SPAIN COUNTRY FICHE

AGEING WORKING GROUP October 2014 projection exercise (2013-2060)

IMPACT OF AGEING POPULATIONS ON PENSIONS

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(21 APRIL 2015)

AWG October 2014 projection exercise (2013-2060)

IMPACT OF AGEING POPULATIONS ON PENSIONS

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EXECUTIVE SUMMARY

This country fiche was presented to the Ageing Working Group (AWG) on 28th October 2014 and has been endorsed by the Economic Policy Committee. Its results shall be included in the Ageing Report 2015 (AR2015).

From the Ageing Report 2012 (AR2012) major revisions on the ratio of projected pension expenditure to GDP have been observed. The AR2015 expects expenditure to be flat, going from 12.1 to 11.2 p.p. of GDP, whereas the AR2012 expected an increase from 10.4 to 13.7 p.p. In other words, the change in this ratio between 2013 and 2060 has dramatically dropped, from a projected increase of 3.3 p.p. to a projected decrease of 0.9 p.p., which represents a moderation in the growth rate of pension expenditure of 4.3 p.p. The reasons behind this change are related both to the change in underlying assumptions and to the 2013 reforms.

Regarding the change in macroeconomic and demographic assumptions, it is remarkable the significant upwards correction of the expenditure to GDP ratio for the base year 2013, from 10.4 to 12.1 p.p., which reflects a noticeable downwards revision of the 2013 GDP. The other great macroeconomic adjustment stems from the update in the population projection of Eurostat, EUROPOP2013. Eurostat now projects the overall population of Spain to be stable throughout the projection period at around 46 million people, compared to an increase of approximately 6 million in the previous projections. This correction is mainly explained by the negative levels of net migration expected in the first decade of the projection, which reverberates through the entire projection horizon, yielding a lower labour force and a lower GDP level in the AR2015. The old age dependency in the AR2015 is higher than in the AR2012 between 2013 and 2050, going from 27% to 63% in 2050. However, in the last decade the projected annual inflows of migrants progressively recover to AR2012 levels, and consequently the dependency ratio in the AR2015 initiates a downwards path, so that by the end of the projection the old age dependency ratio is 53%, below that in the AR2012 (56%). In sum, this evolution of the dependency ratio puts upwards pressure in expenditure during the period 2013-50, but downward pressure thereafter. It is also important to note that unemployment suffers a shaper reduction in the AR2015 than in AR2012 because, although in 2060 the unemployment rate (15-74) level is approximately the same (7%), the starting point in the AR2015 (26%) is much higher than in the AR2012 (20%). All factors taken into account, the change in assumptions increases the expenditure to GDP ratio by 0.1 p.p. in 2060.

With respect to the 2013 reforms, they comprise three main measures: stricter conditions for earlier retirement, a sustainability factor and a new index for pension revaluation (IPR). The three combined generate savings amounting to 2.6 p.p. by 2060. By limiting eligibility conditions and establishing stiffer penalties for early retirement, the expenditure to GDP ratio might decrease by 0.2 p.p. in 2060. The sustainability factor, which automatically adjusts the benefit of new Social Security retirement pensions to developments in life expectancy from 2019 onwards, provides additional savings of 1 p.p. by 2060. Finally, the IPR, which links the revaluation of every kind of pension to attaining a structural financial balance of the Social Security system, moderates spending by a further 1.7 p.p. by 2060.

The European System of National Accounts (ESA) 2010 was introduced from September 2014. As decided by the AWG, Member States do not need to be update their pension country fiches to reflect the new national accounts. The Commission services will incorporate the ESA2010 revision by updating the GDP series for the base year (2013), and by applying the previous growth rates of both GDP and the pension projections from 2013 onwards throughout the projection horizon.

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I. OVERVIEW OF THE PENSION SYSTEM

I.1. Description

a) The public system is based on two schemes: an earnings-related social security scheme and a non-earnings related basic scheme. In this projection exercise the earnings-related pensions (including complements to reach the minimum pension) and the old-age non-earnings related pensions have been considered.

- The **earnings-related social security scheme** is a mandatory pays-as-you-go public system and consists of two parts. The Social Security manages the main part, whose expenditure amounted to 10.8% of GDP in 2013. It covers the self-employed, the employees in the private sector and part of the employees at the central, regional and local public administrations.

  The military and part of the central, regional and local government employees have their pensions directly managed by the central government (*Clases Pasivas del Estado*, CPE). Its expenditure amounted to 1.2% of GDP in 2013. It has been closed to new entrants as of 1-1-2011. All new civil servants since then join the Social Security system. In 2013, employees under this system were around 930 thousand persons and they will be declining throughout the projection period driven by retirement and mortality. CPE also includes non-earnings related war pensions, amounting to less than 0.04% of GDP in 2013.

  Pensions from the Social Security are financed by contributions (from employers, employees, self-employed and part of the unemployed[1]) and by state transfers to finance minimum pension complements. Pensions from the CPE system are financed by contributions from the employees and from direct payments of the central government.

  Pension benefits are taxed as labour income**,** except some disability pensions (absolute permanent and great disability pensions). Compulsory social contributions are excluded from the income tax base.

- The **non-earnings related** basic scheme is granted, as a general rule, to people with income below a threshold set every year in the Budget Law (annual €5.108 in 2013 for the basic amount). The benefit is means-tested and no previous contribution is required. It is quantitatively of less importance (0.1% of GDP for old-age pensions).

b) Private pensions are voluntary (non-mandatory), supplementary and cover both individual and occupational pension funds (48.3% individual and 51.7% occupational of total private pension funds' assets in 2013). Occupational pensions include occupational plans and collective pension insurance plans (with retirement benefit purposes). Private plans are funded and mostly defined-contribution schemes. Occupational private pension schemes are agreed in the wage bargaining framework. They are usually financed by employers and employees. Private pension benefits are also taxed as labour income. Contributions to private pension plans enjoy a favourable tax treatment following the ETT principle (Exempt contributions, Taxed investment income and capital gains of the pension institution, Taxed benefits) with the exception of collective insurance that does not enjoy tax exemptions.

[1] All unemployed receiving benefits, and subsidies if aged over 55.

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I.2. Main pensions formulas[2]

The calculation method for pensions managed by the Social Security is earnings-based. The reference model used in the Ageing Report 2012 (AR2012) took into account the 2011 pension reform (Law 27/2011), which is entering gradually into force.

a) Retirement pensions: In order to be eligible for a contributory retirement pension 15 year of contributions need to be recorded, and at least 2 of these in the last 15 years before the statutory retirement age.

   The statutory retirement age will gradually increase from 65 in 2012 to 67 in 2027. Workers with contributory careers of more than 38.5 years are allowed to retire at 65 with a full pension.

   The pension benefit is calculated as a percentage of the pensionable earnings, the regulatory base (RB). The RB is the average of last years' contribution bases. The period used to calculate pensionable earnings will gradually increase from the last 15 years to 25 years (by 2022). By 2022 the RB will be the average of the contribution bases (CB) of 300 months prior to retirement (divided by 350). The contribution base (CB) is essentially the monthly earned income within thresholds (the lower bound depends on the occupational category of the worker and the upper bound is the same for all workers). CBs corresponding to the 24 months just prior to retirement are computed in nominal terms. The remaining CBs are updated according to the evolution of the Consumer Price Index.

   Contribution breaks are filled less generously than in the past. The 48 most recent months are computed using the minimum CB, and all the previous months using 50% of the minimum CB, instead of 100% of the minimum base.

   The contributions to GDP ratio is kept constant as behavioural changes are not modelled, although it must be noted that increasing the pensionable period in previous reforms (from 2 to 8 years in 1985 and from 8 to 15 years in 1997) incentivised longer contributory records. In any case, a contribution increase would not affect significantly the Social Security balance over the long run since it would be compensated afterwards by a higher average pension.

   The percentage applied to the RB varies from 50% with a minimum of 15 years of contribution to 100% (increasing from 35 years in 2012 to 37 by 2027 with the 2011 reform). The percentage applied to the RB also depends on penalisations for early retirement and premiums for late retirement.

   There are minimum and maximum contributory pension benefits[3]. Minimum pension complements cannot exceed the minimum non-earnings related pension (annual €5,108 in 2013 for the basic amount).

b) Late retirement: The 2011 reform increased premiums for late retirement: +2%, +2¾%, and +4% for an extra year, respectively, for careers below 25 years, between 25 and 37, and over 37. This adds to the normal accrual rate for year of contribution and allows surpassing the maximum pension (though not the maximum contributory base that is the highest upper limit).

[2] See Part 4 for details.

[3] In 2013 the maximum pension benefit was €35,623 per year. Minimum pension benefits depend on pensioner age and household composition (in 2013, €10,932 per year with dependent spouse and over 65). In 2013, 27% of pensions and 21% of new pensions were minimum contributory pension benefits.

c) Disability pensions 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. After 65 years of age they are registered as retirement pensions.

d) Survivors' pensions include widow(ers), orphans and other relatives' pensions. In the case of active persons causing a survivor pension, contribution requirements are needed. The pension benefit for the widow(er) amounts to 52 percent of the deceased spouse's RB (in some cases 70%). For the orphans, it is 20 percent of RB. For other relatives, the pension benefit amounts to 20 percent of the RB, but it can be increased to 52 percent if there are neither widow(er)s nor orphans. In any case, the total pension benefit for the family cannot exceed 100 percent of the RB.

e) For civil servants' pensions (CPE), for the military and part of central government employees, the eligibility requirements for old age pensions are 65 years of age and 15 years of contributions. It includes retirement, disability and survivors pensions. Since 1997, civil servants can retire after the age of 65 up to 70 on a voluntary basis. Under the CPE scheme, early retirement is possible at 60, provided workers have contributed for at least 30 years. However, the pension calculation is less favourable in general. The RB is fixed and indexed to prices and depends on the category the civil servant belongs to. The accrual rate for the pension benefit depends on the whole career. This system has been closed to new entrants as of 1-1-2011.

I.3. 2013 reforms

Since the AR2012, two major reforms have been adopted. Their impact was peer-reviewed by the AWG of April 1st 2014 and endorsed by the EPC of April 8th 2014. They are legislated in Royal Decree-law 5/2013, of March 15th, on measures to favour prolonging the working life of elder workers and to promote active ageing, and in Law 23/2013, of December 23rd, on the sustainability factor and on the index for pension revaluation. The main measures are described below and explained with greater detail in Part IV of this fiche.

a) Sustainability factor of the retirement pension.

The sustainability factor is an automatic link between the amount of retirement pension benefits and developments in life expectancy of pensioners. It will be applied only once on each pensioner when determining the initial amount of a new pension. It will come into effect in 2019.

b) New index for pension revaluation (IPR).

All contributory pensions, including minimum pensions and civil servants' pensions, will increase annually according to the Index for Pension Revaluation, instead of the CPI indexation traditionally used. It has entered into force in 2014, immediately after the adoption of the law. The index is established annually in the National Budget Law at a level consistent with a balanced budget of the Social Security system over the medium run.

c) Modified conditions for early retirement.

Early retirement for involuntary retirees (collective dismissals) requires a minimum retirement age of 63 years (increasing progressively from 61 in 2013 to 63 in 2027) and a minimum contributory period of 33 years (same as before). Early retirement for voluntary retirees requires a minimum age of 65 (increasing progressively from 63 in 2013 to 65 in 2027), a minimum contributory period of 35 years (previously 35) and the computed benefit must be greater than the minimum pension.

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Reduction coefficients become stiffer in most cases as shown in the table below.

New (and previous) reduction coefficients for every year remaining until statutory age				
	<38.5 years	**38.5-41.5**	**41.5-44.5**	**>44.5 years**
Involuntary early retirement	7.5% (7.5%)	7.0% (6.5%)	6.5% (6.5%)	6.0% (6.5%)
Voluntary early retirement	8.0% (7.5%)	7.5% (6.5%)	7.0% (6.5%)	6.5% (6.5%)

Table 1a and 1b show the legislated statutory retirement age, the earliest retirement age and the maximum accumulated penalties in case of earliest retirement, for both voluntary and involuntary retirement. Males and females are subject to the same rules. In the case that a worker with a 40-year career decides voluntarily to retire at the earliest possible age (63 years), the penalty is 15%, 7.5% for each of the two years remaining to reach the statutory retirement age. For involuntary retirement, the earliest retirement age is 61 years and the annual penalty 7%, so that the corresponding penalty is 28%.

TABLE 1a	Statutory retirement age, earliest retirement age and penalties for voluntary early retirement						
		2013	2020	2030	2040	2050	2060
Men - with 20 contribution years	Statutory retirement age	65	65,8	67	67	67	67
	Earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Penalty in case of earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Bonus in case of late retirement age	2%	2%	2%	2%	2%	2%
Men - with 40 contribution years	Statutory retirement age	65	65	65	65	65	65
	Earliest retirement age	63	63	63	63	63	63
	Penalty in case of earliest retirement age	15%	15%	15%	15%	15%	15%
	Bonus in case of late retirement age	4%	4%	4%	4%	4%	4%
Women - with 20 contribution years	Statutory retirement age	65	65,8	67	67	67	67
	Earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Penalty in case of earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Bonus in case of late retirement age	2%	2%	2%	2%	2%	2%
Women - with 40 contribution years	Statutory retirement age	65	65	65	65	65	65
	Earliest retirement age	63	63	63	63	63	63
	Penalty in case of earliest retirement age	15%	15%	15%	15%	15%	15%
	Bonus in case of late retirement age	4%	4%	4%	4%	4%	4%

TABLE 1b	Statutory retirement age, earliest retirement age and penalties for involuntary early retirement						
		2013	2020	2030	2040	2050	2060
Men - with 20 contribution years	Statutory retirement age	65	65,8	67	67	67	67
	Earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Penalty in case of earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Bonus in case of late retirement age	2%	2%	2%	2%	2%	2%
Men - with 40 contribution years	Statutory retirement age	65	65	65	65	65	65
	Earliest retirement age	61	61	61	61	61	61
	Penalty in case of earliest retirement age	28%	28%	28%	28%	28%	28%
	Bonus in case of late retirement age	4%	4%	4%	4%	4%	4%
Women - with 20 contribution years	Statutory retirement age	65	65,8	67	67	67	67
	Earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Penalty in case of earliest retirement age	not poss	not poss	not poss	not poss	not poss	not poss
	Bonus in case of late retirement age	2%	2%	2%	2%	2%	2%
Women - with 40 contribution years	Statutory retirement age	65	65	65	65	65	65
	Earliest retirement age	61	61	61	61	61	61
	Penalty in case of earliest retirement age	28%	28%	28%	28%	28%	28%
	Bonus in case of late retirement age	4%	4%	4%	4%	4%	4%

d) Modified the conditions for early partial retirement.

Access to early partial retirement is restricted: For longer careers (longer than 36.5 years) the minimum age is increased progressively between 2013 and 2027 from 61 to 63 years. For medium careers (between 33 and 36.5 years) the minimum age is raised progressively from 61 to 65 years. For careers shorter than 33 years, partial retirement is not possible (before the reform only 30 years were required).

e) Other elements of the 2013 reforms.

- **Compatibility between retirement pension and work**: The contributory retirement pension will be compatible with any work, both wage- and self-employed, carried out by the pensioner, provided the pensioner has reached the statutory retirement age; the pensioner is entitled to receive a full pension. The compatible work can be both full-time and part-time. The pension benefit will be equivalent to half of the amount the pensioner would be entitled to. For those already retired, the benefit will be half of the amount being perceived up to that moment, excluding minimum complements. The pensioner will not have the right to receive minimum complements. He/she will be considered pensioner for all legal purposes. Once the labour contract or the self-employed activity is ended, the full benefit will be reestablished. During the working period, worker and employer will only be subject to contributions regarding professional contingencies and temporary disability. Additionally both will be subject to a special solidarity contribution of 8%, which does not accrue pension benefits.
- **Measures to avoid discrimination against elder workers in collective dismissals**: In order to promote the lengthening of working life, firms will have to make a special economic contribution to the pension system when workers over 50 are laid-out in collective dismissals.

I.4. "Constant policy" assumptions on pension revaluation

The model applies the no policy change assumption. Traditionally, pension benefits (of those already retired) had been indexed to inflation. After the introduction of the 2013 reforms, **all existing earning-related pensions are projected to be indexed to the new Index for Pension Revaluation** (IPR). Non-contributory pensions are still linked to wages, given that they are not covered in the 2013 reform and that their starting level provides room for improvement.

On the other hand, new pensions have a minimum and a maximum threshold, which are set annually in the annual Budget Law. In the past, minimum pensions have been tracking wages, while the maximum pensions have followed inflation. As a consequence, the general rule is that **new pensions are projected to be linked to wages, with the exception of maximum new pensions which are assumed to follow inflation.** Moreover, all women new pensions are raised by an additional constant coefficient reflecting the partial convergence to men in career duration. On top of that, new pensions are adjusted by the 2011 reform and by the Sustainability Factor.

Regarding the Contributory Bases (CBs) used to compute new pension benefits, they are also determined in the annual Budget Law. In recent years, maximum CBs have increased significantly above maximum new pensions. As a consequence, **all CBs are assumed to grow in line with wages** and contributions over GDP are kept constant throughout the projection period.

Importantly, all the “constant policy” assumptions must be considered with caution as they project a reasonable evolution for the variables involved but they also reflect subjective choices taken by the modellers among a pool of other reasonable alternatives. In particular, the projected divergence between CBs and new pensions and the assumption of maximum and minimum new pensions growing above the IPR are key features of this model.

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II: DEMOGRAPHIC AND LABOUR FORCES PROJECTIONS

II.1. Demographic developments

The age pyramid and table 2 provide an overview of the demographic developments until 2060. The size of the population is expected to remain broadly constant at around 46 million. This represents a sensible drop from the previous projection round, which is explained mainly by reversed migration flows in the first part of the considered time horizon.

The age composition shows significant changes. The old age dependency ratio doubles its starting level at some point of the projection period, although it is on a downward trend since 2048. The increase in the dependency ratio results from both the increase in the size of the cohorts that reach the age of 65 and beyond (relative to working age population) and the increase in life expectancy at 65.

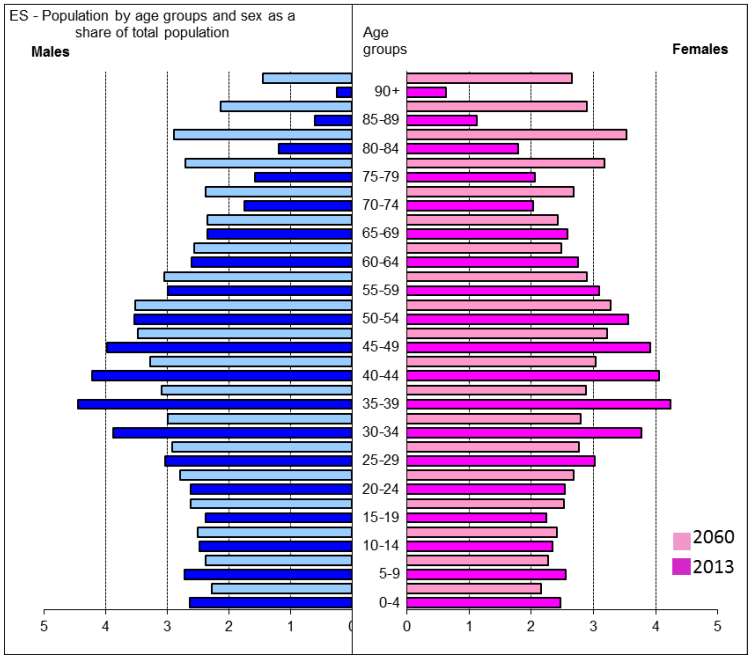

TABLE 2	Main demographic variables evolution						
	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	46.594	45.712	44.495	44.651	45.591	46.131	2013
Population grow th rate	-0,4	-0,3	-0,1	0,2	0,2	0,1	2045
Old-age dependency ratio (pop65/pop15-64)	26,8	30,7	40,2	54,3	62,3	53,2	2048
Ageing of the aged (pop80+/pop65+)	31,1	30,8	30,3	31,6	38,2	49,7	2060
Men - Life expectancy at birth	79,5	80,5	81,9	83,2	84,4	85,5	2060
Men - Life expectancy at 65	18,6	19,3	20,2	21,1	22,0	22,9	2060
Women - Life expectancy at birth	85,2	86,0	87,1	88,1	89,1	90,0	2060
Women - Life expectancy at 65	22,5	23,1	24,0	24,8	25,6	26,3	2059
Men - Survivor rate at 65+	87,1	88,4	90,1	91,5	92,6	93,7	2060
Men - Survivor rate at 80+	59,4	62,7	67,2	71,2	74,9	78,1	2060
Women - Survivor rate at 65+	93,8	94,4	95,1	95,7	96,3	96,7	2060
Women - Survivor rate at 80+	78,7	80,6	83,1	85,3	87,3	88,9	2060
Net migration	-310,9	-79,0	87,5	225,2	305,6	275,0	2050
Net migration over population change	1,7	0,5	-1,4	3,0	3,2	9,5	2034

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II.2. Labour force projections

Table 3 provides an overview of the main changes that will take place in the labour market among elderly workers in the period from 2013 to 2060. It is remarkable that labour force participation for ages 55 to 64 will increase from 54 to 82%, and for ages 65 to 74 from 3.4 to 21%.

TABLE 3	Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74						
	2013	2020	2030	2040	2050	2060	Peak year
Labour force participation rate 55-64	54,2	67,8	79,4	81,8	81,8	82,5	2060
Employment rate for workers aged 55-64	43,4	57,7	72,1	77,3	77,3	77,9	2060
Share of workers on the total labour force (aged 55-64)	80,1	85,1	90,8	94,5	94,5	94,5	2045
Labour force participation rate 65-74	3,4	8,9	18,3	21,1	19,4	20,9	2042
Employment rate for workers aged 65-74	3,1	8,4	17,6	20,6	19,0	20,4	2042
Share of workers on the total labour force (aged 65-74)	93,0	94,0	96,4	97,9	98,0	98,0	2053
Median age of the labour force	39,0	43,0	46,0	44,0	42,0	43,0	2027

Table 4 focuses on career lengths and durations of retirement. The average effective age of retirement rises intensely in the transitional phase 2013-27 of the 2011 pension reform and less so thereafter. The average working career is extended significantly as a result. Despite higher retirement ages, the duration of retirement will rise by more than 2 years due to a higher increase in longevity. The proportion of early retirees to late retirees will drop very significantly.

TABLE 4a	Labour market entry age, exit age and expected duration of life spent at retirement - MEN						
	2013	2020	2030	2040	2050	2060	Peak year
Average effective entry age (CSM) (I)	22,6	22,1	22,1	22,1	22,1	22,1	2013
Average effective exit age (CSM) (II)	62,1	64,8	66,0	66,1	66,1	66,2	2060
Average effective working career (CSM) (II)- (I)	39,4	42,7	43,9	44,0	44,0	44,1	2060
Contributory period	39,6	40,7	41,8	41,9	41,9	42,0	2060
Contributory period/Average working career	100,5	95,3	95,3	95,3	95,3	95,3	2013
Duration of retirement **	20,9	19,3	19,4	20,3	21,2	22,0	2060
Duration of retirement/average working career	53,0	45,2	44,2	46,2	48,2	49,9	2013
Percentage of adult life spent at retirement***	32,2	29,2	28,8	29,7	30,6	31,3	2013
Early/late exit****	2,0	2,8	1,3	1,0	0,7	1,0	2017

*(** Duration of retirement is calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself. *** The percentage of adult life spent at retirement is calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years. **** Early/late exit, in the specific year, is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.)*

TABLE 4b	Labour market entry age, exit age and expected duration of life spent at retirement - WOMEN						
	2013	2020	2030	2040	2050	2060	Peak year
Average effective entry age (CSM) (I)	23,5	23,1	23,1	23,1	23,1	23,1	2013
Average effective exit age (CSM) (II)	62,1	65,8	66,5	66,6	66,6	66,7	2060
Average effective working career (CSM) (II)- (I)	38,5	42,8	43,5	43,5	43,6	43,6	2060
Contributory period	30,7	32,4	34,5	35,5	36,5	37,5	2060
Contributory period/Average working career	79,6	75,8	79,3	81,6	83,8	86,0	2060
Duration of retirement	25,2	22,2	22,1	22,9	23,7	24,5	2013
Duration of retirement/average working career	65,4	51,9	50,9	52,6	54,4	56,2	2013
Percentage of adult life spent at retirement	36,4	31,7	31,3	32,0	32,8	33,5	2013
Early/late exit	1,3	1,9	1,0	0,8	0,6	0,7	2017

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III. PENSION PROJECTION RESULTS

III.1. Extent of the coverage of the pension schemes in the projections. The projection covers the following pension systems:

a) **Contributory Public Pensions**: The model covers old-age and early retirement, disability and survivors pensions under the Social Security and the Civil Servants systems. These include the complements to minimum pensions (requiring at least 15 years of contribution). It also includes the SOVI regime (pensions for persons having contributed only before 1967) and other fading pension schemes[4].

b) **Non-earnings related Public Pensions**: These are non-earnings means-tested basic pensions[5]. They accounted for 0.1% of GDP in 2013. Women account for 80% of old-age non-earnings related pensions.

c) **Private pensions**: Occupational and personal individual pension funds (both are voluntary).

In table 5, the difference between ESSPROS and AWG public pension expenditure is shown. Discrepancies are explained by minor schemes not accounted for in AWG projections such as former pension schemes linked to social assistance (e.g. LISMI for the handicapped) or complements by local and regional governments and by mutual funds for civil servants. Moreover, ESSPROS excludes all insurance policies taken out on the private initiative of individuals or households solely in their own interest, i.e. private individual pensions. Note that the disaggregation between public and private pension expenditure remains unpublished and provisional.

TABLE 5	Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)							
	2005	2006	2007	2008	2009	2010	2011	2012
1 Eurostat total pension expenditure	9,1	8,9	9,2	9,5	10,4	11,0	11,4	12,0
2 Eurostat public pension expenditure	8,9	8,7	8,8	9,0	9,9	10,5	11,0	11,6
3 Public pension expenditure (AWG)	8,6	8,4	8,5	8,7	9,6	10,2	10,8	11,5
4 Difference (2) - (3)	0,3	0,3	0,3	0,3	0,3	0,4	0,2	0,1

III.2. Overview of projection results

a) CSM model

The Commission captured the 2011 reform in its CSM by adding 2.1 years to the effective retirement age between 2013 and 2027, and leaving it constant afterwards. This increase was already included in the AR2012.

On top of that, the 2013 reform is expected to increase the effective retirement age by 0.9 years between 2014 and 2060. Up to 2027, the effective retirement age increases linearly by 0.7 years as a result of restricted access to early retirement as envisaged in RDL 5/2013. Between 2027 and 2060 the sustainability factor generates an additional 0.2 year increase. As a consequence of the 2013 reform, the new participation rate is 1.8 points higher and GDP is 1.8% higher in 2060 than that resulting from the CSM plus 2011 reform.

[4] SOVI pensions can be awarded to persons accrediting contributions before 1967 (but who stopped working afterwards). Persons belonging to mutualism pension schemes after 1967 are awarded additional contribution years (assuming they started working at the minimum working-age).

[5] Regulation of these pensions started in 1990 (Law 26/1990).

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b) Projected total spending

The baseline public pension expenditure considering all the systems will decrease after the 2013 reforms by almost 1 p.p. of GDP from 2013 to 2060. **The level in 2060 reaches 11.2% of GDP.** Compared to the 2012 projections, expenditure in 2060 moderates by around 2.6 p.p. of GDP. GDP level and other aggregates for the base year 2013 used in this projection exercise follow the 1995 European System of National and Regional Accounts (ESA-1995).

TABLE 6	Projected gross and net pension spending and contributions (% of GDP)						
Expenditure	2013	2020	2030	2040	2050	2060	Peak year
Gross public pension expenditure	12,1	12,1	11,5	12,2	12,7	11,2	2047
Private occupational pensions	0,3	0,4	0,4	0,5	0,5	0,4	2042
Private individual pensions	0,3	0,5	0,6	0,7	0,6	0,4	2040
Mandatory private	:	:	:	:	:	:	:
Non-mandatory private	0,3	0,5	0,6	0,7	0,6	0,4	2040
Gross total pension expenditure	12,8	12,9	12,6	13,4	13,7	12,1	2046
Net public pension expenditure	11,2	11,2	10,7	11,4	11,7	10,4	2047
Net total pension expenditure	11,8	11,9	11,6	12,4	12,7	11,2	2046
Contributions							
Public pension contributions	12,4	12,5	12,5	12,3	12,1	11,7	2025
Total pension contributions	13,3	13,4	13,2	12,9	12,4	12,0	2016

The peak year for gross public pension expenditures is 2047, in contrast to the peak observed in 2053 in the previous projection. The impact of the 2013 reforms is large enough so as to neutralize most of the upwards pressure on the dependency ratio up to 2047. From then on, the moderation in expenditure growth compared to the AR2012 is mainly explained by a more benign dependency ratio.

Table 6 shows the results of the occupational and individual pension projections. Under prudent assumptions and considering no policy changes, the expenditure for both items combined remains in 2060 around its initial level of 0.8% of GDP.

As for net pensions, the effective marginal tax rate (estimated with the withholding tax rate) for public pensions is 6.8% and for private pensions is 9.6% in 2013 and kept constant through the projection period.

Contributions share of GDP is kept constant, which might prove to be a conservative assumption if individuals decided to extend their working careers in response to pension reforms.

c) Projected spending by type of pensions

In table 7 projections by type of pension are presented. The main item is retirement pensions which tend to increase their weight on GDP as demographic pressures ensue. However, in the last decade the trend reverses and the expenditure to GDP ratio diminishes thanks to the favourable evolution of the dependency ratio. Disability pensions and survivor's pensions decrease throughout the projection period.

The general scheme keeps its weigh on GDP roughly constant. The civil servants' scheme decreases by 0.8 p.p. due to its phasing out as no new employees will enter this system. The non-earnings related old-age pension expenditure over GDP is of less quantitative importance (0.1% of GDP).

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TABLE 7	Projected gross public pension spending by scheme (% of GDP)						
Pension scheme	2013	2020	2030	2040	2050	2060	Peak year
Total public pensions	12,1	12,1	11,5	12,2	12,7	11,2	2047
of which earnings related:							
Old age and early pensions	8,5	8,8	8,5	9,3	9,9	8,5	2047
Disability pensions	1,2	1,1	1,1	1,0	0,8	0,9	2013
Survivors' pensions	2,4	2,2	1,9	1,9	2,0	1,9	2014
Other pensions	:	:	:	:	:	:	:
of which non-earnings related (including minimum pension and minimum income guarantee):							
Old age and early pensions	0,13	0,14	0,13	0,15	0,16	0,13	2047
Disability pensions	:	:	:	:	:	:	:
Other pensions	:	:	:	:	:	:	:
of which							
Social Security scheme	10,8	10,7	10,2	11,0	11,7	10,7	2048
Civil servants	1,2	1,2	1,2	1,1	0,8	0,4	2026
Non-contributory	0,1	0,1	0,1	0,1	0,2	0,1	2047

III.3. Main driving forces behind the projection results and their implications for main items from a pension questionnaire

a) Decomposition of the ratio of pension expenditures to GDP

Tables 8 decompose the decrease in the public pension expenditure to GDP into the impact, measured in percentage points of GDP, of its main drivers, i.e. the dependency ratio, the coverage ratio, the benefit ratio, the labour market impact and a residual. The coverage ratio and the labour market impact are further decomposed into its components.

$$\frac{PensionExp}{GDP} = Depend.Ratio \, x \, Coverage \, Ratio \, x \, Benefit \, Ratio \, x \, Labour \, Market \, x \, \mathrm{Re}sidual =$$

$$= \frac{Pop65+}{Pop20\_64} x \frac{NumberPensions}{Pop65+} x \frac{AveragePension}{GDPperHourWorked} x \frac{Pop20\_64}{HoursWorked}$$

The main upward driver of pension expenditure is the **dependency ratio** though its influence upwards diminishes after 2040 and turns negative after 2050. The dependency ratio doubles, from 29% in 2013 to 58% in 2060. From 2049 onwards the ratio declines from its peak of 68% and its contribution to expenditure becomes negative in the last projection's decade.

In the first half of the projection, the coverage ratio decreases, yielding a **negative coverage effect**, because the 2011 reform restricts access to retirement pensions, and also because the reduced prevalence of survivor's pensions. For retirement pensions, the coverage increases in the second half of the projections because of increasing female pensions, partly compensating the former trend.

The impact of the 2011 and 2013 reforms and demographic developments put downward pressure on the **benefit ratio** and on the average pension.

Finally, the **employment rate** has an effect conducive to lowering expenditure to GDP in the first half of the projection, first due to the reduction in the high unemployment rate reached during the crisis, and, afterwards, due to the pension reforms (that increases old-age employment rates) together with cohort effects (younger cohorts having a higher participation rate for each age).

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TABLE 8a	Factors behind the change in public pension expenditures between 2013 and 2060 using pension data (in percentage points of GDP) - pensions						
	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	**0,0**	**-0,5**	**0,7**	**0,4**	**-1,4**	**-0,9**	**-0,005**
Dependency ratio effect	1,9	3,5	3,6	1,9	-1,8	9,1	0,187
Coverage ratio effect	-0,1	-0,6	-0,3	0,0	0,3	-0,7	-0,016
*Coverage ratio old-age**	*0,2*	*-0,2*	*0,2*	*0,5*	*0,2*	*0,9*	*0,019*
*Coverage ratio early-age**	*-1,8*	*-1,4*	*1,6*	*0,4*	*-1,6*	*-2,8*	*-0,064*
*Cohort effect**	*0,5*	*-1,2*	*-4,2*	*-4,1*	*3,1*	*-6,0*	*-0,149*
Benefit ratio effect	0,0	-1,5	-1,4	-1,3	-0,2	-4,4	-0,092
Labour Market/Labour intensity effect	-1,6	-1,6	-0,9	0,0	0,2	-3,9	-0,079
Employment ratio effect	*-1,5*	*-1,3*	*-0,7*	*-0,1*	*0,0*	*-3,5*	*-0,071*
Labour intensity effect	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,001*
Career shift effect	*-0,2*	*-0,4*	*-0,2*	*0,1*	*0,2*	*-0,4*	*-0,009*
Residual	-0,1	-0,3	-0,3	-0,1	0,0	-1,0	-0,004
** Sub components of the coverage ratio effect do not add up necessarily.*							

TABLE 8b	Factors behind the change in public pension expenditures between 2013 and 2060 using pensioners data (in percentage points of GDP) - pensioners						
	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	**0,0**	**-0,5**	**0,7**	**0,4**	**-1,4**	**-0,9**	**-0,005**
Dependency ratio effect	1,9	3,5	3,6	1,9	-1,8	9,1	0,187
Coverage ratio effect	-0,1	-0,6	-0,2	0,0	0,3	-0,6	-0,013
*Coverage ratio old-age**	*0,2*	*-0,1*	*0,2*	*0,5*	*0,2*	*1,1*	*0,023*
*Coverage ratio early-age**	*-1,8*	*-1,4*	*1,7*	*0,5*	*-1,6*	*-2,4*	*-0,057*
*Cohort effect**	*0,5*	*-1,2*	*-4,2*	*-4,1*	*3,1*	*-6,0*	*-0,149*
Benefit ratio effect	0,0	-1,5	-1,5	-1,4	-0,2	-4,5	-0,095
Labour Market/Labour intensity effect	-1,6	-1,6	-0,9	0,0	0,2	-3,9	-0,079
Employment ratio effect	*-1,5*	*-1,3*	*-0,7*	*-0,1*	*0,0*	*-3,5*	*-0,071*
Labour intensity effect	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,001*
Career shift effect	*-0,2*	*-0,4*	*-0,2*	*0,1*	*0,2*	*-0,4*	*-0,009*
Residual	-0,1	-0,3	-0,3	-0,1	0,0	-1,0	-0,004
** Sub components of the coverage ratio effect do not add up necessarily.*							

b) Evolution of the replacement and benefit ratios

Table 9 shows the evolution of various replacement ratios (RR) at retirement, i.e. first pension of those who retire in a given year over an (economy-wide) average wage at retirement, and various benefit ratios, i.e. the average pension compared to the average wage of the economy.

The level should be taken with caution as it depends on the average wage used. The wage used is taken from INE (*Encuesta Trimestral de Coste Laboral* or ETCL). This wage has been imputed also to the self-employed and is used for computing both replacement and benefit ratios. Direct comparisons with the Theoretical Replacement Rate (TRR) should also be avoided because of the wage definition and because the TRR is calculated for an individual with full career at 65 and no breaks. Under such conditions, the 2011 reform has no effect on the TRR.

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The RRs at their starting level are among the highest in the EU and are above their respective BRs, as expected. A decline in the RRs is projected due to the 2011 pension reform, to the sustainability factor and to the threshold effect of the maximum new pension increasing with prices, i.e. lagging behind wages. BRs are also expected to decline driven by lower replacement ratios but also by the IPR when set below CPI. The results presented in table 9 are influenced not just by the 2011 and 2013 reforms, but are affected crucially by the "constant policy" assumptions and by the projected developments in key macroeconomic variables, notably wages and inflation.

TABLE 9	Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)					
	2013	2020	2030	2040	2050	2060
Public scheme (BR)	59,7	58,3	51,3	45,0	40,2	39,8
Public scheme (RR)	79,0	73,6	60,6	56,1	51,7	48,6
Coverage*	91,4	86,9	81,8	79,9	80,3	80,8
Public scheme old-age earnings related (BR)	65,4	65,1	56,2	47,6	41,6	40,2
Public scheme old-age earnings related (RR)	81,9	75,9	62,4	57,4	52,8	49,7
Coverage*	53,6	52,3	51,3	53,8	57,0	56,5
Private occupational scheme (BR)	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:
Coverage*	4,8	6,1	7,6	8,0	7,7	7,6
Private individual scheme (BR)	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:
Coverage*	3,8	7,0	10,7	12,1	11,9	11,6
Total (BR)	:	:	:	:	:	:
Total (RR)	:	:	:	:	:	:
*Coverage is the ratio of number of pensions within the scheme and the total number of pensions in the country						

c) Dependency ratios

Tables 10 present the public pension system and demographic dependency ratios. Table 10a shows the results for all pensions and table 10b for public pensioners.

As shown in table 10b, over the projection horizon the number of pensioners increases by 65%, while employment remains more or less constant. This leads to a 30% rise in the pension system dependency ratio (or SDR) from 53% to 71%. This ratio is the number of beneficiaries the labour market is financing and captures the impact of demographic as well as of institutional factors on the pension system, such as the increase in the retirement age or more generally of participation rates for all ages.

The number of people over 65 experiences an increase similar to that in the number of pensioners. However, the working age population tends to decline. As a result, the old-age dependency ratio (ODR) doubles, from 27 to 53%, which can be used as a proxy of the purely demographic impact of an ageing population on the financial sustainability of the system.

Comparing the SDR to the ODR, an indicator of the efficiency of the pension system can be calculated. The observed decline from 2013 to 2060 reflects efficiency gains as institutional factors captured in the SDR tend to moderate the impact of the purely demographic ones. In other words, the system can be considered more efficient by 2060 as it achieves the same number of employees with a much diminished and elder working age population.

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TABLE 10a	System dependency ratio and old-age dependency ratio (public pensioners)					
	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	8.992,3	9.819,5	11.433,1	13.787,0	15.133,3	14.162,1
Employment (thousand) (II)	17.116,1	18.815,1	20.239,2	20.151,9	19.106,6	19.918,7
Pension System Dependency Ratio (SDR) (I)/(II)	52,5	52,2	56,5	68,4	79,2	71,1
Number of people aged 65+ (thousand) (III)	8.347,6	9.192,6	11.255,4	13.836,5	15.175,4	13.858,9
Working age population 15 - 64 (thousand) (IV)	31.164,9	29.918,5	28.016,0	25.488,0	24.366,1	26.069,5
Old-age Dependency Ratio (ODR) (III)/(IV)	26,8	30,7	40,2	54,3	62,3	53,2
System efficiency (SDR/ODR)	2,0	1,7	1,4	1,3	1,3	1,3

TABLE 10b	System dependency ratio and old-age dependency ratio (all pensions)					
	2013	2020	2030	2040	2050	2060
Number of pensions (thousand) (I)	10.948,9	12.552,7	15.474,9	18.998,4	20.691,1	19.297,3
Employment (thousand) (II)	17.116,1	18.815,1	20.239,2	20.151,9	19.106,6	19.918,7
Pension System Dependency Ratio (SDR) (I)/(II)	64,0	66,7	76,5	94,3	108,3	96,9
Number of people aged 65+ (thousand) (III)	8.347,5	9.192,6	11.255,4	13.836,5	15.175,4	13.858,9
Working age population 15 - 64 (thousand) (IV)	31.164,9	29.918,5	28.015,9	25.488,0	24.366,1	26.069,5
Old-age Dependency Ratio (ODR) (III)/(IV)	26,8	30,7	40,2	54,3	62,3	53,2
System efficiency (SDR/ODR)	2,4	2,2	1,9	1,7	1,7	1,8

Tables 11 present the ratio of pensioners to inactive population (Table 11a) and to total population (Table 11b) by age group. Tables 12 do the same for women alone. In table 11b and 12b, the decline in the number of pensioners to total population is remarkable for the age brackets 60-64 and 65-69, reflecting the impact of recent reforms. For elder people, the ratios tend to increase, particularly as women careers expand.

The ratios of pensioners to inactive generally increase mainly due to more women receiving a retirement pension; the ratios for both genders tend to converge. Pensioners in the age group under 65 are mostly under the disability and survivor schemes. The future increases in the ratios for these groups in tables 11a and 12a mainly reflect a sharp reduction in inactivity (the denominator) and are not the result of more people becoming dependent on these schemes (the numerator). The ratios above 100% are due to the possibility of working and collecting a pension at the same time.

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TABLE 11a	Pensioners (public scheme) to inactive population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	6,6	7,7	9,7	9,0	6,9	6,8
Age group 55-59	37,5	48,6	76,5	101,2	99,3	93,8
Age group 60-64	53,2	60,4	75,8	96,4	96,5	90,9
Age group 65-69	80,6	94,3	86,9	96,4	101,5	96,0
Age group 70-74	81,7	91,5	95,0	97,7	101,9	99,2
Age group 75+	90,1	87,3	96,0	96,3	96,3	98,5

TABLE 11b	Pensioners (public schemes) to total population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	2,4	2,6	2,9	2,5	2,3	2,3
Age group 55-59	11,8	10,9	10,7	12,2	12,6	11,9
Age group 60-64	33,0	26,3	21,0	22,4	22,4	21,1
Age group 65-69	76,5	79,7	60,8	62,9	66,3	61,4
Age group 70-74	80,7	90,1	90,8	91,8	95,4	92,7
Age group 75+	90,1	87,3	96,0	96,3	96,3	98,5

TABLE 12a	Female pensioners (public scheme) to inactive population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	5,3	6,5	8,6	7,9	5,9	5,7
Age group 55-59	25,3	35,0	62,8	106,4	104,4	96,9
Age group 60-64	36,3	47,3	68,1	102,5	101,8	97,5
Age group 65-69	64,3	76,1	80,2	91,5	99,5	94,0
Age group 70-74	66,7	77,1	86,0	91,8	98,2	94,3
Age group 75+	82,6	81,0	89,2	94,3	96,4	99,9

TABLE 12b	Female pensioners (public scheme) to total population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	2,1	2,3	2,6	2,2	2,0	2,0
Age group 55-59	10,7	9,7	9,5	10,8	11,1	10,3
Age group 60-64	25,1	22,3	19,4	20,6	19,8	18,5
Age group 65-69	61,7	65,9	57,0	59,8	63,9	59,2
Age group 70-74	66,0	76,0	82,2	86,1	91,5	87,8
Age group 75+	82,6	81,0	89,2	94,3	96,4	99,9

d) Decomposition of new pension expenditure

A **decomposition of the average new pension** of the **retirement Social Security pensions** tries to assess the consistency of the projection (table 13a, b and c). New public pension expenditure is the product of the average contributory period, average pensionable earnings, average accrual rates, the number of new pensions and the sustainability factor. It has to be taken into account that it relies on the *Muestra Continua de Vidas Laborales* (or MCVL, a sample of two million registries provided by the Ministry of Employment and Social Security) for the pensionable earnings and years of contribution's starting points while the average new retirement pension is the observed in 2013.

The **average new pension** calculation is driven upwards by the average contributory period (which tends to increase with increased female participation and with reform-induced behavioural response) and pensionable earnings (which evolve in line with productivity). On the other hand, a declining accrual rate and the sustainability factor put downward pressure on the pension benefit for new entrants.

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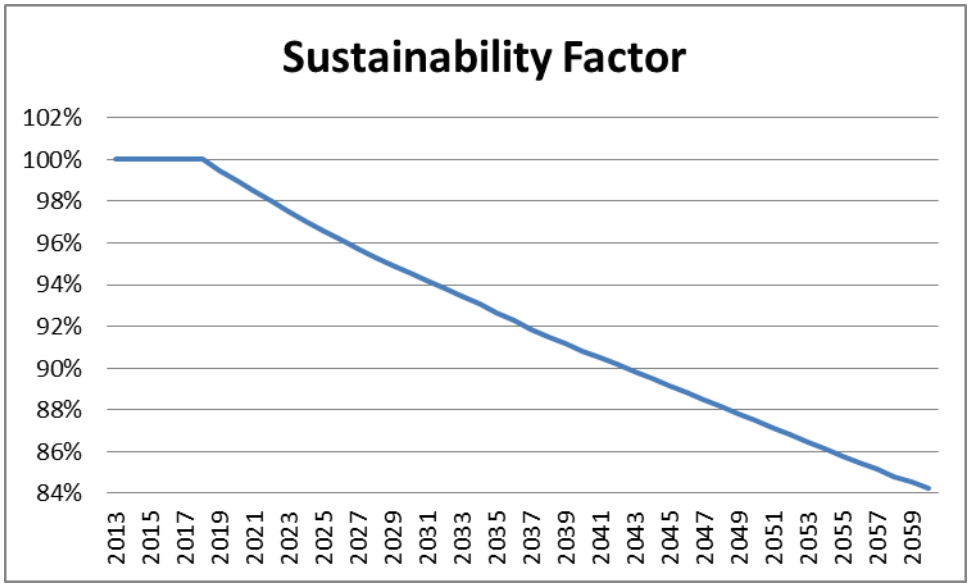
The **average contributory period** increases by 3.2 years. This is due to pension reforms (especially the 2011 reform) and to the increase in job the increase in the female average contributory period linked to higher participation. In fact, contributory careers of women increase by 6.8 years, compared to a 2.4 year-increase for men. This assumption is consistent with women reducing by half the distance in working lives with their male peers (from 9 to 4.5 years).

Pensionable earnings (regulatory base or RB) tend to increase with wages. The gap on pensionable earnings is assumed to remain constant (with earnings for women equal to 76% men's earnings). Closing the gender gap in wages could also contribute to closing the gender gap in pension benefits.

The **sustainability factor** is effective since 2019 and shows a linear decline since then, from 100% to 84%. Further details can be found in Part IV of this fiche.



The **effective accrual rate** takes into account the rules affecting the percentage applied to the pensionable earnings (the "legal" accrual rate), penalisations and premiums for early and late retirement, composition effects, complements to minimum pensions and maximum thresholds. The effective accrual rate in tables 13 diminishes significantly throughout the period 2013-2060. It is computed as the average benefit of new pensions divided by the average contributory career, the monthly average pensionable earnings (Regulatory Base, RB) and the sustainability factor (SF).

$$Accrual = \frac{AvNewPension}{Career * RB * SF}$$

The accrual rate is obtained as a mere application of the formula. However, using an average may distort the picture by underestimating the effective accrual rate for workers with careers below the 37 years required to get a full pension benefit. After 37 years of contributions, the accrual rate is close to null and increasingly a higher share of workers will reach such a long career. For males, the underestimation of the effective accrual rate for individuals with short careers is greater, given that more men have a contribution record above 37 years.

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Finally, the **number of new pensions** is linked to the CSM exits from the labour market. A peak is reached in the 2040s due to the baby-boom effect. Compared to the AR2012, the number of new pensions is significantly lower by 2060 as a result of more moderate population growth throughout the projection period and, to a lesser extent, of the 2013 pension reform.

TABLE 13a	Projected and disaggregated new public pension expenditure (old-age and early earnings related pensions)					
New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	2.850,7	3.124,2	4.304,8	7.266,1	7.857,3	7.756,4
II. Average contributory period	36,6	37,7	38,9	39,1	39,4	39,7
III. Monthly average pensionable earnings	1.541,3	1.804,7	2.456,0	3.481,0	4.948,5	7.027,0
IV. Average accrual rates (%)	2,3%	2,1%	1,7%	1,7%	1,6%	1,6%
V. Sustainability/Adjustment factor	1,0	1,0	0,9	0,9	0,9	0,8
VI. Number of new pensioners ('000)	314,2	320,4	391,8	499,3	405,4	297,2
VII Average number of months paid the first year	7,0	7,0	7,0	7,0	7,0	7,0
Monthly average pensionable earnings / Monthly economy-wide average wage	80%	80%	80%	80%	80%	80%

TABLE 13b	Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - MEN					
New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	2.074,2	2.133,1	2.695,2	4.421,0	4.536,4	4.473,6
II. Average contributory period	39,6	40,7	41,8	41,9	41,9	42,0
III. Monthly average pensionable earnings	1.660,8	1.944,6	2.646,3	3.750,7	5.332,0	7.571,5
IV. Average accrual rates (%)	2,2%	2,0%	1,7%	1,6%	1,6%	1,5%
V. Sustainability/Adjustment factor	1,0	1,0	0,9	0,9	0,9	0,8
VI. Number of new pensioners ('000)	207,5	195,9	217,2	273,0	212,4	159,9
VII Average number of months paid the first year	7,0	7,0	7,0	7,0	7,0	7,0
Monthly average pensionable earnings / Monthly economy-wide average wage	86%	86%	86%	86%	86%	86%

TABLE 13c	Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - WOMEN					
New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	776,5	991,1	1.609,6	2.845,2	3.320,9	3.282,8
II. Average contributory period	30,7	32,4	34,5	35,5	36,5	37,5
III. Monthly average pensionable earnings	1.266,7	1.483,1	2.018,3	2.860,7	4.066,7	5.774,8
IV. Average accrual rates (%)	2,7%	2,4%	2,0%	1,9%	1,9%	1,9%
V. Sustainability/Adjustment factor	1,0	1,0	0,9	0,9	0,9	0,8
VI. Number of new pensioners ('000)	106,7	124,5	174,6	226,3	193,0	137,3
VII Average number of months paid the first year	7,0	7,0	7,0	7,0	7,0	7,0
Monthly average pensionable earnings / Monthly economy-wide average wage	66%	66%	66%	66%	66%	66%

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III.4. Financing of the pension system

Table 14 shows the revenue side of the system. Employer contributions grow in line with GDP. The Employee and State contributions increase at a slower pace mainly due to the fact that they include the contributions for the special scheme for the civil servants, which tend to reduce their size as the scheme phases out. On the contrary, the Employee and State contributions for the Social Security grow in line with GDP. Regarding transfers for complements to minimum pensions within the State contribution, they have been rising strongly up to 2013 because the central government has been increasing its funding share of this element until reaching 100% in 2013.

TABLE 14	Revenue from contribution (Millions), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)					
	2013	2020	2030	2040	2050	2060
Public contribution	127.332,3	159.941,6	233.317,1	325.637,8	429.899,8	615.180,2
Employer contribution	*88.281,7*	*110.446,0*	*161.387,4*	*227.771,2*	*307.247,5*	*454.555,6*
Employee contribution	*19.623,0*	*24.633,0*	*35.935,5*	*50.049,5*	*65.894,6*	*94.304,0*
State contribution	*19.427,6*	*24.862,7*	*35.994,1*	*47.817,1*	*56.757,7*	*66.320,5*
Number of contributors (I)	17.185,5	18.603,4	19.662,0	19.328,8	18.176,9	18.917,7
Employment (II)	17.116,1	18.815,1	20.239,2	20.151,9	19.106,6	19.918,7
Ratio of (I)/(II)	1,0	1,0	1,0	1,0	1,0	0,9

III.5. Sensitivity analysis

Table 15 presents the effect on pension expenditure under alternative sensibility shocks. The results are expressed as deviations in the expenditure to GDP ratio with regards to the baseline scenario. If the shock considered increases (decreases) expenditure, the result is written in red (green).

TABLE15	Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)					
	2013	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	12,1	12,1	11,5	12,2	12,7	11,2
Higher life expectancy (2 extra years)	0,0	0,0	0,0	0,2	0,3	0,1
Higher lab. productivity (+0.25 pp.)	0,0	-0,4	0,0	-0,6	-1,1	-0,7
Lower lab. productivity (-0.25 pp.)	0,0	0,0	0,1	0,3	0,5	0,2
Higher emp. rate (+2 pp.)	0,0	-0,2	0,0	-0,1	-0,2	-0,1
Higher emp. of older workers (+10 pp.)	0,0	-0,5	0,0	-0,4	-0,2	-0,1
Lower migration (-20%)	0,0	0,0	0,0	0,2	0,5	0,2
Risk scenario	0,0	0,0	0,1	0,3	0,5	0,2
Policy scenario: linking retirement age to increases in life expectancy	0,0	0,0	0,0	-0,3	-0,9	-0,8
Total Pension Expenditure						
Baseline	12,8	12,9	12,6	13,4	13,7	12,1
Higher life expectancy (2 extra years)	0,0	0,0	0,0	0,2	0,3	0,2
Higher lab. productivity (+0.25 pp.)	0,0	-0,4	0,0	-0,7	-1,1	-0,7
Lower lab. productivity (-0.25 pp.)	0,0	0,0	0,2	0,4	0,6	0,3
Higher emp. rate (+2 pp.)	0,0	-0,2	0,0	-0,1	-0,2	-0,1
Higher emp. of older workers (+10 pp.)	0,0	-0,5	0,0	-0,4	-0,2	-0,1
Lower migration (-20%)	0,0	0,0	0,0	0,2	0,5	0,2
Risk scenario	0,0	0,0	0,1	0,3	0,5	0,3
Policy scenario: linking retirement age to increases in life expectancy	0,0	0,0	0,0	-0,3	-0,9	-0,8

- *Life expectancy:* mortality rates are adjusted so as to achieve an increase in life expectancy at birth which is 2 year higher at the end of the projection period compared with the baseline scenario. The sustainability factor neutralizes most of the impact of any change in life expectancy.
- *Higher/Lower labour productivity growth:* in this scenario labour productivity growth is assumed to converge, during the period 2016 to 2025, to a steady-state growth rate which is 0.25 p.p. higher/lower than in the baseline scenario. Increasing labour productivity generates greater (downward) deviations than those experienced (upwards) by lower productivity. In both instances, the effect on the denominator (GDP) more than offsets the resulting higher/lower new pension entitlements due to indexation rules.
- *The TFP scenario* is similar to the lower productivity scenario in both design and impact. Its main assumption is that TFP growth converges to 0.8% in the long run instead of 1% assumed as a general case. Under this scenario minor increases in expenditure to GDP ratio are expected.
- *Total employment rate*: employment rate of population aged 20 to 64 increases by 2 p.p. from 2016 to 2025 compared to the baseline scenario, and thereafter the employment rate is kept 2 p.p. higher than in the baseline scenario until the end of the projection period. The higher employment rate is assumed to be achieved by lowering the rate of structural unemployment (i.e. the NAIRU). This leads to a decline in public expenditure by less than 0.1 p.p. in 2060. This effect is rather low because activity rates are kept constant, and in our system the unemployed (receiving benefits and subsidies over age 52) keep contributing and accumulating pension entitlements.
- *Older workers employment rate*: the sensitivity test consists in an increase in employment of population aged 55 to 64, by 10 percentage points from 2016 to 2025 compared to the baseline scenario, keeping thereafter the employment rate 10 p.p. higher than in the baseline scenario. The higher employment rate of this group of workers is assumed to be achieved through a reduction in the inactive population (activity rates increase). It results in a 0.1 p.p. decline in expenditure compared to the baseline due to a decrease in the number of pensions (because of the postponement of the effective retirement age) and the resulting increase in the average pension (due to larger accumulated rights).
- *Lower migration*: a 20% decline in migration increases public expenditure-to-GDP ratio by 0.2 p.p. in 2060.
- *The policy scenario* consists on linking the statutory retirement age and other age requirements to increases in life expectancy. In Spain, up to 2027 the statutory retirement age increases faster than life expectancy, and the model is kept unchanged in that period. Afterwards, the age-related elements of the pension system are linked to life expectancy at 67, yielding savings amounting to 0.6 p.p. in 2060. This result is probably biased to the low side, since labour market participation, employment and disability rates for elderly workers are kept unchanged with regards to baseline, which is an optimistic assumption.

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III.6. Changes in comparison with previous projections

a) Comparison by main drivers

Table 16 shows a decomposition of the public pension to GDP ratio into its underlying drivers for previous projection exercises and the current one. The decomposition follows a similar structure to that of tables 8, with contributions measured in percentage points of GDP.

It can be observed how the increase in public pensions-to-GDP ratio has been declining since the first projection in 2001 due to favourable demographic and macroeconomic assumptions until the 2009 Ageing Report and to deep reforms thereafter. The main driving force pushing **Social Security expenditure** upwards has been demography, with old age dependency ratio doubling. The other drivers soften that pressure, particularly the benefit ratio and the employment effect.

Note that the different projection exercises are not directly comparable, but just a valid approximation, for two reasons. First, because the reference period has been changing; and second, because until the AR2012 (included) the decomposition in drivers was done only for Social Security expenditure and not for the whole public pension system (i.e. including civil servants' and non-contributory schemes), as it has been done in 2014 April and in the current round.

TABLE 16	Overall change in public pension expenditure to GDP under the2006, 2009, 2012 and 2015 projection exercises						
	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	7,05	12,45	-2,28	-1,83	-0,84	:	-0,45
2009 **	6,69	10,72	-0,86	-0,89	-1,73	:	-0,54
2012 Ageing Report***	3,61	9,72	-0,81	-2,17	-2,29	0,06	-0,88
2014 April***	-0,38	8,90	-1,23	-2,18	-4,76	0,06	-1,16
2015 Ageing Report****	-0,86	9,14	-0,73	-3,55	-4,40	0,04	-1,41
* 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060							

b) Comparison by assumptions

TABLE 17	Decomposition of the difference between 2012 and the new public pension projection (% of GDP)						
	2010	2013	2020	2030	2040	2050	2060
Ageing report 2012	10,1	10,4	10,6	10,6	12,3	14,0	13,7
Change in assumptions:		1,7	2,3	2,8	2,6	2,2	0,1
Improvement in the coverage or in the modelling		0,0	0,0	0,0	0,0	0,0	0,0
Change in the interpretation of constant policy		0,0	0,0	0,0	0,0	0,0	0,0
Policy related changes:		0,0	-0,8	-1,8	-2,7	-3,5	-2,6
-Early retirement		0,0	0,0	-0,1	-0,2	-0,2	-0,2
-Sustainability Factor		0,0	0,0	-0,1	-0,5	-0,9	-1,0
-Index for Pension Revaluation		0,0	-0,7	-1,6	-2,0	-2,4	-1,3
New projection	*10,1*	*12,1*	*12,1*	*11,5*	*12,2*	*12,7*	*11,2*

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Table 17 shows the decomposition of the difference between 2012 and the current pension projection for **overall pension expenditure**. Compared to the 2012 projections, the 2013 reforms have generated significant savings, which amount to around 2.6 p.p. of GDP in 2060.

It is important to disentangle what part of the savings is related to macroeconomic and demographic assumptions and which to policy reforms. Regarding assumptions, the 2013 GDP level is much lower now than in the AR2012. That generates an increase in the starting pension to GDP ratio of 1.7 p.p. that is carried over the whole projection horizon. Additional to that, the demographic projections deteriorate in the mid part of the projection (measured through an increase in the dependency ratio) putting upward pressure on the expenditure ratio, which is only partially offset by the positive impact on participation of the 2013 reforms. Nevertheless, the reduction in the dependency ratio in the last decade of the projection pushes the expenditure ratio down. All in all, the significant change in assumptions generates an expenditure to GDP ratio in 2060 which is identical to that in the AR2012, but an overall increase from 2013 in that figure which is much lower now.

The expenditure to GDP ratio in 2060 has been reduced as a direct effect of policy changes on expenditure, which generates 2.6 p.p. in savings. More specifically, more stringent rules for early and partial retirement included in the RDL 5/2013 reduce the spending to GDP ratio since 2014, both directly through restricted access and stiffer penalties, and indirectly through induced higher participation and higher GDP. Beginning in 2019, the Sustainability Factor increasingly curbs expenditure in line with the projected extension of life expectancy, moderating pension spending by 1 p.p. of GDP by 2060. Finally, the main measure for reining in pension expenditure is the IPR, whose impact is particularly felt when the index departure from the CPI is largest, i.e. in the three mid decades of the projection period when the IPR is at its floor (see Part IV.7). Savings associated to the IPR are reckoned to be around 1.3 p.p. by 2060.

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IV. PROJECTION METHODOLOGY AND ASSUMPTIONS

The model has been developed in the Ministry of Economy and Competitiveness and is essentially the same which was used in 2012. The description of the public pension projection model and its base data are explained in this section.

IV.1. Data used to run the models

The macroeconomic and demographic variables used in the projections are exogenous as agreed by the Ageing Working Group (AWG).

The basic data used to run the pension model were supplied in 2014 by the Ministry of Employment and Social Security and Immigration and the Ministry of Finance and Public Administrations (for civil servants and private pensions) and refer to the base year 2013 and to historical data. All data are categorized by type of pensions (old-age and early retirement. disability and survivors), by sex and age (at 31 December each year): Number of new registrations and their average pension; number of withdrawal and their average pension; number of existing pensions and their average pension.

The projection method of the new registrations for each period and their corresponding pension benefit follow the rules of each pension type. The number of new pensions is linked to the participation rates and exit rates provided by the commonly agreed scenario.

The relevant historical data are also taken from an individual data set published by the Social Security, the MCVL[6]. This data set has been mainly used to analyse the impact of the reform on pension benefits.

Finally, the projection of people leaving the system is obtained taking into account the possible causes of withdrawal from the system. Given that the main cause is mortality, the general projection applies age and gender specific mortality rates given by EUROPOP2013 demographic scenario.

IV.2. General description of the models

The projections of pensions are composed by 4 independent and deterministic models:

Model 1. A model for projecting Social Security pensions (for private sector employees. self-employed, unemployed and the public sector employees of the central, regional and local administrations). It includes old age and early retirement public pension expenditure, disability public pension expenditure and survivors' public pension expenditure (widowhood, orphanage, relatives).

Model 2. A model for projecting public pension expenditure for public sector employees of the central administration, administered by the State (civil servants), including old age and early retirement pensions, disability pensions, survivors' pensions and war pensions.

Model 3. A model for projecting non-earnings related minimum pensions. This model is connected with the results of the other models.

Model 4. A model for projecting private pensions (occupational and individual voluntary schemes). This model is elaborated by the General Directorate of Insurance and Pension Funds.

[6] *Muestra Continua de Vidas Laborales* (Ministry of Employment and Social Security, 2012).

IV.3. Projecting public earnings-related pensions: Model 1 methodology

The model simulates the net number of public earnings-related pensions of each category every year, their average pension benefit, and the total pension expenditure per year. The basic formula [1] is decomposed by class of pension (k), sex (s), age (e) and year (t). The types of pension are five: Retirement, Disability, Widowhood, Orphanage and other relatives. Expenditure is the product of the total number of pensions (TP) and the average Total pension Benefit (TB). The ratio to GDP is calculated by dividing expenditure over GDP:

$$\frac{PensionExpenditure_t}{GDP_t} = \frac{\sum_{k=1}^{5}\sum_{s=1}^{2}\sum_{e=0}^{100} TP_{k,s,e,t}\ TB_{k,s,e,t}}{GDP_t} \qquad [1]$$

The projection of demographic variables:
The number of pensions (TP) at 31 December each year, per year of age, is calculated adding to the existing number at 31 December of the previous year and one year of age younger the new entrants (NP) and subtracting people withdrawn from the system (WP) of the same age and year (mortality affects existing pensions and new pensions). The starting point is the registered pensions of the Social Security.

$$TP_{k,s,e,t} = TP_{k,s,e-1,t-1} + NP_{k,s,e,t} - WP_{k,s,e,t} \qquad [2]$$

The projection of quantitative variables [simplified by expression 3 that follows] considers these inter-related components:

- The average pension benefit of new registrations (NB): this is the core of the projection and considers the rules of each type of pension as well as minimum (indexed to productivity (prod) and inflation (inf)), maximum (indexed to inflation), within thresholds (indexed to productivity and inflation), SOVI pensions and others.
- The average pension benefit of people withdrawing from the system (WB) is a weighted average of the existing pensions indexed to the IRP and new entrant's pensions.
- The average total pension benefit (TB) is calculated as a weighted average of existing pensions indexed to the IRP, new pensions and deducting withdrawals of the year.

$$NB_{s,e,t} = NB_{s,e,t-1} * (1 + prod_t + inf_t)$$
$$WB_{s,e,t} = \frac{\left(TP_{s,e-1,t.-1} * TB_{s,e-1,t-1} * (1 + IPR_t) + NP_{s,e,t} * NB_{s,e,t}\right)}{TP_{s,e-1,t-1} + NP_{s,e,t}} \qquad [3]$$
$$TB_{s,e,t} = \frac{\left(TP_{s,e-1,t.-1} * TB_{s,e-1,t-1} * (1 + IPR_t) + NP_{s,e,t}\ NB_{s,e,t} - WP_{s,e,t} * WB_{s,e,t}\right)}{TP_{s,e-1,t-1} + NP_{s,e,t} - WP_{s,e,t}}$$

In what follows, we present special features of the projection model in what relates to new pensions.

Retirement pensions

The projection of the **number of new retirement pensions** depends on the projected trend of participation rates and exits from the labour market given by the assumptions of the macroeconomic and population (CSM Commission model) scenarios.

The **average new retirement pension benefit** (NB) by person is computed as the product of the regulatory base (RB), the reducing/increasing coefficient for early/late retirement (c) and the percentage of the RB received as a pension (p).

$$NB = c * p * RB \quad [4]$$

The table below reflects the percentages p and underlying accrual rates applicable before the 2011 reform and in 2027, when the 2011 reform is fully operational. In between, transitional rules are applied.

"Legal" accrual rate: Percentage (p) over RB (before considering early & late retirement)				
	APPLICABLE IN 2011		APPLICABLE IN 2027	
Years of contribution	Pensionable Earnings (%)	Annual accrual rate (%)	Pensionable Earnings (%)	Annual accrual rate (%)
15	50.0	50	50.0	50.00
16	53.0	3	52.3	2.28
17	56.0	3	54.6	2.28
18	59.0	3	56.8	2.28
19	62.0	3	59.1	2.28
20	65.0	3	61.4	2.28
21	68.0	3	63.7	2.28
22	71.0	3	66.0	2.28
23	74.0	3	68.2	2.28
24	77.0	3	70.5	2.28
25	80.0	3	72.8	2.28
26	82.0	2	75.1	2.28
27	84.0	2	77.4	2.28
28	86.0	2	79.6	2.28
29	88.0	2	81.9	2.28
30	90.0	2	84.2	2.28
31	92.0	2	86.5	2.28
32	94.0	2	88.8	2.28
33	96.0	2	91.0	2.28
34	98.0	2	93.3	2.28
35	100.0	2	95.6	2.28
36			97.8	2.24
37			100.0	2.16

A first module calculates the pension formula for new registrations of old-age pensions using the registries of the MCVL. The pension formula is applied to registries of new entries using the variables provided by the sample. The contributory bases (CB) that enter the regulatory base increase from the last 15 years to 25 years of contribution until 2022.

The previous formula for the Regulatory Base that applied for the 15 years period was:

$$RB = \frac{1}{210}\left(\sum_{j=1}^{24} CB_j + \sum_{j=25}^{180} CB_j * \frac{I_{25}}{I_j}\right) \quad [5]$$

The new one for the Regulatory Base that will apply for the 25 years period will be:

$$RB = \frac{1}{350}\left(\sum_{j=1}^{24} CB_j + \sum_{j=25}^{300} CB_j * \frac{I_{25}}{I_j}\right) \quad [6]$$

In the formulas past CBs are updated with the CPI except for the 2 years before retirement.

Previously a filling of contribution breaks according to the rules takes place. Also the coefficients and contribution periods are modified with the new rules.

The number of contributed years affects both coefficients c and p. Specific coefficients are used for each group depending on the age of retirement and the years of contribution. Equation [4] is disaggregated by age and sex. Complements to minimum pensions and the maximum pension are also considered.

Specific detailed rules for the transition period 2013-27 are duly taken into account. A gradual but incomplete convergence of female careers to men is assumed, also reflected in developments in participation rates.

Permanent disability pensions

The disability pension system consists of various compensations and categories depending on the cause and the degree of disability[7]. Expenditure projections are disaggregated according to degree and cause. The corresponding disability rates applied to the affiliated are disaggregated by age and sex, as well as by cause and degree of disability using data supplied by the Social Security. Withdrawals take into account mortality adjusted by the observed withdrawals.

The average new pension benefit is the key variable for the projection of the average disability pension and it is provided by the Social Security registries. In the projection it increases with productivity and inflation. After the age of 65 disability pensions are computed as retirement pensions.

Survivors' pensions

New entries are linked to the withdrawals in retirement and disability pensions and mortality of labour force with some age lag depending on the type of pension. The average new pension benefit is provided as the starting point by the Social Security.

Up to the 2011 reform, the average entry pension benefit was equal to the 52% of the average regulatory base for new entrants (70% in specific cases). The percentage to be applied to widows and widowers older than 65 who do not work and do not receive another pension is 60%. In the future survivors' pensions will drop in line with higher female participation rates.

IV.4. Projecting public earnings-related pensions: Model 2 methodology

The same structure of model 1 applies as regards the basic formula of expenditure. The main difference is that new contributors are not allowed as of 1-1-2011. Therefore, the number of contributors decreases according to mortality and new pensions. The figures for new pensions are derived from a coefficient of new pensions over contributors of last year and previous age

[7] Specifically, there are three degrees of permanent disability that give rise to a life annuity: total (the worker is disabled for performing his current occupation but may perform some other kind of job), absolute (worker is totally unable to take on any occupation) and complete disability (the worker needs other people's assistance to carry out basic daily activities). In addition, the disability may have three types of causes: common disease, non-workplace accident or causes attributable to occupation.

applied to the remaining contributors each year. The average entry pension takes into account the different rules of the system as explained in part 1.

IV.5. Projecting non-earnings-related pensions: Model 3 methodology

The number of new old-age entrants is the people at their retirement age not receiving any earning-related pension, adjusted by a coefficient that takes into account that there are people not entitled to a means-tested non-contributory pension (for having high income or assets) and people who do not claim their right to a pension. Both the average pension benefit of new entrants and the average pension benefit of existing pensions are linked to wages. The rest of variables are modelled in the same vein as in model 1.

IV.6. Projecting private pensions: Model 4 methodology

The agreed Eurostat demographic and AWG macroeconomic assumptions have been incorporated in the model for private pensions (occupational and individual schemes) elaborated by the Ministry of Economy and Competitiveness (Directorate General for Insurance and Pension Funds). The base data have required additional information from entities that has been gathered through an extended questionnaire (numbers of contributors, contributions, consolidated rights, beneficiaries, all by age) to the major entities, comparing results with own databases.

The model runs separate projections for individual and occupational pension plans and collective pension insurance plans. The assumptions made are very prudent and do not foresee changes in behaviour.

- The number of contributors (aged 21-64) is calculated as a percentage of population in the base year, 2013, by age. These percentages are kept constant along the projection period, and the number of contributors increases with population projection by age.
- Contributions by age and year increase in line with labour productivity and inflation. The average contribution period is around 20 years.
- Pensions can be withdrawn at retirement (age 65 still assumed) which is the bulk of current withdrawals. Quantitatively less important, withdrawals in case of contributors' death before retirement have also been considered.

IV.7. Sustainability factor for retirement pensions.

The sustainability factor is an automatic link between the amount of retirement pension benefits and developments in life expectancy of pensioners. It will be applied only once on each pensioner when determining the initial amount of a new pension. It will come into effect in 2019.

The formula is the following:

$$SF_t = SF_{t-1} * e^*_{67}$$

Where SF is the sustainability factor (equal to one up to 2018), t is the year of application of the factor and $e^*_{67}$is the average annual change in life expectancy at 67 (according to Social Security mortality tables) in a previous period of five years. The value of e^*_{67} is kept fixed for periods of five years.

The formula for computing e^*_{67} for the period 2019-2023 is the following:

$$e^*_{67,2012-17} = \left[\frac{e^{2012}_{67}}{e^{2017}_{67}}\right]^{\frac{1}{5}}$$

The formula for computing e^*_{67} for the period 2024-2028 is the following:

$$e^*_{67,2017-22} = \left[\frac{e^{2017}_{67}}{e^{2022}_{67}}\right]^{\frac{1}{5}}$$

And so on. Thus, for instance, the SF in 2028 would be:

$$SF_{2028} = SF_{2027} * e^*_{67,2017-22}$$

$$SF_{2028} = 1 * (e^*_{67,2012-17})^5 * (e^*_{67,2017-22})^5$$

$$SF_{2028} = 1 * \frac{e^{2012}_{67}}{e^{2017}_{67}} * \frac{e^{2017}_{67}}{e^{2022}_{67}}$$

$$SF_{2028} = \frac{e^{2012}_{67}}{e^{2022}_{67}}$$

For computing the SF, the first four decimal figures will be used.

The SF will be applied only to old-age Social Security contributory pensions, but minimum complements may be exempted in the budget Law.

Life expectancy developments will be published systematically and transparently. Moreover, pensioners will be informed of the effect of the SF in their new pension when receiving their pension for the first time.

The sustainability factor (SF) is computed based on Eurostat's projected life expectancy, which may have wide differences when compared to Social Security mortality tables.

IV.8. New index for pension revaluation (IPR).

A. Legal definition

All social contributory social security pensions, including minimum pensions and civil servants' pensions (*Clases Pasivas del Estado*), will be increased annually according to the Index for Pension Revaluation (or IPR), which should be fixed annually by the National Budget Law. It has entered into force in 2014, immediately after the adoption of the 2013 reform.

The Index is defined according to the following formula:

$$IPR_{t+1} = \bar{g}_{R,t+1} - \bar{g}_{P,t+1} - \bar{g}_{S,t+1} + \alpha * \frac{R^*_{t+1} - E^*_{t+1}}{E^*_{t+1}}$$

Where the IPR for all pensions in year t+1 equals the (arithmetic) mean rate of revenues ($\bar{g}_{R,t+1}$) minus the mean rate of the number of pensions ($\bar{g}_{P,t+1}$), minus the average substitution effect ($\bar{g}_{S,t+1}$), plus/minus the adjustment needed to cover the structural disequilibrium of the system. The substitution effect is the interannual change of the average pension when no revaluation is applied, and it results from the replacement of dying pensioners with new ones whose average pension is higher.

The system disequilibrium is computed as the difference between the (geometric) mean of revenues (R*) and expenses (E*) as a proportion of (geometric) mean expenses. The alpha parameter α measures the correction speed of imbalances and should lie between 0.25 and 0.33, being its value revised every five years. For years 2014-2018 α will be 0.25.

The mean values (both arithmetic and geometric) will be centered on the reference year t+1, taking into consideration eleven values. The IPR must lie between 0.25 and the year-on-year percentage change in annual CPI on December of year t plus 0.5%.

For computing the formula, total non-financial revenues and expenditures of the system will be considered, excluding the following items:

- Budget corresponding to the National Institute of Health Management (INGESA) and the Institute for the Elderly and Social Services (IMSERSO).
- Non-recurrent items, as determined by the General Intervention Board of the State Administration (IGAE).
- Social contributions and benefits for cessation of business.
- On the revenue side, State transfers for financing non-contributory benefits (except transfers for minimum complements of contributory pensions); and, on the expenditure side, non-contributory benefits (except minimum complements of contributory pensions).

The Ministry of Economy and Competitiveness will provide annually to the Social Security administration the macroeconomic projections needed to carry out the calculation of revenue and expenditure for years t+1 to t+6. The value of all variables involved in the IPR formula will be published annually.

Other related provisions include:

- The sustainability factor and the index for pension revaluation, as well as all variables involved for computing them, will be systematically tracked and published.
- A Report on adequacy and sufficiency of pensions should be drafted by the government and discussed in Congress and with the social partners every five years.
- The Independent Authority on Fiscal Responsibility should issue an Opinion on the computed values for the sustainability factor and the index for pension revaluation.
- Civil Servants' pensions (Clases Pasivas del Estado) will be increased annually following the index for pension revaluation envisaged for the Social Security system.

B. Modelling the IPR

Modelling the IPR involves carrying out some iterative procedures since its formula includes future values of variables, which are themselves affected by the IPR. The starting point for modelling the IPR is the full model using the traditional inflation indexation rule. From this model, we obtain two blocks of variables: on the one hand, the exogenous or input variables for the full projection period plus five years beyond 2060 needed for computing the 2060 IPR. These variables are total number of pensions, new pensions, withdrawn pensions, average benefit for new pensions and total revenue. On the other hand, the endogenous or output variables for the first 5 years needed for computing the 2025 IPR, which are the average benefit for the stock of pensions, the average benefit for withdrawals, the substitution effect and the observed revaluation rule. Additionally, we can compute total expenditure on pension benefits as the product of the average benefit for the stock of pensions times the number of

pensions. However, the total Social Security expenditure (as defined in the Law 23/2013) to be used in the IPR formula represents around 113% of expenditure on pension benefits which is captured by a beta (β) parameter in the model that elevates expenditure on pension benefits to Social Security expenditure, initially set at 1.13. As it is expected that economies of scale and technological progress will improve efficiency in the long run, the beta parameter linearly converges to 1.05 in 2060.

Below the variables and **formulas** used for computing the IPR are presented.

N=56 is the number of years considered, 2010 to 2065. m is the size of the moving reference window, set at 5, so that the moving averages used in the IRP take into account a period of 2m+1=11 years. The effective years studied for convergence are T=46, i.e. the period 2015 to 2060. The values for years 2061-65 are only needed for the IPR in year 2060. Because values for years 2010-14 are given, the T years used for computing the IPR are the 46 years from 2015 to 2060, in which convergence is checked.

Input variables:

- Total Pensions by Age = TPA Matrix (101,N). All row elements in this matrix are identified by a subindex a (age) and all column elements are identified by a subindex t (time).
- New Pensions by Age = NPA (101,N).
- Withdrawn Pensions by Age = WPA (101,N).
- Average New pension Benefit by Age = NBA (101,N).
- Revenue = R (1,N).
- Total pension Benefit by Age = TBA (m,101), then extended to (101,N).
- Withdrawn pension Benefit by Age = WBA (m,101), then extended to (101,N).
- Substitution Effect = g_S (1,m), then extended to (1,N).
- Index for Pension Revaluation = IPR (1,m), then extended to (1,N).

Output variables:

- Index for Pension Revaluation = IPR (1,N).
- Number of iterations needed for convergence = iter (1,1).
- Total pension Benefit by Age = TBA (101,N).
- Withdrawn pension Benefit by Age = WBA (101,N).
- Substitution Effect = g_S (1,N).
- Index for Pension Revaluation = IPR (1,N).

Auxiliary variables:

- New IPR= IPR_1 (1,N).
- Total Social Security Expenditure = E (1,N).
- Total pension Benefit by Age No Revaluation= TBANR (101,N).
- Withdrawn pension Benefit by Age No Revaluation = WBANR (101,N).
- Sum of Total, New and Withdrawn Pensions = TP(1,N), NP(1,N), WP (1,N).
- Average Total, New and Withdrawn pension Benefits = TB(1,N), NB(1,N), WB(1,N).
- Average Total and Withdrawn pension Benefits No Revaluation = TBNR(1,N), WBNR (1,N).

Formulas:

$$WBA_{a,t} = \frac{TPA_{a-1,t-1} * TBA_{a-1,t-1} * (1 + IRP_t) + NPA_{a,t} * NBA_{a,t}}{TPA_{a-1,t-1} + NPA_{a,t}}$$

$$WBANR_{a,t} = \frac{TPA_{a-1,t-1} * TBA_{a-1,t-1} + NPA_{a,t} * NBA_{a,t}}{TPA_{a-1,t-1} + NPA_{a,t}}$$

$$TBA_{a,t} = \frac{TPA_{a-1,t-1} * TBA_{a-1,t-1} * (1 + IRP_t) + NPA_{a,t} * NBA_{a,t} - WPA_{a,t} * WBA_{a,t}}{TPA_{a-1,t-1} + NPA_{a,t} - WPA_{a,t}}$$

$$TBANR_{a,t} = \frac{TPA_{a-1,t-1} * TBA_{a-1,t-1} + NPA_{a,t} * NBA_{a,t} - WPA_{a,t} * WBANR_{a,t}}{TPA_{a-1,t-1} + NPA_{a,t} - WPA_{a,t}}$$

$$WB_t = \frac{WBA'_{a,t} * WPA_{a,t}}{WP_t}$$

$$WBNR_t = \frac{WBANR'_{a,t} * WPA_{a,t}}{WP_t}$$

$$TB_t = \frac{TBA'_{a,t} * TPA_{a,t}}{TP_t}$$

$$TBNR_t = \frac{TBANR'_{a,t} * TPA_{a,t}}{TP_t}$$

$$g_{S,t} = \frac{TBNR_t}{TB_{t-1}} - 1$$

$$E_t = \beta * TP_t * TB_t$$

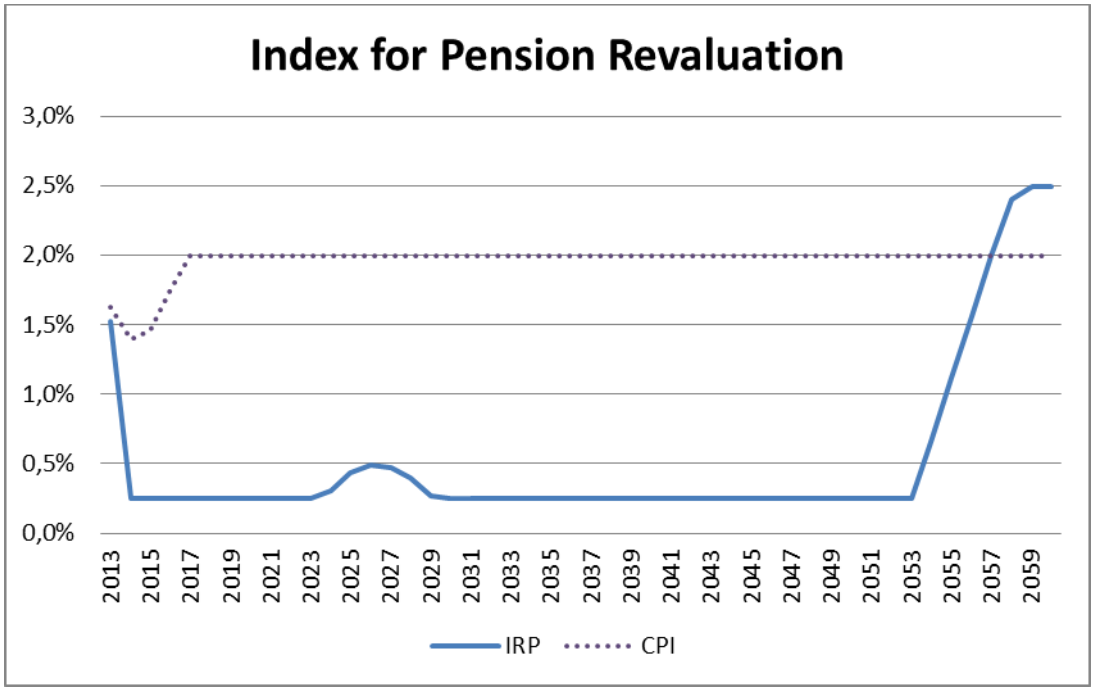
$$IPR_t = \bar{g}_{R,t} - \bar{g}_{P,t} - \bar{g}_{S,t} + \alpha * \frac{R^*_t - E^*_t}{E^*_t}$$

To solve the model, three nested loops are built for computing iteratively the IPR. The first loop sets the number of iterations and adds m years at the end of the projection horizon so as to compute the IPR for 2060. It is controlled by the index iter. The second loop estimates the variables for each of the T periods for which convergence is studied and for the m years 2061-65 necessary for computing the 2060 IRP. All variables are computed consecutively for each of the periods t. This loop is controlled by the time index s, which goes from year 1 (2015) to year T (2060). Finally, the third loop computes the variables for each the corresponding year t and the m years after. This loop is controlled by a moment index k, which goes from moment 0 to moment 5 in the rear window.

The resolution process runs from the third loop to the third. Thus, in the first place and within the third loop, the variables WBA, WBANR, TBA, TBANR, WB, WBNR, g_S and E, are estimated, for the period t and each of the k moments.

Then, after solving for the third loop and within the second loop, the mean values for the variables entering the IPR are calculated, so that we can find a value for t of the new IPR (denoted IPR_1). Thereafter, still within the second loop and for period t, the new IPR_1 is used for computing the variables WBA, TBA, WB, TB, g_S and E. The variables with no revaluation need not recalculation because by definition are not affected by a new indexation rule. This process is repeated for each year t, taking the values of previous years as given.

Afterwards, finalizing the second loop and within the first one, convergence is checked by comparing the old IPR and the new IPR_1. There is convergence if the difference in absolute value for each of the periods is greater than 0.0001. If there is convergence, the first loop ends and the model stops yielding the estimated IPR. Otherwise, the new IPR_1 becomes IPR and the variable iter is increased by one. A new iteration of the first loop is then run. Convergence was found after five iterations.



V. ANNEX

V.1. Institutional context

These projections have been prepared by the General Directorate for Macroeconomic Analysis and International Economy of the Ministry of Economy and Competitiveness of Spain. The projections have been submitted prior to the AWG peer review to the Ministry of Employment and Social Security, to the Ministry of Finance and Public Administrations and to the Bank of Spain. Most inputs from these institutions have been incorporated into the fiche.

According to the Law 23/2013, the Ministry of Employment and Social Security is responsible for the calculation of the IPR. This Ministry shall publish annually the values of the variables used in the computation of the IPR. Therefore, the IPR calculation made in this fiche does not necessarily coincide with the calculation made by the Ministry of Employment and Social Security.

The Ministry of Economy and Competitiveness shall provide to the Social Security Administration the values of the macroeconomic variables needed to determine revenue and expenditure of the Social Expenditure for years t+1 to t+6. The Independent Authority for Fiscal Responsibility (AIReF) shall issue an opinion on the values calculated by the Ministry of Employment and Social Security of the IPR and of the Sustainability Factor. The government shall elaborate every five years from the adoption of Law 23/2013 a study on the impact of the adopted measures on the sufficiency and adequacy of Social Security pensions and shall present it in the Congress and in the context of the social dialogue with unions and business organizations.

V.2. Alternative pension spending decomposition

TABLE A1	Factors behind the change in public pension expenditures between 2013 and 2060 using pension data (in percentage points of GDP) - pensions					
	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	**0,0**	**-0,5**	**0,7**	**0,4**	**-1,4**	**-0,9**
Dependency ratio effect	1,9	4,4	6,2	3,9	-4,0	12,4
Coverage ratio effect	-0,1	-0,6	-0,3	0,0	0,3	-0,8
*Coverage ratio old-age**	*0,2*	*-0,2*	*0,2*	*0,5*	*0,2*	*0,9*
*Coverage ratio early-age**	*-1,7*	*-1,2*	*1,3*	*0,4*	*-1,4*	*-2,6*
*Cohort effect**	*0,5*	*-1,3*	*-3,7*	*-2,3*	*1,4*	*-5,5*
Benefit ratio effect	0,0	-1,4	-1,3	-1,0	-0,1	-3,8
Labour Market/Labour intensity effect	-1,6	-1,4	-0,7	0,0	0,2	-3,5
Employment ratio effect	*-1,5*	*-1,1*	*-0,6*	*-0,1*	*0,0*	*-3,2*
Labour intensity effect	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*
Career shift effect	*-0,2*	*-0,4*	*-0,2*	*0,1*	*0,2*	*-0,5*
Residual	-0,2	-1,5	-3,3	-2,5	2,2	-5,2

TABLE A2	Factors behind the change in public pension expenditures between 2013 and 2060 using pensioners data (in percentage points of GDP) - pensioners					
	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	**0,0**	**-0,5**	**0,7**	**0,4**	**-1,4**	**-0,9**
Dependency ratio effect	1,9	4,4	6,2	3,9	-4,0	12,4
Coverage ratio effect	-0,1	-0,6	-0,2	0,0	0,3	-0,6
*Coverage ratio old-age**	*0,2*	*-0,1*	*0,3*	*0,5*	*0,2*	*1,1*
*Coverage ratio early-age**	*-1,7*	*-1,2*	*1,4*	*0,5*	*-1,4*	*-2,4*
*Cohort effect**	*0,5*	*-1,3*	*-3,7*	*-2,3*	*1,4*	*-5,5*
Benefit ratio effect	0,0	-1,5	-1,3	-1,0	-0,1	-3,9
Labour Market/Labour intensity effect	-1,6	-1,4	-0,7	0,0	0,2	-3,5
Employment ratio effect	*-1,5*	*-1,1*	*-0,6*	*-0,1*	*0,0*	*-3,2*
Labour intensity effect	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*
Career shift effect	*-0,2*	*-0,4*	*-0,2*	*0,1*	*0,2*	*-0,5*
Residual	-0,2	-1,5	-3,3	-2,5	2,2	-5,3

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V.3. Maximum and minimum pensions and contributory bases

TABLE A3	Maximum and minimum pensions and contributory bases (CB)										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Minimum Pension*	492	531	569	619	661	696	735	756	764	779	781
Maximum Pension	2.117	2.189	2.246	2.338	2.394	2.442	2.498	2.498	2.523	2.548	2.554
Minimum CB	573	599	631	666	699	728	739	748	748	753	753
Maximum CB	2.732	2.813	2.898	2.996	3.074	3.166	3.198	3.230	3.263	3.426	3.597
*with dependent spouse and 65+											