0**	**9.9**
Total contributive and war pensions:	**96.9**	**9.5**
Model 1: INSS old age, early retirement, and minimum pensions	47.3	4.7
Model 2: INSS disability pensions	21.9	2.1
Model 3: CPE old age, early retirement, disability, survivors, minimum and war pensions	10.6	1.1
INSS survivors and minimum pensions	17.1	1.7

The three models are deterministic. The macroeconomic and demographic variables used in the projections are exogenous in the three models.

The three models simulate the net number of pensioners of each category every year, their average pension benefit, and the total pension expenditure per year. The basic model works through the three following steps:

1. Projection of demographic variables:

- Projections for the number of pensioners
- Projections for new registrations
- Projections for people leaving the system
- Projections for common pensioners
- Projections for pensioners with minimum supplements

2. Projection of macroeconomic variables:

- Average working life record
- Average contribution bases
- Average pension benefit for new registrations
- Average pension benefit for people leaving the system
- Average pension benefit for common pensioners
- Average minimum supplements

3. Results

The full description of model 1[1] and a short description of model 2 are annexed to this Country Fiche, including earlier estimates for the number of pensioners, average pension benefits, total pension expenditure, and policy sensitivity analysis. As for the CPE scheme, model 3 is an application of models 1 and 2 to the specific characteristics of public service.

Pension expenditure projections are made regularly. The Government published official projections in 1996[2], and new official projections have been presented before the Parliament in 2001. The Parliament, social partners and the public regularly acknowledge, study and use official and unofficial projections made by the Government and by other public and private institutions, and researchers for their discussions.

3. CURRENT POLICY SCENARIO

3.1. Demographic assumptions

The projections use the demographic assumptions provided by Eurostat. Eurostat assumes a total population decrease of more than 10 percent in the period 2000-2050, and a working age population (16 to 64) decrease of more than 28 percent. At the same time, the population older that 64 will increase by more than 75 percent.

The ratio of the population older than 64 to working age population will increase from 25 percent in 2000 to 61 in 2050. If the working age population is defined as those aged 20-64, the old age dependency ratio will increase from 27

[1] Model for simulating expenditure scenarios for contributory Social Security retirement pensions. Ministerio de Economía y Hacienda. SGAPRS 2000-01. Madrid. 2000

[2] La Seguridad Social en el umbral del siglo XXI. Ministerio de Trabajo y Seguridad Social. Madrid. 1996.

percent in 2000 to 66 in 2050. This ratio would be very high relative to the European Union average (53 percent) and slightly behind the highest of the fifteen countries in absolute terms. Taking into account that the old age dependency ratio in 2000 is very similar to the European Union average (27 percent), the evolution of this ratio throughout the projection period shows the significant ageing process in Spain relative to the European Union.

The total age dependency ratio (0-15 and 65+ as a ratio to population 16-64) will also increase from 49 percent in 2000 to close to 86 in 2050. As well, the very-old age dependency ratio (ratio of population aged over 85 to working age population) will also increase, although less than in other European countries.

The ageing process that started to accentuate in the mid eighties will slow till around 2010 due to the consequences of the civil war (1936-1939) and it will accelerate later on. The acceleration will be more pronounced after 2020, especially after 2030, and it will slow down again after 2045.

The three key demographic assumptions behind this scenario, the fertility rate, life expectancy, and annual net migration flows deserve some considerations. According to Eurostat´s assumptions, the fertility rate, 1.19 at present, the lowest in the European Union, will converge progressively to 1.50 at the end of the projection period, still the lowest in the Union (the same rate as those in Germany, Italy and Austria). There are many uncertainties surrounding future fertility rates. However, since 1998 an increase in the number of births has been observed, indicating that perhaps the fertility rate is at present slightly higher than the one provided by Eurostat. Regarding life expectancy, Eurostat´s figures are very similar to the national ones which are slightly higher for both males and females.

Eurostat´s migration assumptions (31.1 thousand net immigrants in 2000 that will increase progressively up to 60 thousand in 2010, maintaining this figure later on until 2050) are questionable. First, because the Spanish Statistics National Institute (INE) has estimated that the net number of immigrants in 2000 has been higher than 360 thousand against the 31,1 thousand estimated by Eurostat. Second, because despite the uncertainty tied to demographic projections it seems very unlikely the figure of 60 thousand immigrants per year during the main part of the projection period. INE projects 160 thousand net immigrants per year from 2005 to 2050.

Eurostat´s demographic projections show a dramatic fall of the labour force. At the same time, there is a dramatic increase of the labour supply in neighbouring countries with significant lower income per capita and large unemployment. It seems quite reasonable to expect larger immigration flows than those projected by Eurostat in the baseline scenario. As it will be show in Part 5, on sensitivity analysis, larger immigration flows may alter significantly the demographic scenario.

3.2. Macroeconomic assumptions

The macroeconomic assumptions are those agreed in the OECD framework.

As a result of the agreed macroeconomic assumptions, the total participation rate (ratio of total labour force to total population between 16 and 64) increases

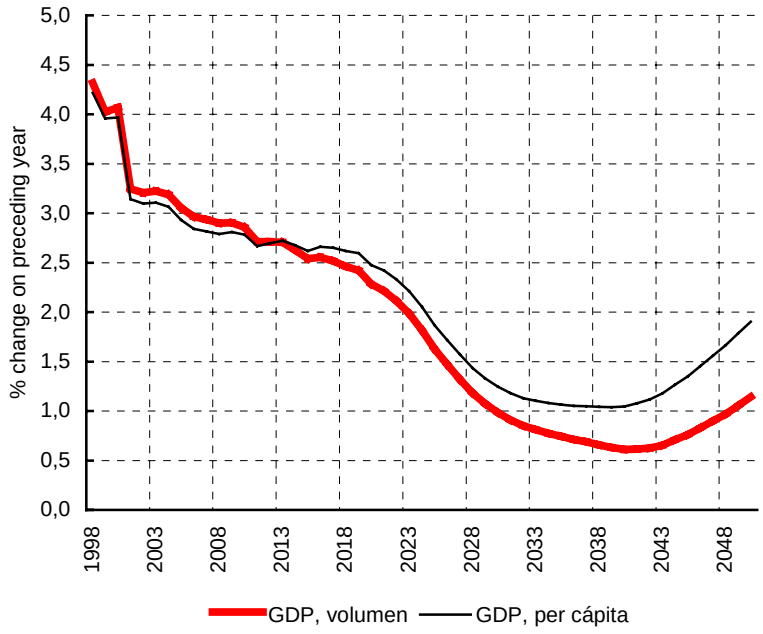
during the projection period from 66.1 percent in 2000 to 76.0 in 2050. The bulk of this increase corresponds to the female participation, reaching a level of 69.8 percent in 2050, while the male participation rate increases 0.7 percentage points, recording a level of 80.0 percent in 2050. With these increases, the participation rates in Spain at the end of the period will be slightly below the current levels in the United States (84.0 percent for males and 70.7 for females).

The ratio of the employed to both total labour force and total population between 16 and 64 will increase throughout the projection period. Nevertheless, due to the fall of population the employment growth rate will start to be negative before 2020

Labour productivity is low during the early years of the projection period when the economy is absorbing many of the unemployed. Later on, when the employment rate falls below 10 percent, it is assumed a period of high productivity growth rates, consistent with some degree of real convergence, averaging 2.5 percent in the period 2013-2020. Afterwards, there is a progressive convergence to the 1.75 percent growth rate agreed within the OECD framework, which is achieved by 2030. The annual average growth rate of labour productivity between 2000-2050 is 1.9 percent.

The GDP deflator is kept constant at 2 percent in the projection period except for the period 2000-2004 where it is slightly higher. Finally, it has been assumed that the rate of unemployment will fall progressively, reaching a rate around 6 percent by the year 2040.

As a result of the macroeconomic assumptions, along with the demographic scenario, real GDP growth, both in absolute and in per capita terms, shows a downward profile, which is accentuated in the period 2020-2040, with a recovery foreseen for the last decade of the projection period. The annual average growth rate of real GDP between 2000-2050 is 1.8 percent (see graph).



3.3. Presenting and explaining the results

Table 3.3.a and Figure 3.3.a show the main results. According to these projections, total pension expenditure is expected to increase from 9.4 percent of GDP in 2000 to a peak of 17.3 percent of GDP in 2050. Spending relative to GDP remains broadly stable from 2000 until 2020 but then accelerates until 2045. After 2045, pension expenditure as a share of GDP stabilises.

Given these results and the ones obtained carrying out the sensitivity tests described in Part 5, it is projected that the absolute peak of the ratio pension expenditure/GDP will be reached in 2048.

For a better understanding of what lies behind these results, it is useful to express public pension expenditure as a percentage of GDP as follows (Table 3.3.b and graph 3.3.b):

$$\frac{Pension\,\exp enditure}{GDP} = \frac{Number\ of\ pensions}{Working\ age\ population}\ \frac{1}{Employment\ rate}\ \frac{Average\ pension}{Average\ productivity}$$

The first component (number of pensions/working age population) is expected to more than double over the forecasting horizon (from 31.7 percent in 2000 to 76.9 percent in 2050). It accounts for more than the entire projected increase in pension expenditure and mainly reflects movements in dependency ratios. This age-related spending component depends on two main elements: the elderly dependency ratio and the coverage of the pension system (eligibility ratio). The first element, the ratio of elderly people to those of working age, is projected to rise substantially from 25 percent in 2000 to 61.2 percent in 2050, as a consequence of longer life expectancy combined with birth rates too low to ensure natural replacement of the population and stabilisation of its structure. In fact, the number of total pensions is expected to increase from 8.4 million in 2000 to 14.6 in 2050, mainly due to the increase in the number of old-age pensioners. The second element, the coverage of the old-age pension system, is expected to increase slightly from 59.9 percent in 2000 to 64 in 2050. Thus, both factors lead to an increase in expenditure on old-age pensions.

The second component is the inverse of the employment rate. It is assumed that the employment rate in Spain, which is currently far below the average rate in the European Union (EU), will converge with EU levels, increasing by around 15 percentage points over the simulation horizon. This is a consequence of the assumptions of an increase in the participation rate (from 66.1 percent in 2000 to 76.0 in 2050) and a fall in the unemployment rate to around 6 percent in 2050. Thus, this second component will partly offset the effects of the first component, reducing pension expenditure as a share of GDP.

The third component (average pension/average labour productivity) depends on the legal rules concerning the contribution rates, the formula for calculating pension benefits and their indexation, and on productivity growth. This component has increased in the last few years due to the maturing of the system and to the minimum pension increasing faster than productivity. Given the rules to calculate pension benefits, information about the labour record of each individual is needed. However, as this information is not available, the estimation of this variable can only

be taken as an approximation. Moreover, it should be taken into account that real wages are assumed to increase in line with productivity. Given all these assumptions, the ratio between the average pension and average productivity is expected to decrease slightly from 17 percent in 2000 to around 16 percent in 2050. Thus, the effect of this third component on pension expenditure as a share of GDP is very small.

Table 3.3.a EVOLUTION OF THE MAIN DETERMINANTS OF TOTAL PENSION EXPENDITURE OVER GDP

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Pension Expenditure over GDP	9,4	8,8	8,9	9,3	9,9	11,0	12,6	14,3	16,0	17,3	17,3
Number of pensions/Pop. 16-64 (%)	31,7	33,7	36,2	39,3	43,0	48,1	54,4	61,5	69,1	75,5	76,9
1/Employment rate	1,8	1,6	1,5	1,5	1,5	1,5	1,4	1,4	1,4	1,4	1,4
Average Pension/Average Productivity (%)	16,9	16,3	16,0	15,6	15,4	15,3	15,7	15,9	16,1	16,2	16,1
Average Pension (level)	1,1	1,3	1,6	1,9	2,4	2,9	3,6	4,4	5,4	6,5	7,8
Average Nominal Productivity (level)	6,7	8,0	9,8	12,3	15,4	19,0	23,0	27,7	33,4	40,2	48,4
Average Pension (2000=100)	100	115	138	169	208	257	317	389	474	572	686
Average Nominal Produtivity (2000=100)	100	119	146	183	229	283	343	413	497	598	720

Graph 3.3.1 EXPLAINING TOTAL PENSION EXPENDITURE (% of GDP)

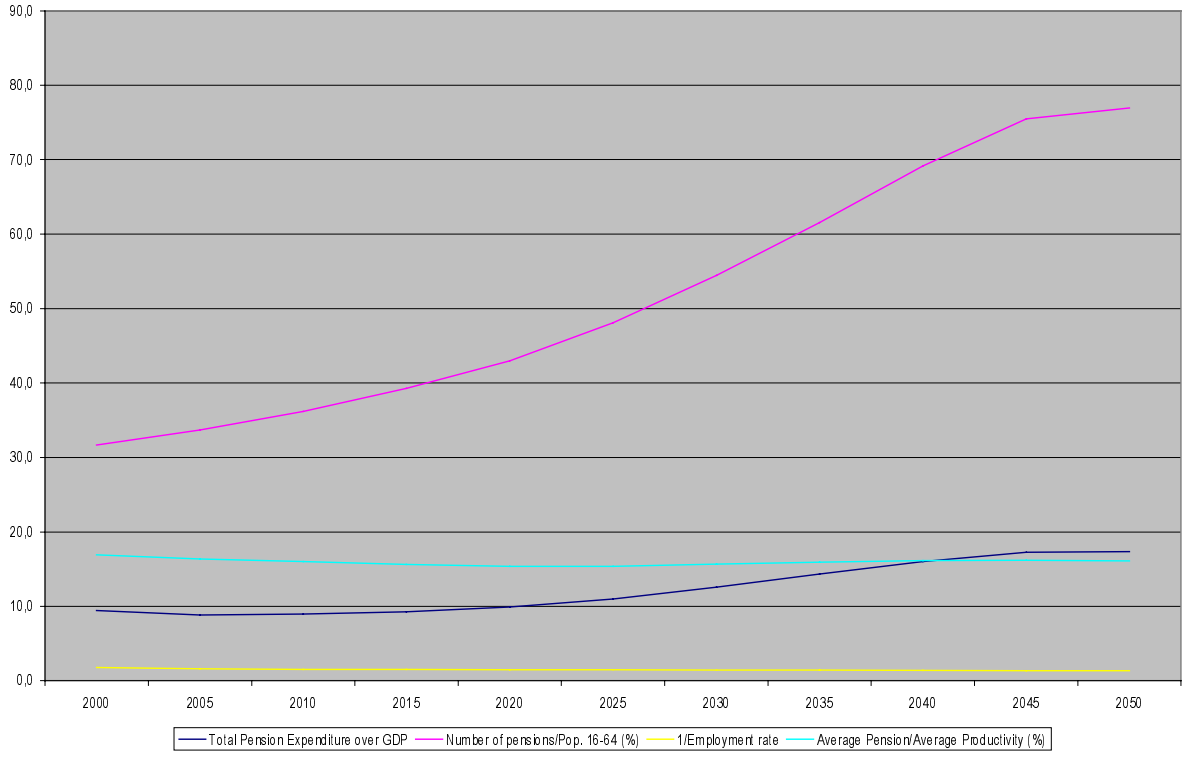
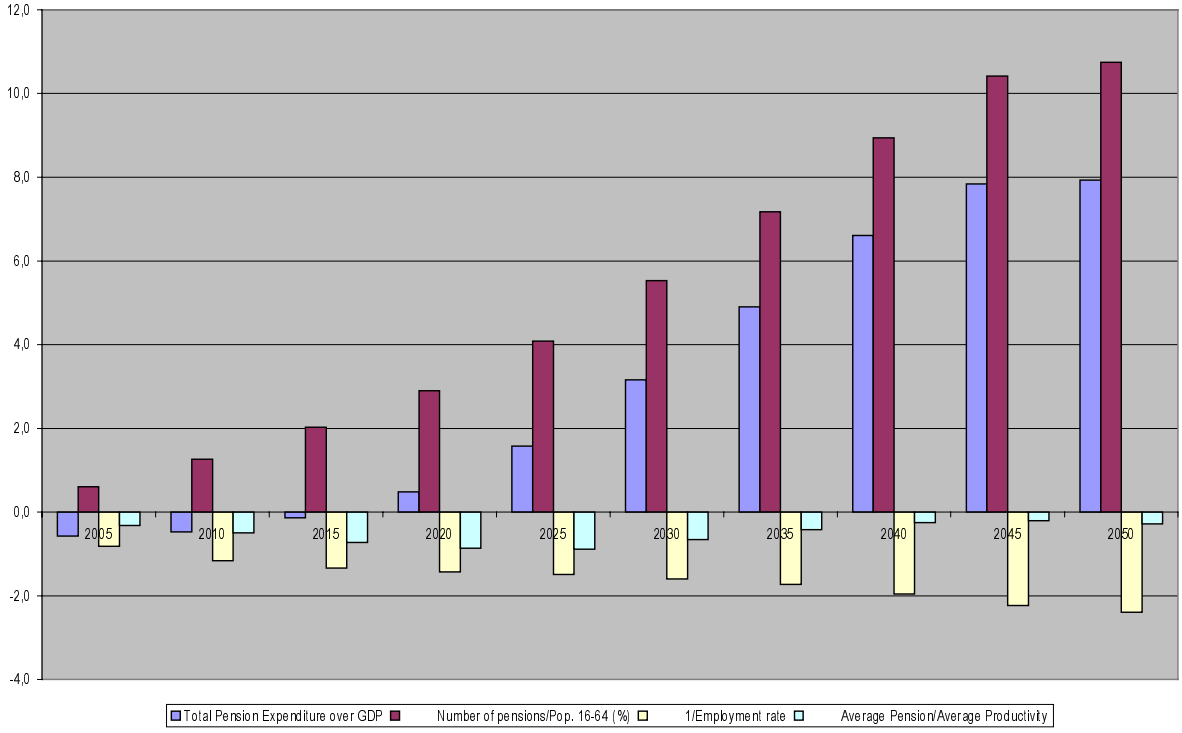


Table 3.3.b. BASELINE SCENARIO. CONTRIBUTIONS TO THE GROWTH OF TOTAL PENSION EXPENDITURE OVER GDP

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Total Pension Expenditure over GDP	-0,6	-0,5	-0,1	0,5	1,6	3,2	4,9	6,6	7,8	7,9
of which due to:										
Number of pensions/Pop. 16-64 (%)	0,6	1,3	2,0	2,9	4,1	5,5	7,2	8,9	10,4	10,7
1/Employment rate	-0,8	-1,2	-1,3	-1,4	-1,5	-1,6	-1,7	-2,0	-2,2	-2,4
Average Pension/Average Productivity	-0,3	-0,5	-0,7	-0,9	-0,9	-0,7	-0,4	-0,3	-0,2	-0,3

Graph 3.3.3 CONTRIBUTIONS TO THE GROWTH OF TOTAL PENSION EXPENDITURE OVER GDP WITH RESPECT TO THE BASELINE (YEAR 2000)



3.4. The impact on public debt

Pension expenditure as a share of GDP will remain broadly stable from 2000 to 2020. Afterwards, pension expenditure relative to GDP will increase markedly up to 2045 where the ratio of pension expenditure to GDP will stabilize again, according to the projections.

In order to identify the burden arising from pension expenditure, it was commonly agreed to estimate the evolution of public debt over the forecasting period under the following assumptions: both revenues and primary spending other than pensions remain constant as a percentage of GDP over the whole forecasting period, with real interest rates of 4 percent. The evolution of public debt is the following one:

Table 3.4
Baseline scenario

General government revenues, expenditure, and public debt projections.
(% of GDP)

Year	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**
Revenues	39.5	39.5	39.5	39.5	39.5	39.5
Expenditure	39.9	38.1	37.4	39.3	43.7	48.3
Pensions	9.4	8.9	9.9	12.6	16.0	17.3
Interest payments	3.3	1.9	0.3	-0.5	0.4	3.7
Other expenditures	27.2	27.2	27.2	27.2	27.2	27.2
Deficit (-) or surplus (+)	-0.3	1.5	2.1	0.3	-4.2	-8.8
Primary deficit (-) or surplus (+)	3.0	3.4	2.4	-0.3	-3.7	-5.0
Gross debt	**60.6**	**29.8**	**2.8**	**-9.4**	**11.6**	**70.5**

Starting at a level of 60 percent of GDP in 2000, gross debt in percent of GDP declines steadily until 2030, becoming negative (accumulation of net assets) since 2022. After 2030, gross debt starts to increase rapidly to reach its peak in 2050 at a level of 70.5 percent of GDP.

The favourable evolution of gross debt in the period 2000-2030 is due to two factors: first, a low pension expenditure/GDP ratio in the period 2000-2020. Second, a primary surplus high enough to offset the later increase in pension expenditure. However, since mid 2030s, the increase in pension expenditure deteriorates the primary balances and the gross debt/GDP ratio rises till 70.5 percent in 2050.

Budget discipline can contribute to meeting the costs of an ageing population through lower interest payments. In fact, in the case that the primary surplus in the year 2005 (3.5 percent of GDP) is kept constant over the projection period, the gross debt/GDP ratio will decrease more rapidly, becoming negative (accumulation of net assets) before 2020. The accumulation of net assets will go on reaching its peak in 2050 at around 160 percent of GDP.

4. THE LISBON SCENARIO

The Lisbon scenario uses the high population scenario of Eurostat´s demographic projections.

The total participation rate is slightly higher than in the baseline scenario. It increases steadily throughout the projection period. In 2050, the total participation rate is 5 percentage points higher than in baseline. Male and female participation rates show similar trends.

The unemployment rate decreases more rapidly than in baseline, converging to the rates experienced during the 1960s and early 1970s.

Labour productivity growth rate decreases also more rapidly than in the baseline scenario converging to a lower rate (1.3 percent) than in baseline (1.75 percent). At this point, it can be argued that this lower convergence rate for labour productivity seems inconsistent with the Lisbon conclusions and assumptions.

Finally, the growth rate of GDP deflator is kept constant at 2.0 percent after 2005, as in the baseline scenario.

Despite the significant difference in the productivity growth rate, there is a reduction in pension expenditure as a share of GDP. The difference of 0.2 percentage points in 2015 becomes 1.1 percentage points at the end of the projection period. In the baseline scenario, total pension expenditure as a share of GDP in 2050 is 17.3 percent, whereas in the Lisbon scenario it is 16.2 percent. Pension expenditure as a share of GDP shows an increasing trend similar to baseline scenario but below it. Moreover, in the Lisbon scenario the peak of total pension expenditure as a share of GDP is reached before, in 2045, than in the baseline scenario, in 2050. This may be interpreted as that the peak for pension expenditure as a share of GDP hovers around 2050 under the current policy assumptions.

The lower increase in pension expenditure as a share of GDP at the beginning of the projection period seems to be mainly affected by higher participation rates. It takes longer to the higher population assumption to affect the result due to the fall of the labour productivity growth rate. The driving forces behind the increase in pension expenditure as a share of GDP are the same as in the baseline scenario.

5. SENSITIVITY TESTS

5.1. Demographic variants

The effects of changes in the underlying demographic assumptions were assessed by simulating two alternative scenarios. The first scenario (high population scenario) refers to the results of the simulations made on the basis of higher fertility rates, higher life expectancy ratios for both males and females and higher net immigration than in the baseline scenario. Under these assumptions, the population increases by almost 3 million people and the dependency ratio rises to 71.6 percent by the end of the period, instead of a drop of more than 4 million in population and an increase up to 76.9 percent in the dependency ratio in the baseline scenario. The effect in terms of total pension expenditure as a share of GDP in 2050 is a decrease of 1.6 percentage points. The ratio pension expenditure/GDP is lower than in the baseline scenario mainly due to a lower dependency ratio (the contribution of this ratio to the growth of total pension expenditure as a proportion of GDP is 1.4 percentage points lower than in the baseline scenario in 2050, as a consequence of the higher fertility ratios and higher net immigration assumed) while the employment rate and the average pension/average productivity ratio remain almost unchanged with respect to the baseline scenario.

The second scenario (low population scenario) is based on lower fertility rates, lower life expectancy ratios and lower net immigration than in the baseline scenario. Under these assumptions, the population decreases by more than 9 million people.

The elderly dependency ratio increases substantially. The effect in terms of total pension expenditure as a proportion of GDP in 2050 is an increase of 1.3 percentage points The ratio pension expenditure/GDP is higher than in the baseline scenario in 2050 as a consequence of a higher dependency ratio (the contribution of this ratio to the growth of total pension expenditure over GDP to 2050 is 0.9 percentage points higher than in the baseline scenario).

Table 5.1.a. DEMOGRAPHIC SCENARIOS. ASSUMPTIONS

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
HIGH POPULATION SCENARIO											
Total fertility rates	1.29	1.51	1.61	1.66	1.71	1.74	1.77	1.80	1.80	1.8	1.8
Life expectancy at birth (males)	75.48	76.46	77.74	78.86	79.83	80.62	81.24	81.67	81.94	82.05	82.02
Life expectancy at birth (females)	82.47	83.3	84.11	84.82	85.43	85.93	86.34	86.64	86.84	86.96	87
Net migration	49372	84045	85892	80000	80000	80000	80000	80000	80000	80000	80000
BASE LINE SCENARIO											
Total fertility rates	1.19	1.28	1.34	1.38	1.42	1.45	1.48	1.50	1.50	1.50	1.50
Life expectancy at birth (males)	74.89	75.39	75.92	76.47	77.02	77.55	78.04	78.45	78.77	78.96	79.01
Life expectancy at birth (females)	82.1	82.76	83.33	83.82	84.21	84.52	84.74	84.89	84.98	85.01	85
Net migration	31054	45527	60000	60000	60000	60000	60000	60000	60000	60000	60000
LOW POPULATION SCENARIO											
Total fertility rates	1.14	1.14	1.14	1.17	1.21	1.25	1.28	1.30	1.30	1.30	1.30
Life expectancy at birth (males)	74.35	74.54	74.72	74.92	75.12	75.3	75.46	75.58	75.64	75.63	75.54
Life expectancy at birth (females)	81.73	82.12	82.35	82.52	82.63	82.68	82.7	82.68	82.63	82.57	82.51
Net migration	14793	22136	36911	40000	40000	40000	40000	40000	40000	40000	40000

5.2. Macroeconomic variants

Participation rate

Changes in participation rates have direct effects on pension expenditure through changes in the number of pensions (disability pensioners) and changes in the average pension benefit relative to productivity. At the same time, changes in participation rates imply changes in the employment rate, given a fixed unemployment rate, affecting the GDP growth rate.

The final effect on pension expenditure as a share of GDP is the combination of these three effects which work in different directions.

In the case of a lower participation rate of 0.5 percentage points starting in 2005, pension expenditure as a share of GDP increases 1 percentage point in 2050 relative to baseline scenario. The contributions of the dependency ratio, the inverse of the employment rate and average pension/average productivity ratio to this increase in pension expenditure as a share of GDP in 2050 relative to the baseline are 0.1, -0.8 and 0 percentage points, respectively.

In the case of a higher participation rate of 0.5 percentage points starting in 2005, an opposite effect is observed. Total pension expenditure as a share of GDP decreases by 0.7 percentage points in 2050 relative to the baseline, mainly as the result of a higher employment rate.

Thus, the main effect of a change in the participation rates comes from the increase/decrease of the rate of employment while changes in the other two components, dependency ratio and average pension/average productivity ratio, play a minor role.

Low unemployment rate

Changes in the unemployment rate do not seem to have these important effects on pension expenditure and public finances as it is assumed that the ratio of other expenditures to GDP, except those of pensions and interest payments, remains constant throughout the period, and people receiving unemployment benefits keep contributing to the social security. However, as in the case of changes in participation rates, changes in unemployment have direct effects on GDP growth.

As a result, lower unemployment rates (reaching 4 per cent in 2050) reduce total pension expenditure as a share of GDP by 0.2 percentage points in 2050.

Productivity

Changes in labour productivity growth have effects on pension expenditure through changes in wages as they are assumed to vary according to productivity growth. The effect on pension expenditure is the result of variations in the average pension benefit of new entrants in the system with the result of variations in the substitution rate.

At the same time, productivity growth changes imply GDP growth variations. Thus, the final effect of changes in productivity growth on pension expenditure as a share of GDP will be the combination of these two effects which a priori work in opposite directions.

In the case of an increase of 0.5 percentage points in productivity growth starting in 2005, pension expenditure will increase steadily throughout the projection period relative to the baseline scenario. The only contribution to this increase will come from the increase in the average pension benefit. The effect of the increase in productivity growth on GDP growth is that nominal GDP will increase steadily throughout the projection period relative to baseline scenario.

The combined effect will be a steady decrease of pension expenditure as a share of GDP throughout the projection period relative to baseline scenario. In 2050, this ratio will be 1.6 percentage points lower than in the baseline scenario. This means that total pension expenditure will be 15.7 percent of GDP instead of 17.3 percent.

In the case of a decrease of 0.5 percentage points in productivity growth, the combined two effects will result in an increase of 1.8 percentage points in pension expenditure as a share of GDP relative to the baseline. In 2050, total pension expenditure will be 19.1 percent of GDP instead of 17.3 percent.

Real interest rates

Changes in real interest rates do not have direct effects on pension expenditure. However, the implications for public finances are very significant. In the case of real interest rates of 3 instead of 4 percent, the ratio of gross debt to GDP improves with respect to the baseline scenario. It reaches its peak in 2050 at a level

of 58.1 percent instead of 70.5 percent. In the case of real interest rates of 5 percent, the ratio deteriorates to reach its peak in 2050 at a level of 94.6 percent.

Comparing the sensitivity test results

In principle, the assumptions and the results of the different sensitivity tests are not comparable. However, as all the sensitivity assumptions propose variations of the variables which seem reasonable in their respective fields, it would be interesting to confront their results to try to get a general idea of their relative impact on pension expenditure. This is proposed in Table 4.

Table 4
The impact of key variable changes on pension expenditure

Sensitivity test	Change in p.p. of pension expenditure over GDP in the year 2050 with respect to the baseline scenario
High population	-1.6
Low population	+1.3
High participation	-0.7
Low participation	+1.0
Low unemployment	-0.2
High productivity	-1.6
Low productivity	+1.8

Changes in labour productivity growth would have stronger impact on pension expenditure as a share of GDP than changes in other variables. However, the sensitiveness of population is also very high.

ANNEX 1[3]

Description of the model for projecting the expenditure on permanent disability pensions (Model 2).

The model is based on the decomposition of total expenditure in four factors, each one related to variables that determine its evolution, so that future expenditure can be forecast by making certain hypotheses about the behaviour of those variables.

The decomposition of an increase in expenditure is

$$\Delta_t GP1 = \Delta P + \Delta I + \Delta TCI + \Delta Pm_t$$

where:

P = total population
I = ratio between eligible population (over 16 years) and total population.
TCI = coverage rate of disability pensions.
P_m = average pension benefit.

The evolution of expenditure depends on demographic and economic variables. In the model these variables are estimated focussing on three components: the group of people who were already receiving pension benefits, the new beneficiaries, and those who leave the pension system.

Demographic variables

The departure point is the population of permanent disability pensioners and its age structure as of 31.12.1996. For each year an age distribution is estimated, given the information provided by the Social Security. For the coming years the population receiving pensions is calculated assuming that over an age of 75 there are no new beneficiaries and that survivors (PI) in year (t) for a given age (e) that will be (e+1) on December 31st of (t+1) will be:

$$PI_t^e (1 - q^e)$$

where **q** is the probability of death at age **e** on year **t**, which is taken from the demographic scenario. Another cause for leaving the pensioner population is the revision of the disability condition of a person. We denote as **r** the coefficient that captures this situation.

Regarding new pensioners, the average time of life in a year is 0,5*q, therefore, the total number of pensioners by age is:

[3] The full description of model 1 (Social Security pensions, including old age and early retirement pensions for private sector employees, the self-employed and their corresponding minimum pensions) is available in the Internet: www.igae.minhac.es/documentos/documentos.htm (see footnote 1).

$$PI_{t+1}^{19} = \left[PI_{t}^{18}(1-q_{t+1}^{18}) + A_{t+1}^{19}(1-0{,}5q_{t+1}^{19})\right] x (1-r^{18})$$

New pensioners are projected by age and by the cause and type of disability. This is done given the demographic scenario, the participation rates, the employment rates and the estimation of each kind of disability rate according to the information provided by the survey of disabled, deficiencies and handicaps.

The disability rate is defined as the number of new pensions for each thousand employed. New pensions are obtained from the disability rates by age. The legal changes introduced in Spain make it difficult to analyse the behaviour of the disability rate in past years. The hypothesis used (which seems the most plausible) is to lower the disability rate (currently high because of the incorporation of the temporary disability group) for all ages until the average reaches 6,3% in 2005 (which is a rate close to the one of previous years, unaffected by legal changes). From this year onwards, the rate is kept constant, so that only the demographic effect does influence the average disability rate.

Each year's withdrawals are projected applying the probability of death to the pensioners of each age, and to the new pensioners of each year. Likewise withdrawals because of revision are also considered.

Economic variables

The initial pension is the main variable which determines the projection of the average disability pension. It depends, firstly, on the regulatory base (which is calculated differently depending on the cause of the disability) which in turn is a function of the contribution base and of the Consumer Price Index, and, secondly, on the percentage applied to the regulatory base which is determined by the type and cause of disability.

The average new pension (Pma) in year **t** is defined as:

$$Pma_t = \sum_{i=1}^{3} \sum_{j=1}^{4} \frac{A_{ijt}}{A_t} \Pi_{ij} \; BR_{ijt}$$

where:

A_{ijt} = New disabled of type **j** (j=1…4), cause of disability **i** (i=1…3) in year **t**.
Π_{ij} = Percentage applied to the regulatory base of a new pension for cause **i** and disability of type **j**.
BR_{ijt} = Regulatory base for the calculation of a disability pension of type **j** and cause **i** in year **t**.

It is assumed that the growth rate of the average contribution base equals that of the average compensation for employee in the macroeconomic scenario.

The average pension of withdrawals is projected considering that withdrawals stem from current pensioners and new pensioners in year **t**. Therefore a relationship

is found by means of a regression using data for the period 1986-1996. The result is kept throughout the scenario.

The average pension of current pensioners (common pensioners), is a function of the average pension of pensioners in year **t**, plus the average pension of new pensioners, minus those corresponding to withdrawals. Average pensions are duly indexed each year.

ANNEX 2

THE COMPLETE RESULTS OF THE PROJECTIONS

(See the complete results in annexed Excel tables)