
**MINISTRY OF ECONOMY AND FINANCE**

**DEPARTMENT OF GENERAL ACCOUNTS**

***General Inspectorate for social expenditure***

# 2015-round of EPC-WGA projections – Italy's fiche on pensions(*)

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(*) For any further clarification, please contact Rocco Aprile, tel. +39 06 47614669, e-mail rocco.aprile@tesoro.it.

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# Chapter 1 -The legal-institutional framework of the Italian pension system

## 1.1 An overview

The Italian pension system is basically public, mandatory and financed according to the pay-as-you-go principle. It covers the entire population and, after a transitional phase, applies the same general rules across all participants, with the exceptions of minor pension schemes. A private, funded pillar also exists, which is on voluntary basis and plays a supplementary role to the public pension system.

Following law 214/2011, only one social security institute (Istituto Nazionale di Previdenza Sociale - INPS) is envisaged which runs all public pensions schemes, for the private and public sectors, excepting just a number of professionals' schemes which, altogether, cover about 4% of total contributors.

In 2013, the public pension expenditure was 15.7% of GDP[1], gross of the tax revenue. Discarding the social assistance component, 83.6%was composed of old age, early and disability pensions. The remaining 16.4%was survivors' pensions. Sector analysis shows that about 60% of public pension expenditure refers to private employees, 25% to public employees and 15% to the self-employed (artisans, shopkeepers and farmers) and professionals' schemes.

The legal-institutional framework of the Italian pension system has been greatly reformed since 1992. The measures that have contributed most to improving financial sustainability, already embodied in the 2012-AWG pension projections, may be summarized as follows:

- the elimination of indexation to real wages (law 503/1992);
- the introduction of the NDC (Notional Defined Contribution) method and the periodic update of the transformation coefficients (accrual rate) to changes in mortality rates (law 335/1995 and law 247/2007);
- the tightening of the eligibility requirements for old age, early, and social assistance pensions (law 503/1992, law 335/1995, law 449/1997, law 243/2004, as modified by law 247/2007, law 214/2011);
- the alignment of the statutory retirement age of women to that of men, thus eliminating a 5-year gap (law 122/2010, law 214/2011);

[1] Pension expenditure and GDP figures have been revised according to ESA 2010.

- the indexation of the eligibility requirements to changes in life expectancy for old age, early, and social assistance pensions.

Since the previous round of projections, based on legislation in force at the end of 2011, only minor interventions have been approved, which mainly include: i) short term cuts to pension indexation; ii) an increase of older workers safeguarded from the higher eligibility requirements foreseen by law 214/2011 and iii) a gradual alignment of the contribution rate of atypical workers to that of employees.

The process of pension reform has also concerned the private, funded pillar. The interventions approved in 1993 (legislative decree 507/1993) and 1995 (law 335/1995) introduced a legislative framework to regulate private, supplementary, funded schemes. Thereafter, additional measures were adopted in order to increase the insured. Particularly, law 243/2004, legislative decree 252/2005, and law 296/2006 provided important changes in terms of fiscal incentives to join private pension funds.

## 1.2 The public pension system

### 1.2.1 Calculation rules

As a result of the 1995-reform (law 335/1995), the Italian pension system has been moving to a NDC regime, where pensions are calculated on the basis of an actuarial equivalence between the contributions paid over the entire career and the pension payments expected after retirement. The previous DB (Defined Benefit) regime still applies pro-rata in a transitional phase.

**NDC regime**. Under the NDC regime, the pension amount is calculated as a product of two factors: the total lifelong contributions, capitalised with the nominal GDP growth rate (five-year geometric average) and the transformation coefficient, the calculation of which is mainly based on the probabilities of death and leaving a spouse, and the average outliving period[2]. As a consequence, the pension amount is proportional to the contribution rate and directly related to retirement age - the lower the age, the lower the pension and vice-versa.

Until the end of 2012, the transformation coefficients were foreseen only for the age bracket 57-65. For retirement ages below (i.e. disability pensions) or above the range, the lowest and the highest coefficients were respectively applied. As of 2013, the upper limit of the age range has been extended to 70 and then further, in line with the increase in the eligibility requirements brought about by changes in life expectancy (see §. 1.2.2).[3]

[2] For the formula and parameters, see Annex 2. The transformation coefficient is approximately the inverse of the number of years for which a pension is expected to be paid to the pensioner and his/her surviving spouse, the latter weighted with the reversibility rate.

[3] A transformation coefficient corresponding to an age 3 months higher than that of retirement is foreseen for women for each child up to a maximum of 1 year.

According to current legislation, the transformation coefficients are revised according to changes in mortality rates every three years up to 2019 and every two years as of 2021.The revision procedure is automatic insofar as it falls entirely under the administrative sphere of competence[4].

**DB regime.** Under the previous DB regime, the pension amount is calculated as a fraction of the reference wage, which is obtained multiplying 2% by the years of contribution, up to a maximum of 80%[5]. The reference wage is an average of wages related to the last part of career, indexed to prices up to the year before that of retirement. The number of annual wages involved varies depending on sector, contribution period and retirement age.

**Transitional phase.** Two different regimes are foreseen in the transitional phase, depending on the years of contribution matured at the end of 1995:

- the insured with at least 18 years of contribution maintain the DB calculation method for contributions accrued until 2011[6]. For contributions accrued thereafter, the NDC method is applied. This regime will however be phased out in the next few years;
- the insured with less than 18 years of contributions are subject to the so-called pro-rata, mixed regime, where a pension is calculated as a sum of two components: the former, related to contributions accrued up to 1995, is based on the DB method[7]; the latter is based on the NDC method. With regard to future pensions, most contribution years are already subject to the NDC method, which are gradually increasing up to the entire career over the next two decades.

**Disability pensions.** General calculation rules, as described above, also apply to disability pensions. Plus, an additional contribution period is acknowledged to those with 100% disability, up to the maximum contribution period or the SRA, if lower[8].

**Survivors' pensions.** In all regimes, survivors' pensions account for 60% of the deceased's pension or, where the deceased is a contributor, the amount is calculated as described above[9]. A survivor's pension cannot be cumulated with other income sources for

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[4] In accordance with the administrative procedure laid down by law 247/2007, the 2013-revision of the transformation coefficients was adopted by a directorial decree of the Ministry of Labour and Social Policies of 14 May, 2012. Such coefficients apply for the three-year period 2013-2015 before the next update which will came into force as of 2016.

[5] In case of early retirement based on contribution requirements (paragraph 1.2.2), a penalty is applied to the quota of pension calculated according to the DB method (1% at the age of 61, 2% at the age of 60 and then increased by 2 pp each year below 60).

[6] For the contribution years after 1992, the number of annual wages involved in the calculation increases gradually until it covers the last 10 years for employees and the last 15 for the self-employed.

[7] For contributions accrued in the three-year period 1993-1995, the reference wage tends gradually to cover the entire career.

[8] In fact, the maximum degree of disability is considered incompatible with any kind of work.

[9] In the case of a surviving spouse with one or two children, the percentage of 60% is increased to 80% and 100%, respectively. Such a percentage is arranged differently when there are only surviving children. As of 2012, the percentage of 60% is reduced by 10% for each year spent unmarried during the previous 10 years,

25%, 40% or 50% of its amount if the survivor's total income exceeds, respectively, three, four or five times the minimum pension.

### 1.2.2 Eligibility requirements

The Italian pension system basically foresees two channels to access retirement (see table 1 and figure A2.1):

- Statutory Retirement Age (SRA) to be entitled to an old age pension, with 20 years of contributions;
- early retirement, with an age below the SRA, but requiring higher contribution periods.

**Statutory Retirement Age (old age pensions).** In 2014, the SRA is 66 years and 3 months for men (all sectors) and female employees in the public sector. It is temporary lower for female employees in the private sector (63 years and 9 months) and the female self-employed (64years and 9 months), though rapidly increasing, catching up the SRA of other workers as of 1st January, 2018. In the same year, the minimum age requirement to be entitled to the old age allowance will be increased by 1 year and then fully aligned to the SRA.

According to a specific legislative provision, the SRA must be at least 67 in 2021. Based on the official demographic projections, such a target may be achieved in advance through the periodic indexation of the eligibility requirements to changes in life expectancy (see below).

**Early retirement.** This is allowed on the basis of a minimum contribution requirement, regardless of age. In 2014, the required contribution period is:

- 42 years and 6 months, for men;
- 41 years and 6 months, for women.

For those enrolled in the pension system after 1995 (i.e. those under the NDC), a further channel to access early retirement is foreseen (law 214/2011). According to the latter, workers may retire up to a maximum of three years earlier than the SRA, as long as they have 20 years of contributions and a pension not inferior to 1,200 euro per month in 2012 (which corresponds to 2.8 times the old age allowance, in 2012), indexed with the five-year average of nominal GDP.

**Indexation of the eligibility requirements.** Starting from 2013, an indexation mechanism (every three years up to 2019 and two years starting from 2021) is applied, linking the eligibility requirements to changes in life expectancy at 65, as measured by the Italian National Institute of Statistics (Istat) over the preceding three-year period (two years as of 2021). Such a mechanism applies to:

- the minimum age requirement for old age pensions (SRA) and old age allowances (*assegno sociale*);
- the minimum contribution requirements for early pensions, regardless of age;

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as long as the age difference between the deceased and the surviving spouse exceeds 20 years and the former was 70+ on marriage. Such a reduction is not applicable in case of children, students or disabled persons.

- the minimum age requirement for early pensions, under the NDC regime.

As expressly foreseen by law, the updating procedure of the eligibility requirements falls completely within the administrative sphere of competence, thus assuring the effectiveness of the periodic revision as well as the compliance with the scheduled dates[10].

Such a linking mechanism is fully consistent with that foreseen for the update of the transformation coefficients to changes in mortality rates (law 247/2007), in terms of the administrative procedure and periodicity of revisions.

**Disability pension.** In all regimes, to be entitled to a disability pension, 5 years of contributions are required, 3 of which accrued in the last five years before retirement.

**Survivor's pension.** In all regimes, survivor's pensions are acknowledged to the spouse and/or children of the deceased either pensioner or contributor[11]. As for the latter, 15 years of contributions are required or, alternately, 5 years, 3 of which accrued in the last five years.

### 1.2.3 A safety net: the old age allowance and additional lump sums

Social assistance benefits include the old age allowance (5,750 euro per year, in 2013) and social assistance additional lump sums (*maggiorazioni sociali*). Further income is provided to the elderly by the so-called social purchase card (*carta acquisti*).

Social assistance benefits are provided to the elderly on low income, regardless of contributions. Therefore, they are means-tested and subject to a minimum age requirement of 65 years and 3 months in 2014, increased by 1 year in 2018 and linked to changes in life expectancy.

The old age allowance ("social pension" if awarded before 1996) is acknowledged to the elderly with a personal income not exceeding the benefit itself and, if married, a couple's income non-exceeding twice the benefit.

Social assistance additional lump sums are foreseen to supplement the old age allowance to given income thresholds, depending on age and marital status (single/married). For the 70+, the income thresholds account for 8,214 euro (personal income) and 13,964euro (couple's income), in 2013[12].

Considering the additional income provided through the social purchase card (yearly financed by the State), such thresholds are further increased up to 8,694 euro and 14,924 euro, respectively, which may be regarded as the minimum income guaranteed to the elderly.

Only under the DB and mixed regimes, besides the old age allowance, a means-tested, topping-up mechanism to the minimum pension (6,441 euro per year, in 2013) is foreseen, subject to the fulfilment of the eligibility requirements.

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[10] The 2013-indexation of the eligibility requirements was adopted by a directorial decree of the Ministry of Economy and Finance of 14 December 2011.

[11] A survivors' pension can also be entitled to children up to 18 years (or 26 years, if students).

[12] Such thresholds are somewhat lower for the under 70.

### 1.2.4 Indexation of pensions

Pensions are indexed to price inflation, unlike the rule applied before 1992, which also provided partial indexation to real wages for private sector pensioners[13]. According to current legislation, the percentage of indexation to prices is differentiated by pension amount brackets. Such a percentage is 100% of the inflation rate for the amount of pension up to three times the minimum pension, 90% for the amount between three and five times the minimum, and 75% for the part above five times the minimum[14].

### 1.2.5 Accumulation of pension and labour income

**Old age and early pensions**. According to Law 133/2008, old age and early pensions can be cumulated in full with labour income. The previous legislation laid down some restrictions, especially in the case of employees.

**Disability pensions**. The possibility of accumulation is fully allowed only with 40 years of contributions. Otherwise the pensioner is subject to withdrawal from their pension of 50% of the amount exceeding the minimum pension. In any case, the amount pension is first reduced by 25% or 50%, depending on whether the pensioner's full income, including the amount of pension, exceeds four or five times the minimum pension.

**Survivor's pensions**. The accumulation without any curtailment is allowed as long as the pensioner's income, including the amount of pension, lies below 3 times the minimum pension. For higher incomes, a reduction of 25%, 40% and 50% is foreseen for income amounts falling in the brackets three to four, four to five and more than five times the minimum.

### 1.2.6 Financing of the public pension system

Public pension expenditure is financed through contributions and public budget transfers, mainly covering social assistance provisions.

Contribution rates are differentiated by sector, as below:

- **private and public employees:** 33%, of which about 1/3$^{rd}$ is paid by the employee and 2/3$^{rd}$ by the employer;
- **the self-employed:** (artisans, shopkeepers and farmers): gradually increasing from around 22.2% in 2014 to 24% in 2018;

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[13] Since then pensions, including minimum pension (paragraph 1.2.3), have been indexed only to prices.

[14] For the two-year period 2012-2013, pensions above 3 times the minimum were not indexed to price inflation for their total amount (the financial effects were already embodied in the 2012-round of projections). For the three-year period 2014-2016, indexation to price inflation is reduced by the following percentages applying to the total pension amount: 95% for pensions in between 3 and 4 times the minimum, 75% for pension in between 4 and 5 times the minimum, 50% for pensions in between 5 and 6 times the minimum, 40% (45%, in 2015-2016) for pensions above 6 times the minimum. For 2014 alone, the pension quota above 6 times the minimum is not indexed.

- **atypical workers:** from 28% in 2014 to 33% in 2018. Such percentages are reduced to22% and 24% (from 2016), respectively if they are pensioners or contributors to other public pension schemes.

The difference in contribution rates between employees and the self-employed is actually lower than it may appear, if expressed in terms of a homogeneous definition of the contribution base. In fact, the contribution base includes the total contributions in the case of the self-employed, and only the 1/3$^{rd}$ paid by the worker, in the case of employees. As for the latter, the inclusion of the remaining quota paid by the employer would reduce the contribution rate from 33% to about 27%.

### 1.2.7 Taxation of pensions

Pensions are taxed as labour-income, allowing for deductions inversely correlated to income levels. Pension income below 7,500 euro per year is tax-exempt (no tax-area).

In 2013, total revenue on public pensions accounted for about 18% of total expenditure which, in turn, corresponded to nearly 2.8% of GDP.

Contributions paid to the public pension system are fully deductible from taxable income.

## 1.3 The private funded pillar

The reforms passed in 1992-1993 and 1995introduced legislation on private, supplementary, funded schemes. During the 1990's, other interventions were progressively adopted to regulate financial markets and reform taxation on returns from financial assets. At the end of the decade, additional measures were approved aiming to increase the amount of savings invested in pension funds (law 133/99 and the related legislative decree for fiscal treatment of contributions paid to private funds).

Despite the legislative intervention mentioned above, the number of workers enrolled in private pension funds remained low. For this reason, the 2004-pension reform (law 243/2004 and the related legislative decree 252/2005) and law 296/2006 introduced further measures to foster the development of the second pillar. Two interventions thus came into force as of 2007: *i*) higher fiscal incentives, and *ii*) silence-as-assent for the transfer to pension funds of severance pay in the private sector employees. According to the latter, the annual flow of severance pay is transferred to private pension funds unless workers communicate their refusal. Nevertheless, enrolment in private pension funds remains on a voluntary basis.

Table 18 gives some statistical information about the development of the private component of the pension system in Italy during the period 2000-2013, in terms of coverage, contributions paid, and financial assets.

## 1.4 Pension reforms since January 2012

Law 214/2011 is the last major pension reform of the Italian pension system and was already embodied in the 2012-round of projections. Since then there have only been minor changes to the legal framework, mainly concerning: i) short term cuts to pension indexation, ii) an increase in the workers safeguarded from the higher eligibility requirements foreseen by law 214/2011 and iii) the alignment of the contribution rate of atypical workers, who are not pensioners or contributors to other public pension schemes (27% in 2013) to that of employees (33% in 2018).

The first two interventions go in the opposite directions in terms of financial effects on the public pension expenditure. In the short term, they almost compensate for each other, while in the mid-term savings due to indexation cuts clearly prevail, before being nullified in the long run when the pensioners concerned (and their survivors) disappear. Instead, the third intervention produces higher contributions over the entire forecasting period and a corresponding higher pension expenditure in the long run.

The financial effects on pension expenditure are shown in figure 3. Over the five-year period 2016-2020, the net effect is on the savings side and accounts for about 1% of total pension expenditure (0.1 pp. in terms of GDP). In the following period this effect stays positive for a couple of decades and then becomes slightly negative in the long term.

## 1.5 Actual 'constant policy' assumption used in the projection

According to the current legislation, social pensions and old age allowances are indexed to price inflation. Furthermore, additional lump sums, available for the low income elderly, are constant in nominal terms. In these cases, the application of indexation rules as laid down by law would imply, de facto, the disappearance of social assistance provisions which play an important role within the public pension system. In fact, in the past years improvements to social assistance benefits provided by the public pension system have been repeatedly legislated. The same considerations apply to the minimum pension, which is only foreseen in the transitional phase. For these reasons, the pension model assumes that social assistance benefits, including additional lump sums, are indexed to nominal GDP per capita, in the mid-long term, while the minimum pension is indexed to wages. However, in the short term up to 2018, pension projections fully comply with the indexation rules foreseen by current legislation.

# Chapter 2 - Overview of demographic and labour forces projections

## 2.1 Demographic development

According to 2013-Eurostat demographic projections, total population is expected to rise by 10% over the entire forecasting period (Table 2). Such an increase mainly depends on net migration and further improvements in life expectancy. Net annual flow of migration averages around 350 thousand up to 2040 and then declines to about 200 thousand towards 2060. Life expectancy at birth increases by 5 years for women and 5.7 for men; life expectancy at 65, which approximates the age of retirement, rises by about 4 years for both genders.

The transition of the baby boom generation, longevity gains, and low fertility rates are responsible for the relevant ageing of the population, as shown in figure 2 which compares changes in the age distribution between the base year and the end of the forecasting period. The old age dependency ratio increases from 32.8% in 2013 to 53% in 2060, signalling a potential strong impact of ageing on age-related expenditures and the importance for the pension system to be strengthened by automatic mechanisms to contain or counteract this pressure.

However, the demographic prospects look a little less worrying than those foreseen in the 2012-round of projections. In fact, the elderly dependency ratio at the end of the forecasting period is expected to settle on a lower level of about 3-4 pp. More specifically, the elderly 70+ are forecast to be reduced by about 4% compared to the 2010-Eurostat projection which broadly translates into the number of pensioners.

## 2.2 Labour forces

Labour forces are projected to increase by 5% over the forecasting period. Such a trend is fully explained by the evolution of older workers' participation rates, which are greatly affected by changes in the eligibility requirements. In fact, participation rates rise from 45.4% to 69% in the age-class 55-64, and from 6.1% to 25% in the age-class 65-74, against a decrease of 2.6 pp in the age-class 20-54. The latter mainly depends on male prime-age activity rates which are projected to decline in the age-class 36-44. However, this outcome does not depend on either retirement legislation or evidence of structural changes in workers behaviour. It just results from an extrapolation of a temporary impact of the economic crisis on labour forces.

As shown in tables 4, the average effective exit age increases in line with the periodic updates of the eligibility requirements, which adds to the initial alignment of female private sector SRA to that of other workers. In 2060, the average effective exit age overcomes the threshold of 67 for both males and females (67.3 and 67.5,

respectively), though women start from a base year level about 1 year lower (62.6 against 63.5of men).

Since the average entry age is around 24 for men and 26 for women, the average effective working career over the second half of the forecasting period accounts for about 43 and 41, respectively. Compared to the average accrued contribution records, the average effective working career scores 6 years higher for men and 4 years higher for women at the end of the forecasting period. Such differences account for about 1year lower in the previous two decades.

# Chapter 3 -Pension projection results

## 3.1 Extent of the coverage of pension schemes

Pension projections cover the expenditure of the whole public pension system and that for old-age allowances (social pensions, if awarded before 1996) and social assistance additional lump sums. The first component encompasses old age, disability and survivors' pensions related to contribution requirements. The second component is included because of its close relationship with ageing, being only entitled to the low income elderly.

Such an aggregate is just a bit smaller than that of Eurostat (ESSPROS statistics). The difference accounts for about 0.7-0.8% of GDP (Table 5) and is due to:

- benefits entitled to survivors and the disabled (0.6-0.7 percentage points in terms of GDP) which are related neither to pension contributions nor to ageing (benefits paid to the disabled below the SRA, war pensions, work injury annuities and merit awards);
- supplementary pensions provided by private pension funds (0.1 percentage points in terms of GDP) which, by definition, fall outside the perimeter of the public pension system.

The exclusion of private pension schemes is mainly motivated on the grounds that the State runs no risk concerning the financial returns of private pension funds. This statement is based on the following:

- private pension funds are never mandatory, regardless of whether they are or occupational pension schemes or not;
- participation in private pension funds never replaces the coverage of the public pension system, which is compulsory for all workers (no opting out);
- a quota of capital accumulated in the private pension system(up to 50%) may be withdrawn as a one-off reimbursement on retirement (or even before, to finance particular expenses, such as home purchasing);
- private pension funds play a supplementary role to the public pension system providing a minor fraction of elderly income. This implies that workers joining a private pension fund on voluntary basis will accept all the risks concerning the financial returns, since the public pension system in any case provides them with an adequate pension.

### 3.1.1 Pension expenditure to GDP ratio

Table 6 shows the projected ratio of pension expenditure (gross of tax revenues) to GDP obtained on the basis of the AWG baseline scenario and in accordance with pension legislation in force in September 2014. Reported values refer to the end-year of

each decade of the forecasting period. Graphs based on annual values are given in figure 4.

In the three-year period between the current base year of projections and that of the 2012-round, the ratio of pension expenditure to GDP increased by about 0.9pp, passing from 14.8% in 2010 to 15.7% in 2013. Such an increase is fully explained by the negative effects of the economic crisis on the denominator of the ratio. In fact, the dynamics of pension expenditure are unaffected and substantially in line with the values forecast in the public finance documents.

After the years of recession, the ratio between pension expenditure and GDP settles on 15.7%, in the two-year 2013-2014, and then gradually decreases to 15.3%, around 2020. In the central part of the forecasting period, the ratio rises again to its maximum of 15.9% in2036. Thereafter, pension expenditure declines rapidly in terms of GDP, reaching 14.8% in 2050 and 13.8% in 2060.

The decreasing trend of the ratio over the first decade is mainly due to the tightening of the eligibility requirements for old age and early pensions, and particularly the alignment of the SRA of women in the private sector to that of other workers by 2018.

The upward trend in the ratio seen in the middle of the forecasting period is caused by low productivity growth still below its convergence level and the transition of the baby boom generations to old age, which raises the ratio of pensions to employees, despite the containing effects exerted by further tightening of the eligibility requirements. In this phase, the pressure of demographic factors exceeds the declining trend in the benefit ratio that comes about from the gradual introduction of the NDC method (mixed regime).

The rapid contraction in pension expenditure to GDP ratio over the final part of the forecasting period is determined by full application of the NDC method, which runs in parallel with the stabilization and subsequent decline in the ratio of pensions to employees. The latter mainly arises from the gradual disappearance of the baby boom generations flanked by the automatic adjustment of eligibility requirements to changes in life expectancy.

## 3.2 Tax revenues on pensions

Tax revenues on pensions, reported in Table 6, have been projected following a simple rule agreed in the AWG which states that tax revenues as a share of pension expenditure stay constant over time. Such an approach, though extremely simplistic, has the merit of guaranteeing cross-country comparability, since both income tax systems and pension models vary considerably from country to country. According to the rule, the incidence of tax revenues on public pensions moves from 2.8% of GDP in the base year to 2.9% in the decade 2030-2040 and settles on 2.5% at the end of the forecasting period.[15]

[15] Information concerning the incidence of income tax on pensions in the base year is important in order to assess the real burden of public pension expenditure in terms of GDP, and render it comparable amongst countries.

## 3.3 Pension expenditure by scheme/sector

Table 7 shows that old age and early pensions, including disability pensions above the SRA, cover the largest part of pension expenditure. The incidence passes from 82% in 2013 to 84% in 2060. In the same period, the weight of survivors' pensions declines slightly from 16% to 13%, while the quota of disability pensions, below the SRA, increases from 2% to 3%.

Table 7also gives the projected pension expenditure distributed by sector. Discarding old age allowances and social assistance additional lump sums, private sector employees, including atypical workers, account for about 59% of the total pension expenditure in 2013, and their relative weight increases over time to 75% in 2060. Correspondingly, the quota of public sector employees and that of the self-employed is reduced from 26% to 14% and from 15% to 11%, respectively.

Changes in the distribution of pension expenditure by sector are only partly explained by the corresponding composition of the insured, which follows the same pattern. An important contribution comes from the containing effects brought about by the introduction of the NDC method, which mainly affects public sector employees and the self-employed. The former depends on the DB method which is more generous than that foreseen for private sector employees. The latter depends on the contribution rate which is lower than that of other workers (24% instead of 33%).

Finally, the expenditure for social pensions and old age allowances is projected to increase in terms of GDP, moving from 0.3% in 2013 to 0.4% in 2060. Such a trend is driven by both the number of beneficiaries and the average amount of pension. The former mainly depends on ageing and the decreasing quota of that part of the elderly with only survivor's pension entitlements; the latter is due to the more favourable indexation rule assumed under the constant policy scenario (§.1.5).

## 3.4 Main driving forces behind pension projections

### 3.4.1 Benefit ratio and economic dependency ratio

Based on the decomposition reported in table 8.a and 8.b, the demographic transition and the expected increase in life expectancy would exert a strong negative impact on the dynamics of pension expenditure to GDP ratio. Such an effect (measured by the old age dependency ratio) accounts for 8 pp over the entire forecasting period and is mainly concentrated in the period 2025-2040.

However, the potential deterioration of the pension system due to the adverse demographic outlook should not materialize thanks to the compensating effects brought about by the substantial pension reform process, which is reflected in i) the benefit ratio (-1.9 pp), due to the introduction of the NDC regime and the indexation of pension to price inflation; ii) the coverage ratio (-5.2 pp), because of the increase in the eligibility requirements and their linkage to changes in life expectancy and iii) the employment ratio, mainly driven by the postponement of retirement age.

The decomposition of pension expenditure to GDP ratio as a product of the 'benefit ratio' (the ratio of average pension to labour productivity) and the 'economic dependency ratio' (the ratio of pensions to employees) allows for a better analysis of the driving forces behind the baseline pension projection (Figures 4.b and 4.c).

The initial decline of the pension expenditure to GDP ratio derives from a large, rapid reduction in the economic dependency ratio, mainly because of the tightening of the eligibility requirements, which adds to an increase in the employment rate. Such a declining trend lasts until around 2027. Thereafter, over the following two decades, the ratio of pensions to employees begins to rise more sharply for well-known demographic reasons, when the baby boom generations are expected to move from working age (denominator of the ratio) to old age (numerator of the ratio), while the employment rate stops increasing. In the last part of the forecasting period, the economic dependency ratio first stabilizes and then declines because of the progressive elimination of pensions paid to the baby boom generations.

The benefit ratio, instead, increases steadily up to 2025-2030. In that period, in fact, the increasing quota of pensions calculated according to the NDC method does not compensate for the low productivity growth assumed in the transitional phase. In the subsequent period, however, when productivity growth reaches its structural level, the benefit ratio decreases significantly because of the phased-in process of the NDC regime.

As reported in Figure 5, the dynamics of the benefit ratio strongly depends on the dynamics of old age and early pensions. In turn, the latter is largely explained by the reduction in the replacement rate (new old age and early pensions) which declines rapidly, after a period of fluctuation at an almost constant level over the period 2013-2019. The reduction accounts for about 19% at its minimum in the 5-year period 2045-2049 and 14% in 2060. In this regard, we should note that the moderate increase in the replacement rate seen in the last years of the forecasting period only partly affects the pensioners in 2060 (and then the benefit ratio, since most of them will have retired somewhat earlier. Such an effect is emphasized by the interaction with the baby boom generations.

### 3.4.2 Average replacement rates

As noted above, the reduction in the benefit ratio is mainly due to normative reasons. Besides the fact that pensions are only price indexed, an important role is played by the gradual shift from the DB regime to the NDC, which is enforced by the periodic revision of transformation coefficients in accordance with mortality assumptions.

In this regard, Table 9 shows the evolution of the ratio between the average amount of new pensions (old age and early retirement), and the gross average wage at retirement. This indicator remains substantially stable for the first decade, because of the endurance of DB calculation rules as well as higher contribution records brought about by the tightening of the eligibility requirements. All this is accompanied by low dynamics of productivity, which average around an annual growth rate of 0.2%, in real terms, over the period 2014-2023.

With the gradual consolidation of the NDC calculation method, flanked by a recovery in productivity growth, the ratio starts to decline, settling on about 52% towards the end of

the forecasting period. It is interesting to note that, during the transitional phase, the indexation to prices reduces the gap between the older pensions, calculated with the more generous DB rules, and the new ones (Table A2.1).

Table 9 also reports the replacement rate at retirement net of supplementary pensions, which approximates the replacement of new pensioners. Such an indicator is obviously more meaningful for cross country comparison, given that the ratio between pensions and pensioners may vary considerably among member states[16]. As expected, the replacement rate referring to new pensioners is about 2.5 pp higher than that referring to new pensions.

The replacement rate calculated in terms of average final wages does not allow to assess the relative size of new pensions in terms of average labour compensation. In this regard, table 9 also reports the replacement rate expressed in terms of the average economy wage. Compared to replacement rate based on final wages, it settles at 10 pp above.

While it is useful to measure the impact of changes in calculation rules, gross replacement rates are insufficient to assess whether the pension system can guarantee an adequate income to the elderly after retirement. In this regard, the analysis should be complemented with further information concerning the distributive effect of the pension rules, the presence of a safety net, the disposable income of the pensioner before and after retirement, and additional income sources provided by the private, funded pillar (Annex 2)[17].

### 3.4.3 Old age and economic dependency ratio

Figures 4.d-4.f provide a better understanding of the evolution of pensions to employees ratio, which is projected to grow significantly less than the elderly dependency ratio. Apart from the increase in the employment rate (Figure 4.e), the lower dynamics depend mainly on the reduced incidence of pensions to the population 70+ (Figure 4.d). The latter is largely due to the evolution of survivors' pensions paid to the over 70 and the earnings-related pensions paid to the under 70.

As for the former, it should be noted that the evolution of survivors' pensions is more or less independent of changes in life expectancy, which, on the contrary, significantly affect the number of the elderly. In fact, higher life expectancy does not, for the widow or widower, increase the average period of outliving their spouse.

As for the latter, the reduction of pensions to people under 70, in terms of the elderly, only partly depends on the increase in the eligibility requirements. The remaining

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[16] Supplementary pensions are old age pensions based on contribution records not utilised for the calculation of the main pension. Therefore, they are generally very small. Without them, the number of new pensions coincides with the number of new pensioners and, consequently, the average amount of pension increases, as well as the average number of contribution years.

[17] In this regard, Annex 2 provides a micro-level analysis of gross and net theoretical replacement rates, i.e. the ratio between the initial, annual pension and the last annual wage, for different career typologies.

part is due to a purely demographic factor. In fact, the incidence of population in the age bracket 50-69 (where the major part of pensions under 70 is located) on that of 70+ is projected to fall relevantly. Therefore, the number of pensions under 70 would be projected in reduction even if the take-up ratio were constant.

### 3.4.4 Pensioners and elderly population

Tables 11.b and 12.b report in total and for women, the incidence of pensioners in terms of population. In all age brackets characterised by an increase in the eligibility requirements, we can observe a reduction in the incidence of pensioners. Differently, such a reduction is very limited in the age bracket 70-74 and 75+. This is because the latter is not affected by the increase in the eligibility requirements, and with the former only marginally, towards the end of the forecasting period.

However, the slight decrease is mainly explained by the presence of non-resident pensioners. In fact, the definition of population underlying the demographic projections refers to resident people, while pensions are also paid to the non-resident. As can be seen at the bottom of the table, taking out non-resident pensioners at the beginning of the forecasting period leads to such a reduction disappearing. This means that the number of 70+ pensioners is projected to evolve fully in line with the population in the same age bracket, thus confirming the demographic consistency of pension projection.

Furthermore, it should be considered that immigrants over 60 are likely to bring with them pension rights matured in their own countries or, alternatively, they are not able to mature pension rights in the host country. Analogously, elderly people leaving the country are likely to take their pension entitlements away with them. If the two group numbers were the same there would be a sort of compensation: non-resident pensioners would be counterbalanced by the resident without pension rights due to their entering the country at an advanced age. In the case of Italy, the latter tend to exceed the former during the forecasting period, according to the assumptions on net migration flows[18]. If we took out the quota of the elderly deriving from net migration flows above 60, which accounts for about 1 pp in the second half of the forecasting period, the incidence of pensioners to population would be correspondingly higher.

The same conclusions may be drawn from the analysis of the incidence of pensioners in terms of inactive population, reported in table 11.a and 12.a.

### 3.4.5 Old age and system dependency ratios

The Old age Dependency Ratio (ODR) expresses a demographic concept of dependency which is based on the population age structure (§. 2.1). In fact, it compares the elderly above a given age threshold (generally 65), supposed economically dependent, with the working age population (generally 20-64), supposed economically active. However such a decomposition does not correspond to an economic concept of dependency. In fact, an elderly person might be still active, contributing to the pension

[18] At the beginning of the forecasting period, however, non-resident pensioners do not have any appraisable compensation, as Italy has only recently moved from being a net sending country to being a net receiving one.

system, while an adult might be inactive, receiving pension benefits. On top of that, the age thresholds dividing dependent people (elderly and young) from the working age population are not clearly defined and vary over time in relation to possible changes in behaviours and the legislative frameworks regulating pension and educational systems.

Diversely, such aspects are reflected in the economic dependency ratio, defined as the ratio between pensioners and employees, regardless of age. This indicator is referred to as "Pension System Dependency Ratio (SDR)" in table 10, emphasising the contribution brought about by changes in the legal framework of the pension system.

The ratio between the SDR and ODR provides a measure of what can be roughly labelled as "System Efficiency", being aware that many factors may affect it other than the pension system regulation. As shown in table 10, such an indicator undergoes a large reduction over the forecasting period, from 2.1to 1.3 signalling the effectiveness of the pension reform process described in chapter 1.

## 3.5 New public pension expenditure

Tables 13.a-13.c illustrate, in total and for both genders, the projected new pension expenditure and its decomposition in terms of new pensions and their average amount. In turn, the latter have been broken down into three factors: the average contribution period, the average pensionable earnings, and the average accrual rate.

The evolution of the number of new pensions shows the impact of the transition of the baby boom generations. From a level of about 400,000 over the first decade of the forecasting period, the number of new pensions increases to a level of about 700,000 in the middle of the forecasting period, despite the increase in the eligibility requirements, and declines afterwards by about 100,000 units. Gender composition shows that new male pensions account for about 55-60% of the total.

The average accrual rate is a weighted average of the accrual rate explicitly foreseen in the DB calculation method (2%) and that implicit in the NDC (contribution rate times transformation coefficients). The former is constant, while the latter changes according to the level of the contribution rate, the age of retirement and the periodic revision of transformation coefficients. The average accrual rate passes from 1.95%, characterized by the prevalence of pensions calculated on the basis of the DB method, to 1.73% around 2030, when the NDC method is largely predominant, and then to 1.71% at the end of the forecasting period. The latter may be obtained by simply multiplying the average contribution rate (about 31%) by the transformation coefficient corresponding to the average retirement age, about 5.4% (Figure 6). Gender analysis highlights that the average accrual rate of females is a little higher than that of males by about 0.1. This signals that women will retire somewhat later than men under the NDC regime because of their lower income. It also depends on the increased transformation coefficients acknowledged to women in relation to the number of children (§. 1.2.1).

Figure 6 illustrates how and to what extent the indexation of the eligibility requirement to changes in life expectancy is able to compensate for the downward effects due to the revision of the transformation coefficients.

The average contribution period per pension increases by more than 4 years reaching in 2060 a level of 37.3 (figure 7). Such an increase accounts for about three-quarters of the corresponding increase in the average retirement age. The difference is mainly explained by the postponement of the entry age in the labour market observed for younger generations. Though the final value shows no visible gender differentiation, in the central part of the forecasting period the average contribution period of men exceeds that of women by a couple of years.

The overall increase in the average contribution period is basically concentrated in the early and late part of the forecasting period. The initial increase is due to the elevation of the retirement age, also driven by the alignment process of the SRA foreseen for women in the private sector, which applies to cohorts of retirees who entered the labour market early.

Instead, in the central part of the forecasting period, the average contribution period stays almost stable, despite the indexation of the eligibility requirements. This outcome has basically two explanations. Firstly, the cohorts retiring in this period started contributing to the pension system somewhat later compared to their predecessors, as results from the database of the insured. Since the average entry age of women is significantly higher than that of men, this also explains the gender difference in the contribution periods. Secondly, the early retirement channel only foreseen under the NDC regime becomes gradually effective around 2030-2035 and thus contributes to slowing down the increase in the average retirement age.

However, in the last 10-15 years of the forecasting period, the average contribution period grows again in line with the average retirement age, since both the above-mentioned factors cease to operate. In fact, the entry age of generations retiring in this period stabilizes as well as the percentage of those retiring earlier than the SRA. The phased-in process of early retirement under the NDC regime also explains the gradual disappearance of gender differences. In fact, men are most likely to fulfil the prerequisite of a minimum amount of pension, because of their higher wages and early starting careers[19].

The average contribution period per pensioner follows the same path as that referred to pensions, though it is a couple of years higher, since supplementary, additional pensions are generally of a very small amount. Figure 7compares the projected evolution of such a variable with that of the average contribution period per pension.

The average pensionable earnings are actually a weighted average between the explicit reference wage under the DB method and an implicit reference wage under the NDC one[20]. As expected, average pensionable earnings, if deflated with productivity growth, decline in the long run according to the gradual shift towards the NDC calculation rules. In

[19] Furthermore, the retirement at the SRA also requires a minimum pension of 1.5 the old age allowance, which is not always reached, especially for women.

[20] With regard to the former, the number of last annual wages involved in the calculation of the reference wage mainly depends on sector, contribution period and retirement age. As for the latter, the implicit reference wage is defined as an average of lifelong wages indexed with GDP growth.

terms of the average gross wage (national accounts figures), it passes from 110% of the first decade to around 100% of the last one.

## 3.6 Pension contributions and contributors

The number of contributors grows substantially in line with employment over the whole forecasting period, allowing for minor adjustments by sector (Table 14)[21]. Since the cohort dynamics of the average labour income subject to contribution (contribution base divided by the number of contributors) are made to be consistent with productivity assumptions, the overall contribution base evolves in line with GDP growth. Therefore, pension contributions as a share of GDP remain basically constant over time, after a slight increase due to the gradual elevation of the contribution rates foreseen for the self-employed and atypical workers by 2018. Starting from the level of 10.5% in 2013, contributions to GDP ratio settles on 10.6% in 2020 and maintains this level up to 2060 (Table 6).

## 3.7 Sensitivity analysis

Table 15 reports the deviations in pension expenditure to GDP brought about by the sensitivity tests agreed in the AWG. Figure A4.1, in Annex 4, also compares the deviations in public debt as a share of GDP in 2040 and at the end of the forecasting period.

Since the current legislation already foresees a linkage between the eligibility requirements and changes in life expectancy (paragraph 1.2.2), the sensitivity test on "policy scenario" is of no relevance in this context.

**Life expectancy**. Because of a 2-year increase in life expectancy, the elderly dependency ratio (people of 65+ to working-age population 20-64) settles at an increasingly higher level than that in the baseline. At the end of the forecasting period, the elderly dependency ratio is about 4 percentage points higher (61.9% vs 58%). In fact, while the denominator (working-age population) tends to remain almost unchanged, the numerator strongly reflects differences in life expectancies. However, the increasing deviation in the elderly dependency ratio is counterbalanced by the containing effects exerted on the number of pensioners, through the indexation of the eligibility requirements, and on the average amount of pension by the revision of transformation coefficients. The corrective effects exerted by the automatic adjustment to changes in life expectancy overcome those brought about by demographic changes, until 2042. Thereafter, the ratio of pension

[21] The probability of exiting from the labour market, as estimated by the Commission, does not guarantee in itself consistency with the probability of retiring that is endogenously calculated by the pension model on the basis of the fulfilment of contribution and age requirements. However, through a bilateral consultation, a satisfactory approximation of the exit probability was achieved in the mid-long run, allowing for some differences in terms of distribution by age, gender and time profile. Therefore, the number of contributors has been slightly adjusted, in the short term, according to the temporary deviation registered between the number of employees consistent with the probability of exiting endogenously calculated by the pension model and those calculated by the Commission on the basis of exogenous assumptions.

expenditure to GDP tends to increase a little more rapidly than that under the baseline assumptions until it settles 0.4 percentage points above, at the end of the forecasting period.

In order to explain the size and the time profile of deviations from the baseline, it is useful to recall that an increase in life expectancy, and then in the retirement age, produces a reduction in the number of new pensioners. Correspondently, the same change in life expectancy implies lower mortality rates for all ages (especially the highest), which gradually raise the number of total pensioners. The latter gradually compensate for the financial effect caused by the reduction of new pensioners. As expected, the transition of the baby boom generations emphasises the saving effects in the central part of the forecasting period, as they retire, and the compensating effects in the last part, as they get older[22].

**Productivity**. Symmetrical changes in productivity growth produce almost symmetrical deviations from the baseline projection. The dynamics of GDP results in an upward/downward shift of exactly the same size as that of productivity, since no change in employment has been envisaged. Consequently, the ratio of pension expenditure to GDP is lower/higher than that in the baseline. Assuming a change in productivity growth by 0.25 pp, the deviation gradually increases till about 2048, where it accounts for more than 0.5 percentage points. Afterwards the gap remains almost unchanged, shrinking slightly towards the end of the forecasting period[23].

As expected, projected differences in the ratio of pension expenditure to GDP are explained by the diverse evolution of the benefit ratios. Differently, the ratio of pensions to employees and its decomposition are going to change imperceptibly. The latter depends on the NDC method, which also requires a minimum amount of pension to access early and old age retirement. Finally, it is interesting to point out that symmetrical changes in productivity growth produce almost symmetrical deviations from the baseline projection.

**Employment rate**. An increase of 2 pp in the employment rate immediately translates into a corresponding increase of GDP. This causes the ratio of pension expenditure to GDP to settle below the baseline for the first forty years. In fact higher employment levels result in a corresponding higher number of pensions only after a long period. However, towards the end of the forecasting period, the ratio of pension expenditure to GDP tends to overlap the baseline projection. This is partly due to replacement rates under the NDC regime, which are increasingly higher than those in the baseline, due to higher GDP growth rates utilised for capitalising accrued contributions.

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[22] The positive deviation in the last part of the forecasting period is also explained by the specification of the sensitivity test assumptions provided by the Commission which do not envisage any change in employment compared to the baseline, despite an increase in the average retirement age consequent to changes in life expectancy.

[23] When pensions are indexed only to prices, as in the case of Italy, an increase (decrease) in the growth rate of productivity will result in an increase (decrease) in the growth rate of GDP of the same size. Diversely, pension expenditure is only marginally affected at the beginning. In fact, productivity growth only impacts on new pensions, which are related to earnings. Generally, it takes two to three decades until the structural change in the growth rate of productivity is entirely transferred to pension expenditure evolution.

**Older workers' participation rate.** Current pension legislation already foresees a tightening of the eligibility requirements over the same period chosen in the sensitivity test for increasing older workers' participation rates. In this regard, prolonging working lives, further than that already assumed in the baseline scenario, has been achieved through two interventions: zeroing the probabilities of early retirement and increasing the propensity of working after the SRA. The pension model calculates the corresponding lower number of pensioners[24] and the subsequent increase in the average amount of pension due to higher contributions accrued.

Ex-post, the increase in the employment rates of older workers brought about by changes in retirement assumptions has turned out substantially in line with that provided for, though some differences remain in terms of age and time profiles.

The reduction in pension expenditure to GDP ratio reaches its maximum value of 1.8 percentage points in 2025. Such an outcome mainly reflects changes in employment (and GDP growth) and in the number of pensions during the first decades of the forecasting period. Moving towards 2060, these effects tend to be counterbalanced by an increase in the average pension due to longer working careers and, under the NDC system, higher transformation coefficients and contribution capitalization. In the last decade of the forecasting period, the latter effect tends to equalise, in terms of financial effects, the reduction in the ratio of pensioners to employees.

**Lower net migration.** This sensitivity test implies an increase in pension expenditure to GDP ratio. It reaches a peak of 16.3% in 2040 whilst settling at 14.2% at the end of the forecasting period. Compared to the baseline scenario, the maximum difference of 0.5 percentage points is reached around 2050. Afterwards, it tends to shrink towards 2060, where it accounts for 0.4 percentage points. Such a result is explained by lower GDP growth rates, due to reduced numbers of employees. In particular, the further increase in the elderly dependency ratio is translated into the ratio of pensions to employees. The difference tends to stabilise as soon as the lower number of immigrants is transformed into a lower number of elderly people and, consequently, a lower number of pensioners. A further containing effect on pension expenditure is exerted by the average amount of pension which is reduced because of lower replacement rates. The latter come about from the less favourable capitalization of contributions, which is linked to GDP growth, under the NDC regime.

**Risk scenario.** Such a scenario differs from the baseline only for the convergence level of TFP growth which settles on 0.2 pp lower. According to the capital formation rule agreed in the AWG, this implies a reduction in productivity growth of 0.3 pp. Therefore the results are substantially in line with those obtained with the sensitivity test on lower productivity growth.

[24] Changes in the number of pensioners is somewhat higher than changes in employment and contributors because of the presence of workers who keep on working after retirement.

## 3.8 Comparison with the previous AWG baseline projections

Table 17 compares pension results in the 2015-round of projections and those of the previous round, where differences of pension expenditure to GDP ratio are decomposed according to the main driving factors. An in depth explanation of pension projections carried out in the previous rounds, as well as changes between subsequent updates, is reported in the related fiches on Italian pension projections[25].

Differences between 2012 and 2015-AWG pension projections are mainly explained by changes in the base year level of GDP and the revision of scenario assumptions, since the legislative framework has remained substantially unchanged (see §. 1.4). In this regard three aspects deserve to be pointed out (Figures 8 and 9).

**GDP revision based on ESA 2010.** New ESA 2010 NA figures have been used. Compared to ESA 1995, the new accounting methodology has brought marginal changes to the aggregate of pension expenditure, while GDP time series has been revised upwards significantly. In 2010, GDP level resulted 3.5% higher, thus reducing pension expenditure to GDP ratio by 0.5 pp. GDP scenario assumptions have been rescaled accordingly.

**Three-year period 2011-2013.** In the three-year period between the base year of the previous round of projection and that of the current one, pension expenditure to GDP ratio has increased by 1.2 pp. Since the final level of pension expenditure in 2013 is substantially equivalent to that forecast in the 2012-round, such an increase depends entirely on GDP growth. In fact, the overall increase in GDP over the three year period has turned out to be about 8% (7% in real terms) lower than that forecast in the previous round of projections[26].

**Changes in scenario assumptions.** Once rescaled for the difference in the starting level, the projected differences in the dynamics of pension expenditure to GDP ratio are substantially explained by the revision of scenario assumptions, especially concerning TFP. In fact, the current scenario is characterised by lower TFP growth rates over the first two decades of the forecasting period and higher thereafter. The former mainly depends on the postponement of the end year of the convergence phase from 2025 to 2035; the latter is brought by additional TFP growth rates acknowledged to catching-up countries, which did not apply to Italy in the previous projection round[27].

Changes in the time profile of TFP growth translate, correspondently, into productivity and GDP dynamics. This implies a progressive increase in the difference of pension expenditure to GDP ratio between the current baseline projection and that of 2012, from

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[25] In particular, for the projection rounds 2001, 2006 and 2009, see Italy's fiche published in the third volume of the 2009-ageing report. Economic Policy Committee – European Commission (AWG), *Pension schemes and pension projections in the EU-27 Member States 2008-2060*, pages 192-195, Occasional Papers 56/October 2009.

[26] Applying such percentage to the ratio between pension expenditure and GDP in the base year, it actually gives 1.2 pp.

[27] In fact, in the 2012-round of projections, Italy scored more or less in line with the average EU GDP per capita.

2020 to 2030. Then, the differences tend to shrink and nullify around 2040-2045. In the last 15 years of the forecasting period, the updated curve settles about 0.3 pp below that of the previous round.

The lower dynamics of pension expenditure to GDP ratio projected from 2030 is explained by the following three factors: higher productivity growth (as already pointed out), lower average pension consequent to the less favourable dynamics of productivity in the previous period and a reduction of elderly population, as a result of the updated demographic projection (§.2.1).

# Chapter 4 - The projection model

## 4.1 Updating and institutional utilization

The 2015 AWG projections of the Italian pension system have been made with the model of the Department of General Accounts (Dipartimento della Ragioneria Generale dello Stato – RGS), which covers the whole public pension expenditure, according to the definition given in paragraph 3.1.

The RGS pension model has been regularly updated since 1999 (yearly up to 2011 and twice a year thereafter). Updating procedures have always involved the setting of data and parameters for the base year, while demographic and macroeconomic assumptions have been revised depending on the availability of new estimates and information. Methodological improvements have also been introduced over time. Any changes to the projection model and scenario assumptions are illustrated and commented on in the RGS annual reports which focus on the mid-long term prospects of public expenditure for pensions, health and long term care.

Since 2002, a standardised set of tables has also been included which report analytical results of projections in order to improve comparability through time and between different scenario assumptions. The latest report refers to 2014-update and incorporates the financial effects of legislative changes passed up to March 2014[28]. The next update of projections is foreseen for November 2014[29].

Projections of the Italian pension system, based on AWG scenario assumptions, are regularly presented as part of Italy's Stability Programmes, in the section devoted to the analysis of the mid-long term sustainability of public finances. Projections based on national scenarios are also reported in the Public Finance Documents[30].

The RGS pension model has been constantly utilised to assess the financial effects of pension reform proposals and those actually passed. It has also been used at national and international levels within research programmes on the financial implications of ageing

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[28] Ministero dell'Economia e delle Finanze-RGS (2014), *Le tendenze di medio-lungo periodo del sistema pensionistico e socio-sanitario* (Mid-long term trends for the pension, health and long term care systems), Report no. 15, http://www.rgs.mef.gov.it/VERSIONE-I/Attivit--i/Spesa-soci/Attivita_di_previsione_RGS/2014/. The full version of the report is in Italian. However, a comprehensive summary and the tables with the analytical results are also available in English.

[29] Ministero dell'Economia e delle Finanze-RGS (2014), *Le tendenze di medio-lungo periodo del sistema pensionistico e socio-sanitario*, Nota di Aggiornamento del Rapporto n. 15, http://www.rgs.mef.gov.it/VERSIONE-I/Attivit--i/Spesa-soci/Attivita_di_previsione_RGS/2014/.

[30] Such documents are prepared each year by the Ministry of Economy and Finance and presented to Parliament by the Government.

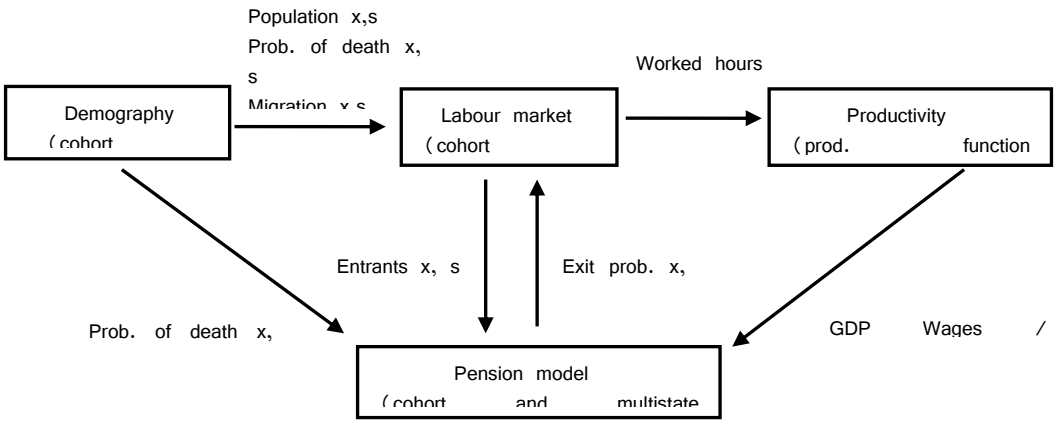
and pension reforms, as well as within institutional cooperation with the OECD and the IMF.

Compared to the previous 2012-AWG projections, the database of the insured covering private and public sector employees, and the self-employed, has been updated to 2012. The legal framework is in line with the legislation in force at the end of September 2014 (§. 1.4).

## 4.2 Methodology

The RGS pension model reproduces accurately the main features of the legal-institutional framework, which has been extremely important in Italy in consideration of the several pension reforms enacted during the last two decade. At the same time, the model is provided with methodological solutions assuring consistency with demographic and macroeconomic scenario assumptions.

The pension model is composed of four modules: demography, labour market, productivity and pension. The pension module is strictly interrelated with the others as in the outline reported below:




**The demographic module** adopts the traditional cohort component approach according to which the number of people, by age and sex, is projected on the basis of probabilities of death, total fertility rates, and net migration flows. The latter, in turn, is obtained as a difference between emigrants (based on the probabilities of emigrating) and immigrants[31].

**The labour market module** is mainly based on a projection of the labour force, by age, sex and level of education, to which unemployment rates are applied. The labour force projection combines the dimensional effect of working age population and the cohort evolution of participation rates. The latter is obtained extrapolating the cohort trend in the propensity to enter the labour market on a permanent basis, estimated on labour force database. The extrapolation of past trends is adjusted to take account of further effects

[31] The national baseline scenario adopts the demographic projections elaborated by Istat.

brought about by: i) the evolution of enrolment rates and related changes in educational achievements, and ii) the fulfilment of eligibility requirements for pension entitlement, which depends on pension legislation and worker distribution by age and contribution years.

Unemployment rates, distributed by age and sex, are assumed to change through time, converging on an average target value also taking into account the evolution of the working age population. The total hours worked are calculated on the basis of the incidence of part-time and full-time workers, and the corresponding average hours worked.

**The productivity module** bases its projection on a sum of two components: i) an exogenous assumption on the growth rate of total productivity factors, which is kept constant at its long term level after an initial adjustment, and ii) the additional contribution due to changes in the ratio of capital stock to employment (capital deepening). To this end, a Cobb Douglas production function is utilised.

**The pension module** adopts a multistate approach involving a large number of 'discriminating' variables, i.e. variables which are relevant for the pension rules to be applied. Such variables are divided into two groups: state and monetary variables.

The first group contains variables that identify distinct positions within the system, as reported in the table below.

| State variables | Specifications |
|---|---|
| Fund (or group of workers) | 13 in the private sector and 5 in public sector |
| Sex | Male, female |
| Age | [15-74] |
| Typology of contributor | Contributor, dormant, pensioner-contributor |
| Contribution years | [0-49] before retirement; [1-20] after retirement |
| Regime | Earnings-related, contribution-based, mixed |
| Typology of pension | Disability (2 types), old age, early retirement |

At any time, it is possible to identify members of the pension system in terms of their belonging to one of the possible combinations of the state variable specifications. The forecast of members is worked out according to the following general equation:

$$\underbrace{\boldsymbol{a}_{t,s,x,f}}_{members} = \underbrace{\boldsymbol{a}_{t-1,s,x-1,f}}_{members} \underbrace{\varphi_{t-1,s,x-1,f}}_{\substack{probability \\ of\ surviving}} \times \underbrace{\boldsymbol{T}_{t-1,s,x-1,f}}_{\substack{transition \\ matrix}} + \underbrace{\boldsymbol{e}_{t,s,x,f}}_{entrants} \qquad \forall s, f, 15 \le x \le \omega$$

where, for each sex $s$, age $x$, and fund (or specific group of workers) $f$, $\boldsymbol{a}$ indicates the row vector of the insured distributed by different states at the end of the year $t$, $\varphi$ is the probability of surviving, $\boldsymbol{e}$ indicates the row vector of entrants to the pension system in the year $t$, and $\boldsymbol{T}$ is a matrix of transition probabilities that serves to calculate changes in the states of members already insured at the end of the year $t-1$ and still alive at the end of the year $t$. The general element $t_{i,j}$ of the transition matrix expresses the probability that a member belonging to state $i$ at the end of the year $t-1$ will transit to state $j$ at the end of the year $t$.

New entrants, i.e. those insured for the first time in the pension system, are set equal to the cohort increase of employment, suitably transformed into new contributors. The number of entrants by age and sex are attributed to each fund, or other appropriate aggregations of workers, on the basis of specific distributions of probability.

Mean values of monetary variables, such as wages/earnings, pension etc., are associated with each of the possible combinations of the state variable specifications and supplemented with indexes of variability (the variation coefficient) and distribution functions[32].

The number of survivors' pensions is determined by adding the new pensions to those of the previous year still being paid out. The new pensions are calculated by applying the probabilities of death and leaving a surviving spouse (or dependent children) to pensioners or contributors who have matured the requirements foreseen. Lastly, a permutation matrix is applied to attribute an age to the surviving spouse on the basis of the age of the deceased.

## 4.3 Internal consistency of the model

The consistency of the model with the legal-institutional framework is achieved by grouping the insured according to the state variables which have been devised to provide, dynamically, all information relevant to calculate the number of pensions and their amounts. Furthermore, the model is able to take on board data concerning workers already insured in the system at the beginning of the forecasting period, including dormant members who are no longer contributing but would later be able to claim a pension, on the basis of past contribution records.

The consistency of the pension module with the demographic and occupational ones is favoured by the cohort approach which is coherently applied to all of them. The most relevant mechanisms through which such consistency is sought may be summarized as follows:

- with regard to mortality, coherence is assured by applying the probability of death to all the insured (contributors, pensioners, etc.), those already in the system at the beginning of the forecasting period, and those entering afterwards;
- as for net migration flows and employment rates below 42, consistency is guaranteed through the calculation of workers joining the pension system as new contributors, which depends on the cohort profile of participation and unemployment rates, besides the dimension of demographic cohorts;
- consistency with employment in the age classes above 42 is also assured. In fact, the probabilities of exiting from the labour market are endogenously calculated by the pension module according to current legislation and retirement behaviour;

[32] In particular, such an approach makes it possible to give adequate treatment to the topping up mechanism for the minimum pension under the DB and mixed regimes, the indexation of pensions by size bracket, and the eligibility requirement for retirement under the NDC regime.

- net migration flows from 42 to 60 are also transformed into new contributors according to the employment rates forecast in the corresponding age classes. Immigrants above 60 are considered neither contributors nor pensioners entitled to an earnings-related pension;
- wages (or labour income in the case of the self-employed) are projected to increase over time by cohort, applying the dynamics of productivity and a further increase due to career progressions[33]. In this regard, consistency with macroeconomic assumptions is assured by targeting the career progressions to guarantee constancy through time of the ratio between the average contribution base of all workers (gross wages for the employees and gross labour income for the self-employed) and productivity.

[33] The dynamic of wages is projected by cohort, consistently with the cohort evolution of labour force and contributors. In a very stylised way, for the various segments of the pension system (scheme, regime, category of workers etc.), the following algorithm is utilised:

$$w_{t,a,x} = w_{t-1,a-1,x-1}\left(1+\sigma_t+\pi_t\right)\left(1+\gamma_a\right)\left(1+\varepsilon_t\right)$$

where: $t$ = year; $a$ = contribution years; $x$ = age; $\sigma$ = inflation rate; $\pi$ = productivity growth rate; $\gamma$ = additional wage growth rate due to career progression, which is applied as long as a further year of contribution is matured, $\varepsilon$ stands for the percentage of change necessary to guarantee that the average wage grows in line with productivity.

**Table 1 - Statutory retirement age (SRA) and early retirement**

| Years of contributions | | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|---|
| Men | SRA with 20 years of contributions [1] | | | | | | |
| | - All sectors (DB, mixed and NDC regimes) | *66y + 3m* | *66y+9m* | *67y+7m* | *68y+5m* | *69y+3m* | *70y* |
| | Early retirement [1] | | | | | | |
| | - Minimum contribution requirement regardless of age (DB, mixed and NDC regimes) | *42y+5m* | *43y* | *43y+10m* | *44y+8m* | *45y+6m* | *46y+3m* |
| | - Minimum retirement age with 20 years of contribution and a minimum amount of pension [3] (NDC alone) | - | - | *64y+7m* | *65y+5m* | *66y+3m* | *67y* |
| | Penalty in case of earliest retirement age [4] | Penalty implied by the actuarial equivalence under NDC calculation method. | | | | | |
| Women | SRA with 20 years of contributions [1] | | | | | | |
| | - Private sector [2] (DB, mixed and NDC regimes) | *62y+3m* | *66y+9m* | *67y+7m* | *68y+5m* | *69y+3m* | *70y* |
| | - Public sector (DB, mixed and NDC regimes) | *66y + 3m* | *66y+9m* | *67y+7m* | *68y+5m* | *69y+3m* | *70y* |
| | Early retirement [1] | | | | | | |
| | - Minimum contribution requirement regardless of age (DB, mixed and NDC regimes) | *41y+5m* | *42y* | *42y+10m* | *43y+8m* | *44y+6m* | *45y+3m* |
| | - Minimum retirement age with 20 years of contribution and a minimum amount of pension [3] (NDC alone) | - | - | *64y+7m* | *65y+5m* | *66y+3m* | *67y* |
| | Penalty in case of earliest retirement age [4] | Penalty implied by the actuarial equivalence under NDC calculation method. | | | | | |

(1) Indexation of age requirements is foreseen every three years from 2013 to 2019 and every two years from 2021. Changes in life expectancy are consistent with mortality assumptions underlying 2013-Europop baseline demographic projection. The 2013-indexation of the eligibility requirements was adopted by a directorial decree of the Ministry of Economy and Finance of December 14, 2011.
(2) SRA of women in the private sector equalizes that of men (and women in the public sector) starting from 2018. In 2015, the SRA of the female self-employed is 1 year higher.
(3) The minimum amount of pension is 1,200 euro per month (which corresponds to 2.8 times the old age allowance, in 2012) indexed with the five-year average of nominal GDP. This early-retirement channel is actually ineffective until 2025-2030, since the required amount of pension presupposes a substantial contribution period (significantly higher than 20 years) matured under the NDC regime.
(4) In case of early pensions, a penalty is applied to the quota of pension calculated according to DB method, which accounts for 1% at the age of 61, 2% at the age of 60 and then increased by 2 pp each year below 60.

**Table 2 - Main demographic variables evolution**

| Demography | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | Peak year[1] |
|---|---|---|---|---|---|---|---|
| Population ('000) | 60,210 | 62,065 | 64,229 | 66,296 | 67,044 | 66,293 | 2049 |
| Population growth rate | 1.1 | 0.3 | 0.4 | 0.3 | 0.0 | -0.2 | 2014 |
| Old-age dependency ratio (pop65/pop15-64) | 32.8 | 35.1 | 41.3 | 50.2 | 52.9 | 53.0 | 2058 |
| Ageing of the aged (pop80+/pop65+) | 29.8 | 31.8 | 31.9 | 32.2 | 39.9 | 43.8 | 2059 |
| Men - Life expectancy at birth | 79.8 | 80.8 | 82.1 | 83.3 | 84.4 | 85.5 | 2060 |
| Men - Life expectancy at 65 | 18.4 | 19.1 | 20.0 | 21.0 | 21.8 | 22.7 | 2060 |
| Women - Life expectancy at birth | 84.7 | 85.5 | 86.6 | 87.7 | 88.7 | 89.7 | 2060 |
| Women - Life expectancy at 65 | 22.0 | 22.6 | 23.5 | 24.4 | 25.2 | 26.0 | 2060 |
| Men - Survivor rate at 65+ | 88.8 | 89.9 | 91.2 | 92.4 | 93.4 | 94.2 | 2060 |
| Men - Survivor rate at 80+ | 60.8 | 64.0 | 68.3 | 72.1 | 75.6 | 78.6 | 2060 |
| Women - Survivor rate at 65+ | 93.6 | 94.2 | 95.0 | 95.6 | 96.2 | 96.7 | 2060 |
| Women - Survivor rate at 80+ | 76.6 | 78.8 | 81.7 | 84.2 | 86.3 | 88.2 | 2060 |
| Net migration ('000) | 1135.6[2] | 348 | 382 | 336 | 215 | 196 | 2029 |
| Net migration over population change | 1.7 | 1.7 | 1.7 | 1.9 | -11.4 | -1.9 | 2049 |

Source: EUROSTAT and Commission Services.
(1) Excluded the year 2013.
(2) The figure reported for 2013 does not refer to the net flows of immigrants alone, but it also include a revision of the base year population.

**Table 3 - Partecipation 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 | 45,4 | 58,6 | 66,7 | 67,7 | 68,1 | 69,0 | 2060 |
| Employment rate for workers aged 55-64 | 42,8 | 55,8 | 64,1 | 65,4 | 65,8 | 66,7 | 2060 |
| Share of workers aged 55-64 on the total labour force | 94,3 | 95,1 | 96,1 | 96,7 | 96,7 | 96,7 | 2042 |
| Labour force participation rate 65-74 | 6,1 | 9,5 | 18,9 | 20,2 | 21,3 | 25,0 | 2060 |
| Employment rate for workers aged 65-74 | 6,0 | 9,3 | 18,6 | 19,9 | 21,1 | 24,7 | 2060 |
| Share of workers aged 65-74 on the total labour force | 98,0 | 98,1 | 98,4 | 98,7 | 98,6 | 98,7 | 2056 |
| Median age of the labour force | 41,0 | 44,0 | 45,0 | 44,0 | 44,0 | 44,0 | 2023 |

Source: Commission Services.

**Table 4a - Labour market entry age, exit age and expected duration of life spent at retirement - Male**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | Peak year |
|---|---|---|---|---|---|---|---|
| Average effective entry age (CSM) (I) | 26.7 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 2013 |
| Average effective exit age (CSM) (II) | 63.5 | 65.9 | 66.1 | 66.4 | 66.8 | 67.3 | 2060 |
| Average effective working career (CSM) (II)- (I) | 36.8 | 41.9 | 42.1 | 42.4 | 42.8 | 43.3 | 2060 |
| Contributory period | 32.1 | 36.1 | 36.5 | 36.2 | 35.8 | 37.3 | 2060 |
| Contributory period/Average working career | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 2013 |
| Duration of retirement ** | 20.0 | 18.3 | 19.2 | 20.1 | 20.1 | 20.9 | 2014 |
| Duration of retirement/average working career | 54.4 | 43.7 | 45.6 | 47.4 | 47.0 | 48.3 | 2014 |
| Percentage of adult life spent at retirement*** | 30.6 | 27.7 | 28.5 | 29.3 | 29.2 | 29.8 | 2014 |
| Early/late exit**** | 3.4 | 1.9 | 1.9 | 2.2 | 2.3 | 2.9 | 2052 |

Source: Commission Services.

**Table 4b - Labour market entry age, exit age and expected duration of life spent at retirement - Female**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | Peak year |
|---|---|---|---|---|---|---|---|
| Average effective entry age (CSM) (I) | 27.5 | 26.4 | 26.4 | 26.4 | 26.4 | 26.4 | 2013 |
| Average effective exit age (CSM) (II) | 62.6 | 65.5 | 65.4 | 66.4 | 67.1 | 67.5 | 2060 |
| Average effective working career (CSM) (II)- (I) | 35.1 | 39.1 | 39.0 | 40.0 | 40.7 | 41.1 | 2060 |
| Contributory period | 33.9 | 34.6 | 33.9 | 34.3 | 35.0 | 37.4 | 2060 |
| Contributory period/Average working career | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2013 |
| Duration of retirement ** | 23.7 | 22.6 | 23.5 | 23.5 | 23.4 | 23.3 | 2014 |
| Duration of retirement/average working career | 67.5 | 57.8 | 60.2 | 58.8 | 57.5 | 56.7 | 2014 |
| Percentage of adult life spent at retirement*** | 34.7 | 32.2 | 33.1 | 32.7 | 32.3 | 32.0 | 2014 |
| Early/late exit**** | 2.8 | 2.5 | 2.0 | 3.0 | 2.3 | 2.8 | 2018 |

Source: Commission Services.

** 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 5 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)**

| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eurostat pension expenditure[(1)] | [a] | 14.2 | 14.5 | 14.6 | 14.6 | 14.6 | 14.6 | 14.5 | 14.9 | 16.0 | 16.0 | 16.1 |
| - GDP (ESA 2010) revision | [b] | -0.4 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 |
| Public pension expenditure (AWG, NA) | [c] | 13.0 | 13.2 | 13.3 | 13.3 | 13.4 | 13.3 | 13.3 | 13.6 | 14.7 | 14.8 | 14.9 |
| Total difference [a] + [b] - [c] | | 0.8 | 0.9 | 0.9 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.8 | 0.7 | 0.7 |
| - Benefits paid to the disabled and the deaf and dumb below 65 years old, war pensions, work injury annuities and merit awards | | 0.6 | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.5 |
| - Survivors' war pensions and survivors' work injury annuities | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| - Supplementary pensions paid by private pension funds | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

Source: EUROSTAT and Member States.
(1) GDP (ESA95) .

**Table 6 - Projected gross and net pension spending and contributions (% of GDP)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | Peak year |
|---|---|---|---|---|---|---|---|
| **Expenditure** | | | | | | | |
| Gross public pension expenditure | 15.7 | 15.3 | 15.7 | 15.8 | 14.8 | 13.8 | 2036 |
| Net public pension expenditure | 12.9 | 12.5 | 12.8 | 12.9 | 12.1 | 11.3 | 2036 |
| **Contributions** | | | | | | | |
| Public pension contributions | 10.5 | 10.6 | 10.5 | 10.5 | 10.7 | 10.6 | 2051 |

Source: Commission Services.

**Table 7 - Projected gross public pension spending by scheme (% of GDP)**

| Pension scheme | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | Peak year |
|---|---|---|---|---|---|---|---|
| Total public pensions | 15.7 | 15.3 | 15.7 | 15.8 | 14.8 | 13.8 | 2036 |
| *of wich earnings related:* | | | | | | | |
| *- Old age and early pensions* [1] | 12.6 | 12.2 | 12.6 | 12.9 | 12.2 | 11.4 | 2042 |
| *- Disability pensions* | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 2028 |
| *- Survivor's pensions* | 2.5 | 2.5 | 2.4 | 2.2 | 2.0 | 1.8 | 2014 |
| *of wich non-earnings related* [2] *:* | | | | | | | |
| *- minimum pensions and minimum income guarantees* | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 2060 |
| *of wich:* | | | | | | | |
| *- private employees* | 9.1 | 8.6 | 9.0 | 10.0 | 10.4 | 10.1 | 2048 |
| *old age, early and disability pension* | 7.6 | 7.1 | 7.5 | 8.6 | 9.1 | 8.8 | 2048 |
| *other pensions (survivors)* | 1.5 | 1.6 | 1.5 | 1.4 | 1.4 | 1.3 | 2014 |
| *- public employees* | 4.0 | 4.1 | 4.2 | 3.5 | 2.3 | 1.8 | 2027 |
| *old age, early and disability pension* | 3.4 | 3.6 | 3.7 | 3.0 | 2.0 | 1.6 | 2027 |
| *other pensions (survivors)* | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 | 0.2 | 2014 |
| *- self-employed* | 2.3 | 2.3 | 2.3 | 2.0 | 1.7 | 1.5 | 2014 |
| *old age, early and disability pension* | 1.9 | 2.0 | 1.9 | 1.7 | 1.4 | 1.2 | 2014 |
| *other pensions (survivors)* | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 2030 |

Source: Commission Services and Member State.
(1) Includes disability pensions above the SRA.
(2) Old age allowance and additional lump sums.

**Table 8.a - Factors behind the change in public pension expenditures between 2013 and 2060 (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 | -0.4 | 0.4 | 0.1 | -1.0 | -1.0 | -1.9 | -0.03 |
| Dependency ratio effect | 1.2 | 2.7 | 3.3 | 0.9 | 0.1 | 8.0 | 0.17 |
| Coverage ratio effect | -1.5 | -1.6 | -1.2 | -0.4 | -0.5 | -5.2 | -0.12 |
| Benefit ratio effect | 0.9 | 0.5 | -1.4 | -1.5 | -0.5 | -1.9 | -0.04 |
| Labour Market/Labour intensity effect | -0.9 | -0.9 | -0.4 | 0.1 | -0.2 | -2.3 | -0.04 |
| - *Employment ratio effect* | -0.8 | -0.4 | -0.2 | 0.0 | 0.0 | -1.4 | -0.02 |
| - *Labour intensity effect* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.00 |
| - *Career shift effect* | -0.2 | -0.5 | -0.2 | 0.1 | -0.2 | -1.0 | -0.02 |
| Residual[(1)] | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 | -0.5 | 0.00 |

Source: Commission Services.
(1) This residual is made by two components: the residual effect as defined in eq. [1] and the interaction effect.

**Table 8.b - Factors behind the change in public pension expenditures between 2013 and 2060 (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 | -0.4 | 0.4 | 0.1 | -1.0 | -1.0 | -1.9 | -0.03 |
| Dependency ratio effect | 1.2 | 2.7 | 3.3 | 0.9 | 0.1 | 8.0 | 0.17 |
| Coverage ratio effect | -1.7 | -1.4 | -1.0 | -0.4 | -0.5 | -5.0 | -0.11 |
| Benefit ratio effect | 1.2 | 0.3 | -1.6 | -1.5 | -0.5 | -2.1 | -0.04 |
| Labour Market/Labour intensity effect | -0.9 | -0.9 | -0.4 | 0.1 | -0.2 | -2.3 | -0.04 |
| - *Employment ratio effect* | -0.8 | -0.4 | -0.2 | 0.0 | 0.0 | -1.4 | -0.02 |
| - *Labour intensity effect* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.00 |
| - *Career shift effect* | -0.2 | -0.5 | -0.2 | 0.1 | -0.2 | -1.0 | -0.02 |
| Residual[(1)] | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 | -0.5 | 0.00 |

Source: Commission Services.
(1) This residual is made by two components: the residual effect as defined in eq. [1] and the interaction effect.

**Table 9 - Replacement rate at retirement (RR) , benefit ratio (BR) and coverage by pension scheme old-age earnings related (in %)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Average pensions / average wage at retirement (RR) - new pensions | 59.9 | 61.2 | 57.8 | 52.3 | 50.2 | 51.8 |
| *Average pensions / average wage at retirement (RR) - new pensioners* | *66.2* | *66.0* | *60.9* | *55.0* | *52.7* | *54.4* |
| *Average pensions / average-wide economy wage (RR) - new pensions* | *67.4* | *71.6* | *66.8* | *61.8* | *58.8* | *61.5* |
| Average pensions / average wage at retirement (BR) - pensioners | 59.2 | 65.3 | 67.4 | 60.2 | 54.0 | 52.8 |
| Coverage | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Commission Services.

**Table 10 - System Dependency Ratio and Old-age Dependency Ratio**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Number of pensioners (I) ('000) | 15,440 | 15,046 | 16,024 | 17,735 | 18,074 | 17,325 |
| Employment (II) ('000) | 22,024 | 23,746 | 25,122 | 24,889 | 24,510 | 24,491 |
| Pension System Dependency Ratio (SDR) (I)/(II) | 70.1 | 63.4 | 63.8 | 71.3 | 73.7 | 70.7 |
| Number of people aged 65+ (III) ('000) | 12,773 | 13,902 | 16,275 | 19,182 | 20,038 | 19,875 |
| Working age population 15-64 (IV) ('000) | 38,993 | 39,592 | 39,442 | 38,180 | 37,858 | 37,481 |
| Old-age Dependency Ratio (ODR) (III)/(IV) | 32.8 | 35.1 | 41.3 | 50.2 | 52.9 | 53.0 |
| System efficiency (SDR/ODR) | 2.1 | 1.8 | 1.5 | 1.4 | 1.4 | 1.3 |

Source: Commission Services.

**Table 11.a - Pensioners (public schemes) to inactive population ratio by age group (%)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Total | | | | | | |
| - Age group -54 | 2.5 | 2.6 | 2.1 | 1.7 | 1.5 | 1.5 |
| - Age group 55-59 | 37.5 | 27.2 | 28.6 | 24.3 | 21.4 | 19.3 |
| - Age group 60-64 | 74.1 | 53.6 | 52.5 | 41.9 | 32.9 | 29.9 |
| - Age group 65-69 | 99.0 | 88.5 | 88.6 | 82.2 | 72.2 | 58.9 |
| - Age group 70-74 | 100.0 | 98.9 | 96.5 | 97.0 | 93.0 | 93.9 |
| - Age group 75+ | 102.1 | 102.5 | 99.7 | 98.2 | 97.2 | 97.0 |
| - Age group 55-69 | 77.4 | 63.4 | 65.4 | 60.1 | 49.5 | 41.5 |
| - Age group 70+ | 101.4 | 101.3 | 98.7 | 97.8 | 96.2 | 96.3 |
| Without non resident pensioners in 2013 | | | | | | |
| - Age group -54 | 2.4 | 2.5 | 2.1 | 1.7 | 1.5 | 1.5 |
| - Age group 55-59 | 37.0 | 27.0 | 28.5 | 24.2 | 21.4 | 19.3 |
| - Age group 60-64 | 73.4 | 53.3 | 52.4 | 41.9 | 32.9 | 29.9 |
| - Age group 65-69 | 96.8 | 87.9 | 88.5 | 82.1 | 72.2 | 58.9 |
| - Age group 70-74 | 96.0 | 96.3 | 96.1 | 96.8 | 93.0 | 93.9 |
| - Age group 75+ | 97.0 | 97.4 | 97.4 | 97.4 | 96.9 | 96.9 |
| - Age group 55-69 | 76.1 | 63.0 | 65.3 | 60.1 | 49.5 | 41.5 |
| - Age group 70+ | 96.7 | 97.1 | 97.0 | 97.2 | 96.0 | 96.2 |
| - Net elderly immigrants 70+ (1) | 0.0 | 0.4 | 1.0 | 1.1 | 1.0 | 0.8 |

Source: Commission Services.

(1) Cumulated net flows of immigrants above 60 as a share of inactive population 70+.

**Table 11.b - Pensioners (public schemes) to population ratio by age group (%)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Total | | | | | | |
| - Age group -54 | 1.2 | 1.2 | 1.0 | 0.8 | 0.8 | 0.7 |
| - Age group 55-59 | 14.1 | 8.6 | 7.6 | 6.8 | 6.1 | 5.4 |
| - Age group 60-64 | 53.9 | 28.3 | 21.0 | 15.3 | 11.7 | 10.2 |
| - Age group 65-69 | 90.8 | 73.9 | 62.0 | 54.8 | 46.0 | 35.2 |
| - Age group 70-74 | 96.2 | 96.6 | 91.1 | 90.6 | 86.3 | 85.4 |
| - Age group 75+ | 102.1 | 102.5 | 99.7 | 98.2 | 97.2 | 97.0 |
| - Age group 55-69 | 51.1 | 34.0 | 29.3 | 26.9 | 20.9 | 16.8 |
| - Age group 70+ | 100.2 | 100.6 | 97.1 | 95.8 | 94.5 | 94.3 |
| Without non resident pensioners in 2013 | | | | | | |
| - Age group -54 | 1.1 | 1.2 | 1.0 | 0.8 | 0.8 | 0.7 |
| - Age group 55-59 | 13.9 | 8.5 | 7.6 | 6.8 | 6.1 | 5.4 |
| - Age group 60-64 | 53.4 | 28.2 | 21.0 | 15.3 | 11.7 | 10.2 |
| - Age group 65-69 | 88.8 | 73.4 | 62.0 | 54.8 | 46.0 | 35.2 |
| - Age group 70-74 | 92.4 | 94.1 | 90.8 | 90.4 | 86.3 | 85.4 |
| - Age group 75+ | 97.0 | 97.4 | 97.4 | 97.4 | 96.9 | 96.9 |
| - Age group 55-69 | 50.3 | 33.8 | 29.3 | 26.9 | 20.9 | 16.8 |
| - Age group 70+ | 95.5 | 96.3 | 95.4 | 95.2 | 94.3 | 94.2 |
| - Net elderly immigrants 70+ (1) | 0.0 | 0.5 | 1.1 | 1.2 | 1.0 | 0.8 |

Source: Commission Services.

(1) Cumulated net flows of immigrants above 60 as a share of population 70+.

**Table 12.a - Female pensioners (public schemes) to inactive population ratio by age group (%)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Total | | | | | | |
| - Age group -54 | 2.6 | 2.8 | 2.3 | 1.7 | 1.5 | 1.4 |
| - Age group 55-59 | 24.2 | 20.3 | 22.9 | 22.2 | 18.7 | 16.0 |
| - Age group 60-64 | 60.8 | 37.1 | 35.9 | 31.7 | 26.3 | 23.6 |
| - Age group 65-69 | 88.2 | 75.5 | 69.5 | 65.6 | 58.2 | 45.5 |
| - Age group 70-74 | 90.5 | 90.8 | 87.8 | 89.2 | 87.4 | 87.4 |
| - Age group 75+ | 98.5 | 98.9 | 97.4 | 95.9 | 95.2 | 95.9 |
| - Age group 55-69 | 63.0 | 48.8 | 48.4 | 47.3 | 39.4 | 31.7 |
| - Age group 70+ | 96.2 | 96.5 | 94.8 | 94.1 | 93.5 | 94.2 |
| Without non resident pensioners in 2013 | | | | | | |
| - Age group -54 | 2.6 | 2.7 | 2.3 | 1.7 | 1.5 | 1.4 |
| - Age group 55-59 | 23.7 | 20.1 | 22.8 | 22.1 | 18.7 | 16.0 |
| - Age group 60-64 | 60.1 | 36.8 | 35.8 | 31.7 | 26.3 | 23.5 |
| - Age group 65-69 | 86.4 | 75.1 | 69.4 | 65.5 | 58.2 | 45.5 |
| - Age group 70-74 | 88.4 | 89.6 | 87.7 | 89.1 | 87.3 | 87.4 |
| - Age group 75+ | 94.7 | 96.1 | 96.2 | 95.6 | 95.1 | 95.8 |
| - Age group 55-69 | 62.0 | 48.5 | 48.3 | 47.3 | 39.4 | 31.7 |
| - Age group 70+ | 92.8 | 94.2 | 93.8 | 93.8 | 93.4 | 94.2 |
| - Net elderly immigrants 70+ (1) | 0.0 | 0.4 | 1.0 | 1.1 | 1.0 | 0.8 |

Source: Commission Services.

(1) Cumulated net flows of immigrants above 60 as a share of inactive population 70+.

**Table 12.b - Female pensioners (public schemes) to population ratio by age group (%)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Total | | | | | | |
| - Age group -54 | 1.4 | 1.5 | 1.3 | 1.0 | 0.8 | 0.8 |
| - Age group 55-59 | 12.1 | 8.6 | 8.1 | 7.5 | 6.5 | 5.5 |
| - Age group 60-64 | 49.5 | 22.7 | 18.3 | 13.9 | 11.0 | 9.4 |
| - Age group 65-69 | 84.6 | 66.6 | 54.1 | 47.7 | 39.4 | 29.2 |
| - Age group 70-74 | 89.1 | 89.4 | 83.8 | 83.9 | 80.7 | 78.9 |
| - Age group 75+ | 98.5 | 98.9 | 97.4 | 95.9 | 95.2 | 95.9 |
| - Age group 55-69 | 47.2 | 30.3 | 26.3 | 24.3 | 18.9 | 14.6 |
| - Age group 70+ | 95.7 | 96.1 | 93.5 | 92.5 | 91.8 | 92.3 |
| Without non resident pensioners in 2013 | | | | | | |
| - Age group -54 | 1.4 | 1.5 | 1.3 | 1.0 | 0.8 | 0.8 |
| - Age group 55-59 | 11.9 | 8.5 | 8.1 | 7.5 | 6.5 | 5.5 |
| - Age group 60-64 | 48.9 | 22.6 | 18.3 | 13.9 | 11.0 | 9.4 |
| - Age group 65-69 | 82.8 | 66.3 | 54.1 | 47.7 | 39.4 | 29.2 |
| - Age group 70-74 | 87.0 | 88.2 | 83.7 | 83.9 | 80.7 | 78.9 |
| - Age group 75+ | 94.7 | 96.1 | 96.2 | 95.6 | 95.1 | 95.8 |
| - Age group 55-69 | 46.4 | 30.1 | 26.3 | 24.3 | 18.9 | 14.6 |
| - Age group 70+ | 92.4 | 93.7 | 92.6 | 92.2 | 91.8 | 92.2 |
| - Net elderly immigrants 70+ (1) | 0.0 | 0.5 | 1.1 | 1.2 | 1.0 | 0.8 |

Source: Commission Services.

(1) Cumulated net flows of immigrants above 60 as a share of population 70+.

**Table 13.a - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Total**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Projected new pension expenditure (millions EUR) | 5,650 | 11,417 | 19,463 | 27,041 | 30,547 | 45,034 |
| I. Number of new pensions ('000) | 299.3 | 499.2 | 700.7 | 734.6 | 605.1 | 597.6 |
| II. Average contributory period | 32.9 | 35.5 | 35.4 | 35.4 | 35.5 | 37.3 |
| III. Average accrual rates | 1.95 | 1.80 | 1.73 | 1.70 | 1.70 | 1.71 |
| IV. Monthly average pensionable earnings ('000 EUR) | 2,268 | 2,751 | 3,487 | 4,693 | 6,427 | 9,102 |
| V. Sustainability/Adjustment factor | : | : | : | : | : | : |
| VI. Average number of months paid the first year | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 |
| Monthly average pensionable earnings/Monthly economy-wide average wage | 105.2 | 111.9 | 109.1 | 102.5 | 97.3 | 96.6 |

Source: Commission Services.

**Table 13.b - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Male**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Projected new pension expenditure (millions EUR) | 3,457 | 7,237 | 12,193 | 16,769 | 18,530 | 27,388 |
| I. Number of new pensions ('000) | 168.6 | 290.3 | 394.6 | 416.3 | 339.8 | 341.5 |
| II. Average contributory period | 33.1 | 36.1 | 36.5 | 36.2 | 35.8 | 37.3 |
| III. Average accrual rates | 1.95 | 1.79 | 1.69 | 1.66 | 1.66 | 1.66 |
| IV. Monthly average pensionable earnings ('000 EUR) | 2,442 | 2,967 | 3,850 | 5,161 | 7,059 | 9,957 |
| V. Sustainability/Adjustment factor | : | : | : | : | : | : |
| VI. Average number of months paid the first year | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 |
| Monthly average pensionable earnings/Monthly economy-wide average wage | 113.3 | 120.7 | 120.4 | 112.7 | 106.9 | 105.6 |

Source: Commission Services.

**Table 13.c - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Female**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Projected new pension expenditure (millions EUR) | 2,193 | 4,180 | 7,271 | 10,273 | 12,018 | 17,646 |
| I. Number of new pensions ('000) | 130.7 | 208.9 | 306.1 | 318.4 | 265.3 | 256.1 |
| II. Average contributory period | 32.5 | 34.6 | 33.9 | 34.3 | 35.0 | 37.4 |
| III. Average accrual rates | 1.94 | 1.82 | 1.78 | 1.77 | 1.77 | 1.78 |
| IV. Monthly average pensionable earnings ('000 EUR) | 2,044 | 2,452 | 3,020 | 4,082 | 5,618 | 7,962 |
| V. Sustainability/Adjustment factor | : | : | : | : | : | : |
| VI. Average number of months paid the first year | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 |
| Monthly average pensionable earnings/Monthly economy-wide average wage | 94.9 | 99.8 | 94.4 | 89.1 | 85.1 | 84.5 |

Source: Commission Services.

**Table 14 - Revenue from contribution (million), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Public contribution | 169,413 | 210,210 | 284,457 | 405,049 | 583,605 | 829,480 |
| Employer contribution | 108,005 | 132,783 | 179,898 | 256,651 | 372,755 | 529,573 |
| Employee contribution | 61,408 | 77,427 | 104,558 | 148,398 | 210,850 | 299,907 |
| State contribution(1) | : | : | : | : | : | : |
| Number of contributors (I) | 23,309 | 25,103 | 26,554 | 26,382 | 26,088 | 25,877 |
| Employment (II) | 22,024 | 23,746 | 25,122 | 24,889 | 24,510 | 24,491 |
| Ratio of (I)/(II) | 105.8 | 105.7 | 105.7 | 106.0 | 106.4 | 105.7 |

Source: Commission Services.

(1) Contributions paid by the State as "employer" are included in employer contribution. The quota of public pension expenditure not covered by contribution is by definition charged on public finances.

**Table 15 - Public and total pension expenditures under different scenarios (deviation from the baseline)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Public Pension Expenditure | | | | | | |
| Baseline | 15.7 | 15.3 | 15.7 | 15.8 | 14.8 | 13.8 |
| Higher life expectancy (2 extra years) | 0.0 | 0.0 | -0.1 | -0.1 | 0.2 | 0.4 |
| Higher lab. productivity (+0.25 pp.) | 0.0 | -0.1 | -0.3 | -0.5 | -0.5 | -0.5 |
| Lower lab. productivity (-0.25 pp.) | 0.0 | 0.1 | 0.3 | 0.5 | 0.5 | 0.5 |
| Higher emp. rate (+2 pp.) | 0.0 | -0.2 | -0.3 | -0.3 | -0.2 | -0.1 |
| Higher emp. of older workers (+10 pp.) | 0.0 | -0.6 | -1.4 | -0.6 | 0.0 | 0.1 |
| Lower migration (-20%) | 0.0 | 0.1 | 0.3 | 0.5 | 0.5 | 0.4 |
| TFP risk | 0.0 | 0.0 | 0.2 | 0.6 | 0.8 | 0.7 |

Source: Commission Services.

**Table 16 - Average annual change in public pension expenditure to GDP during the projected period under the 2006, 2009, 2012 and 2015 projection exercises**

| | Public pension to GDP | Dependency ratio | Coverage ratio | Employment effect | Benefit ratio | Labour intensity | Career prolongation effect | Residual (incl. interaction effect) |
|---|---|---|---|---|---|---|---|---|
| 2006 * | 0.41 | 11.54 | -3.17 | -1.99 | -5.29 | : | | -0.69 |
| 2009 ** | -0.41 | 10.40 | -3.22 | -1.14 | -5.47 | : | | -0.98 |
| 2012 *** | -0.90 | 9.55 | -5.55 | -1.31 | -2.03 | 0.03 | | -1.58 |
| 2015 **** | -1.93 | 8.05 | -5.16 | -1.43 | -1.95 | 0.06 | -0.97 | -0.53 |

Source: Commission calculations

* 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060

Explanatory note: The Table presents the average annual change of pension expenditure and the contributions of the underlying component to that change, whereas Table shows, for different intervals of time, the decomposition, in percentage points, of the factors behind the change in public pension expenditures. * 2004 - 2050, ** 2007 - 2060, *** 2010 - 2060, **** 2013 – 2060. Please note that the four components do not add up because of a residual component.

**Table 17 - Decomposition of the difference between 2012 and the new public pension projection (% of GDP)**

| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Ageing report 2012 | 15.0 | 14.5 | 14.5 | 15.6 | 15.7 | 14.4 |
| *- GDP revision ESA 2010* | *-0.5* | *-0.5* | *-0.5* | *-0.5* | *-0.5* | *-0.5* |
| *- Change in assumptions* (1) | *1.2* | *1.4* | *1.8* | *0.7* | *-0.3* | *-0.2* |
| *- Improvement in the coverage or in the modelling* | *:* | *:* | *:* | *:* | *:* | *:* |
| *- Change in the interpretation of constat policy* | *:* | *:* | *:* | *:* | *:* | *:* |
| *- Policy related changes* | *0.0* | *-0.1* | *-0.1* | *0.0* | *0.0* | *0.0* |
| New projection | 15.7 | 15.3 | 15.7 | 15.8 | 14.8 | 13.8 |

Source. Member State.

(1) Includes changes in the base year GDP level.

**Table 18 - Private component of the Italian pension system - Historical data 2000-2013**

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pension expenditure, gross (mln €)** | 1,568 | 2,120 | 1,847 | 2,788 | 1,887 | 1,502 | 2,484 | 1,715 | 2,336 | 1,697 | 1,745 | 1,711 | 1,607 | 1,951 |
| Non-mandatory occupational pensions[(1)(2)] | 1,568 | 2,120 | 1,847 | 2,788 | 1,887 | 1,502 | 2,484 | 1,715 | 2,336 | 1,697 | 1,745 | 1,711 | 1,607 | 1,582 |
| - pensions | 602 | 637 | 733 | 736 | 735 | 698 | 918 | 905 | 900 | 892 | 898 | 896 | 898 | 884 |
| - benefit in capital | 966 | 1,483 | 1,114 | 2,052 | 1,152 | 804 | 1,566 | 810 | 1,436 | 805 | 847 | 815 | 708 | 697 |
| Non-mandatory private pensions | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Number of pensioners (thousands)** | 108 | 121 | 123 | 114 | 111 | 111 | 143 | 133 | 133 | 132 | 130 | 131 | 132 | 130 |
| Non-mandatory occupational pensions[(1)(2)] | 108 | 121 | 123 | 114 | 111 | 111 | 143 | 133 | 133 | 132 | 130 | 131 | 132 | 130 |
| Non-mandatory private pensions | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Contributions (mln €)** | 2,665 | 3,751 | 4,231 | 4,568 | 4,951 | 5,481 | 6,231 | 8,434 | 10,900 | 11,121 | 11,481 | 11,842 | 12,052 | 12,414 |
| Non-mandatory occupational pensions[(1)] | 2,665 | 3,395 | 3,638 | 3,822 | 4,021 | 4,401 | 4,988 | 7,007 | 9,118 | 9,146 | 9,212 | 9,365 | 9,307 | 9,298 |
| Non-mandatory private pensions | 0 | 356 | 593 | 746 | 930 | 1,080 | 1,243 | 1,427 | 1,782 | 1,975 | 2,269 | 2,477 | 2,745 | 3,116 |
| **Number of contributors (thousands)** | 1,692 | 2,160 | 2,396 | 2,587 | 2,740 | 2,963 | 3,184 | 4,560 | 4,854 | 5,055 | 5,272 | 5,537 | 5,829 | 6,204 |
| Non-mandatory occupational pensions[(1)] | 1,692 | 1,959 | 2,038 | 2,078 | 2,112 | 2,219 | 2,304 | 3,424 | 3,536 | 3,570 | 3,568 | 3,541 | 3,544 | 3,590 |
| Non-mandatory private pensions | 0 | 201 | 357 | 509 | 628 | 744 | 880 | 1,136 | 1,314 | 1,485 | 1,703 | 1,996 | 2,285 | 2,614 |
| **Assets of pension funds and reserves (mln €)** | 23,011 | 32,970 | 34,642 | 37,609 | 40,878 | 47,307 | 51,576 | 57,747 | 61,302 | 73,827 | 83,222 | 90,769 | 104,401 | 116,443 |
| Non-mandatory occupational pensions[(1)] | 23,011 | 32,777 | 34,025 | 36,331 | 38,728 | 43,969 | 47,030 | 51,957 | 54,677 | 64,861 | 72,013 | 77,577 | 88,315 | 96,930 |
| Non-mandatory private pensions | 0 | 193 | 617 | 1,278 | 2,150 | 3,338 | 4,546 | 5,790 | 6,625 | 8,966 | 11,209 | 13,192 | 16,086 | 19,513 |

Source: Covip (2000-2013), Relazione annuale. Such reports can be downloaded from the following web site: www.covip.it
(1) It includes open and close pension funds and those pre-existing before 1993-reform.
(2) It only refers to the " pre-existing" pension.

**Figure 1: Age pyramid comparison: 2013 vs 2060**

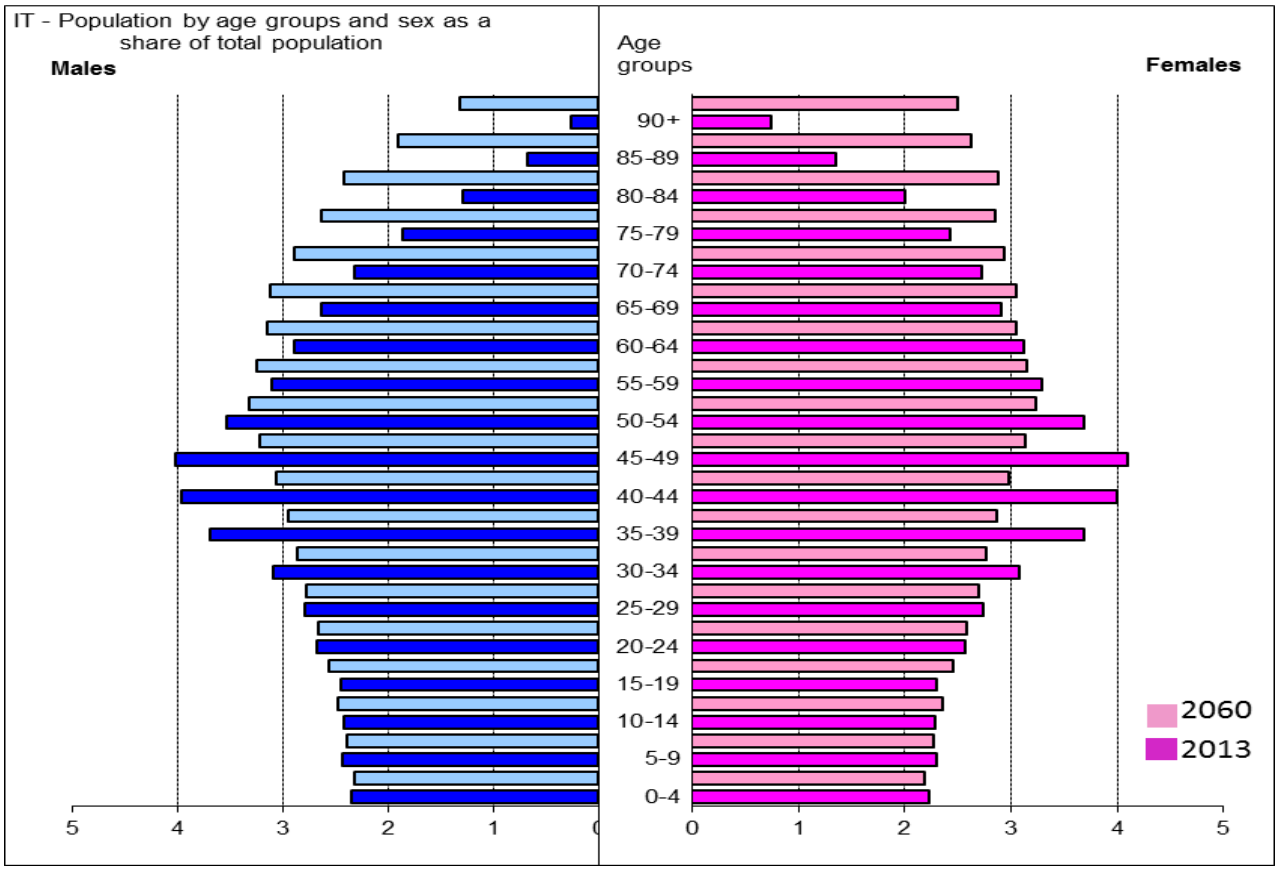



**Figure 2: Elegibility requirements and average retiremnet age**

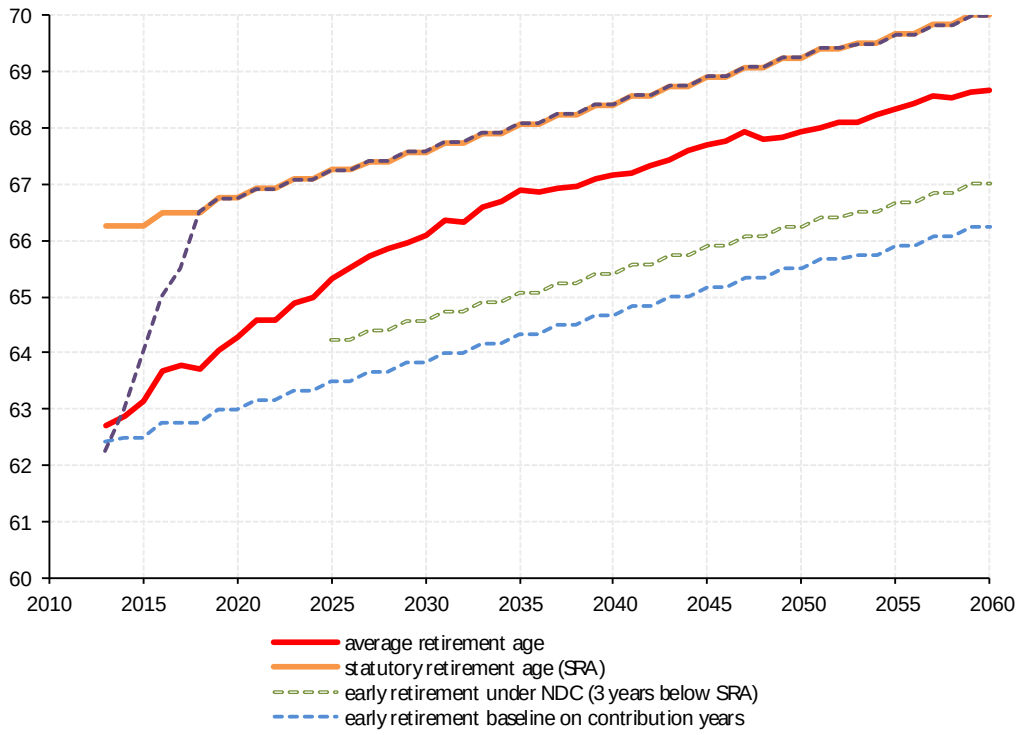


**Figure 3: interventions adopted since January 2012 – Financial effects on pension expenditure in pp of GDP (+ costs; - savings)**

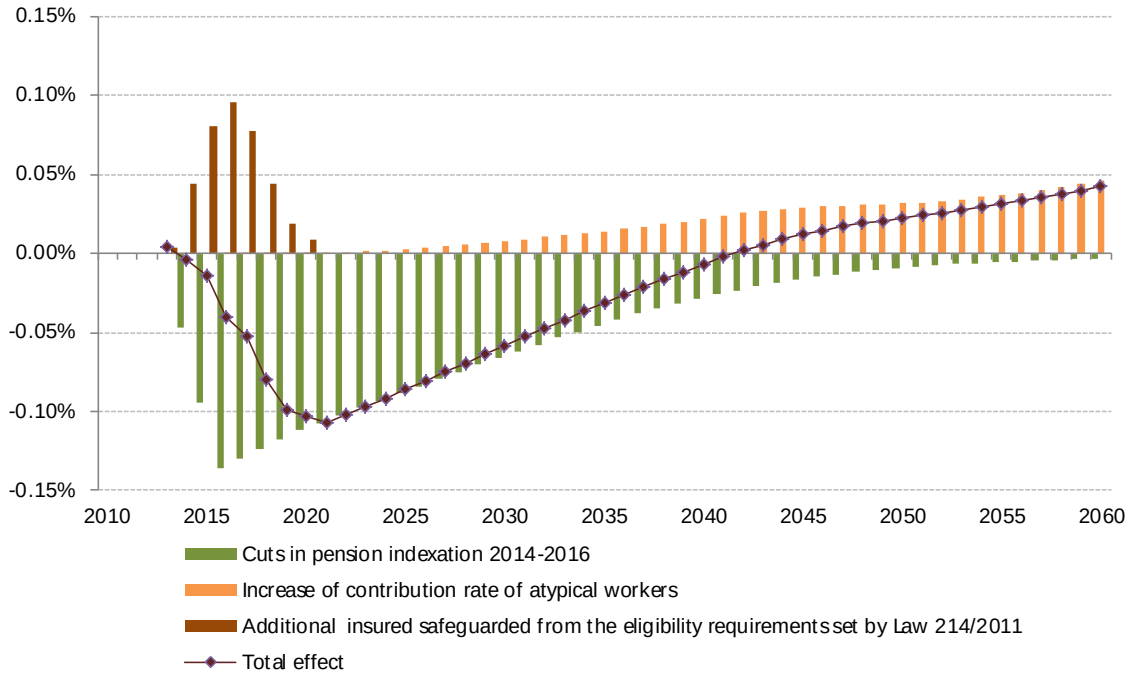


**Figure 4: pension expenditures percentage of GDP and its decomposition - AWG 2015 Baseline projection**

**Figure 4.a: percentage ratio of expenditure to GDP**

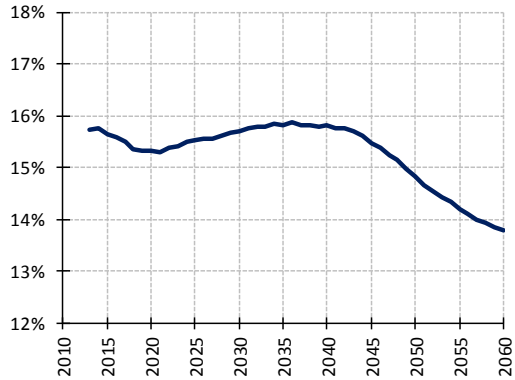



**Figure 4.b: percentage ratio of average pension to productivity**

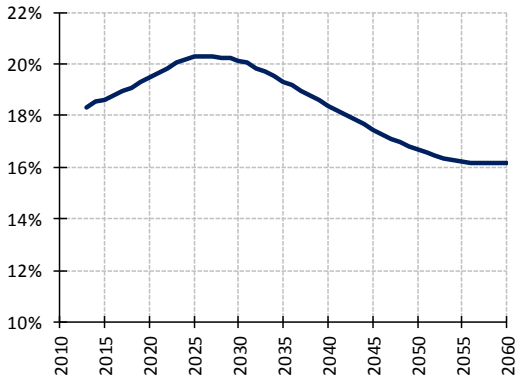



**Figure 4.c: percentage ratio of pensions to employees**

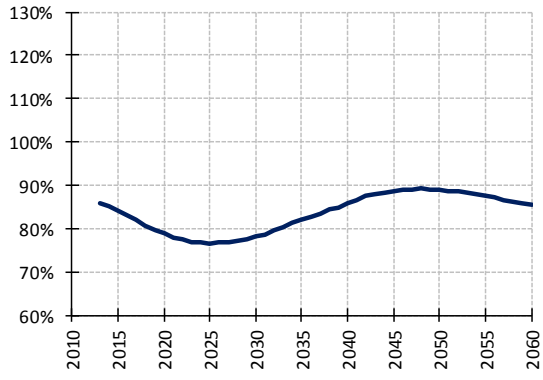



**Figure 4.d: percentage ratio of pensions to people of 70+**

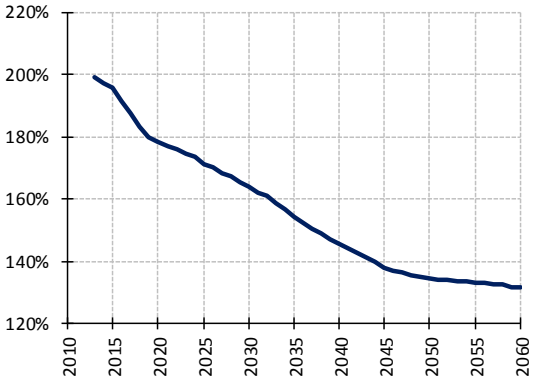



**Figure 4.e: percentage ratio of employees to population [20-69]**

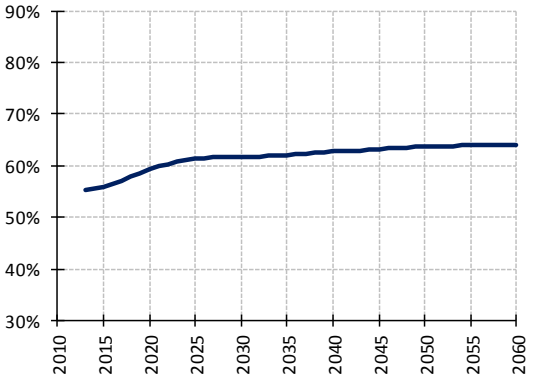



**Figure 4.f: percentage ratio of people of 70+ to population [20-69]**

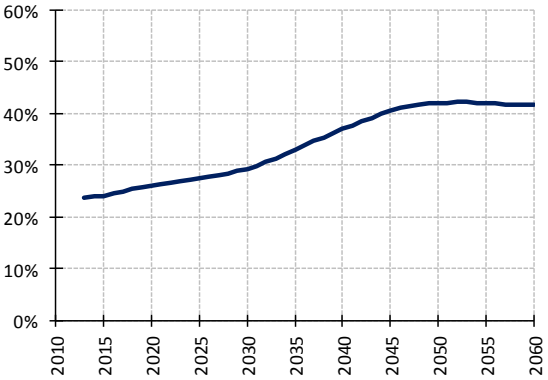


**Figure 5: benefit ratio and replacement rate expressed in terms of economy wide average wage**

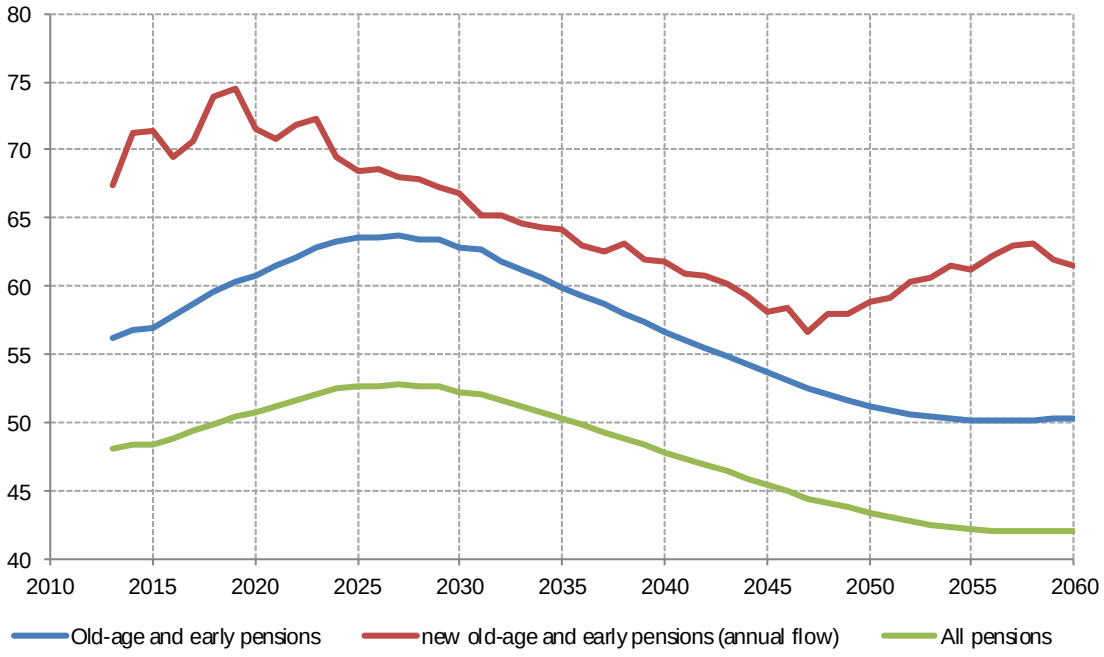



**Figure 6: update of transformation coefficients and average at the average retirement age**

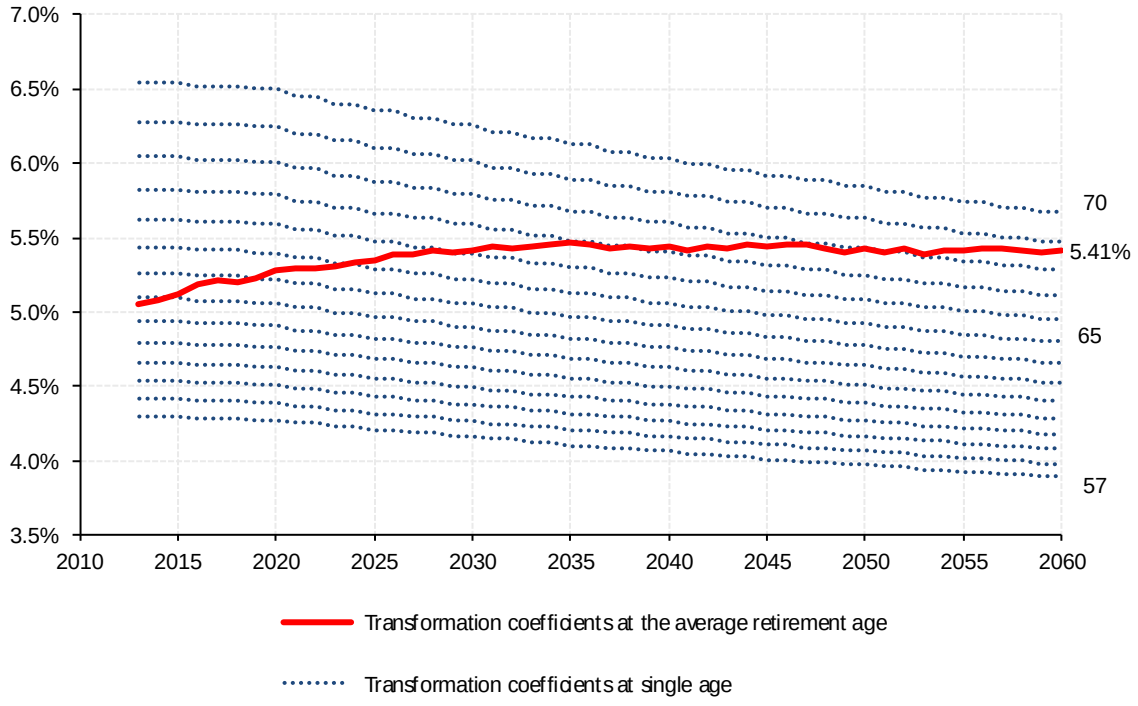


**Figure 7: average contribution period**

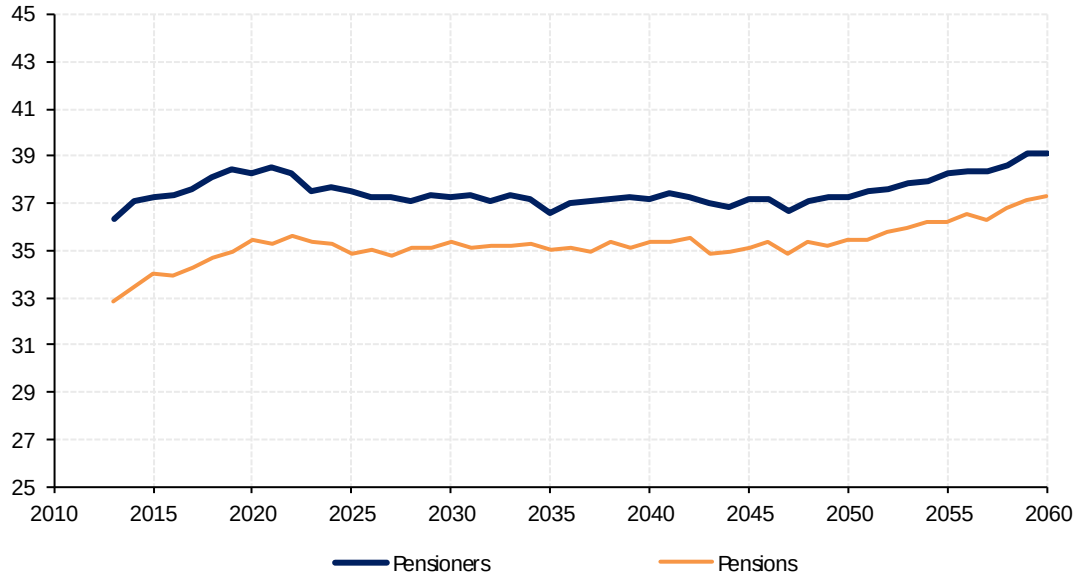



**Figure 8: Pension Expenditure to GDP ratio - Comparison between 2012 and 2015 baseline projections**

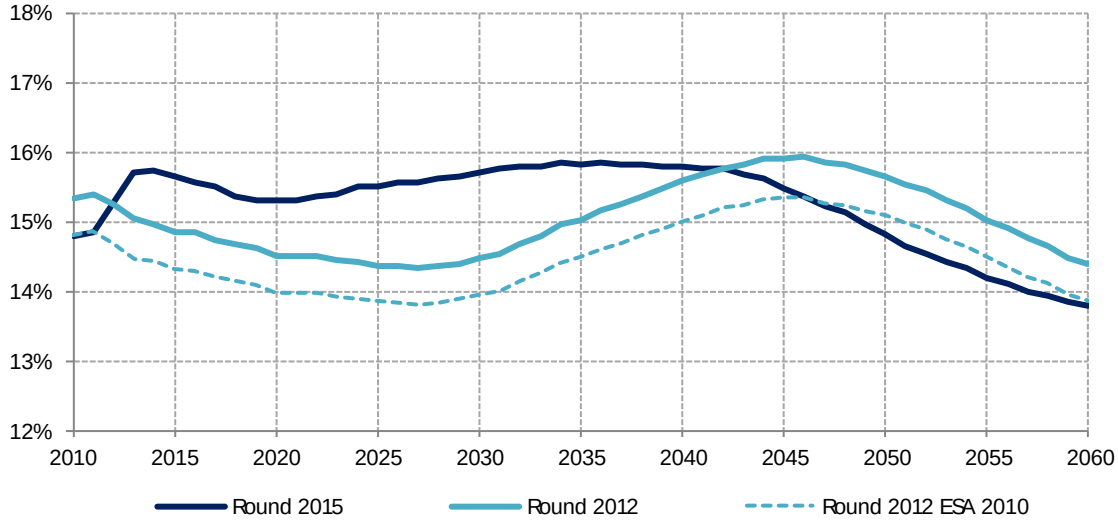
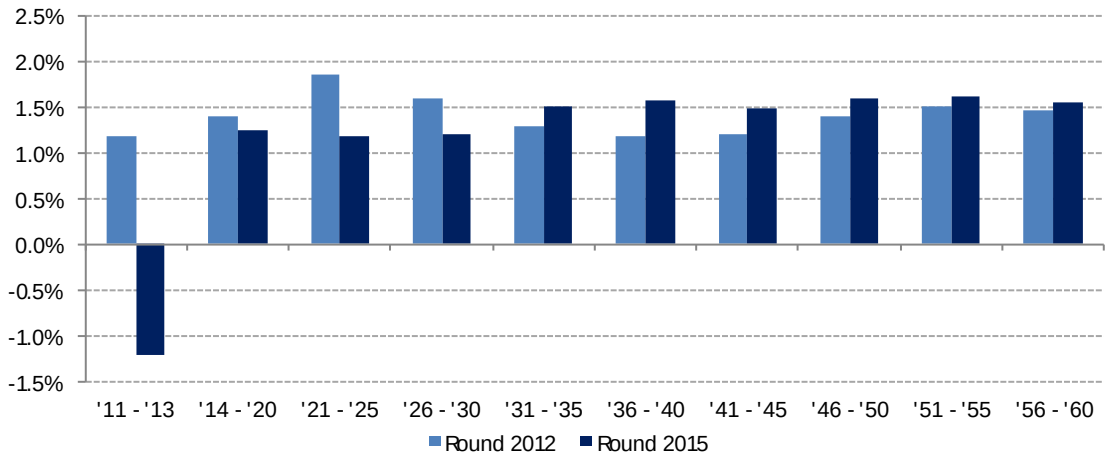



**Figure 9: GDP growth rates - Average of the period**



# ANNEX 1 - Regulatory framework

The annex includes:

- a summary table describing the calculation rules under the DB, mixed and NDC regimes (Table A1.1);
- a summary table describing the eligibility requirements under the DB, mixed and NDB regimes (Table A1.2 and Table A1.3);
- a summary table reporting the evolution of the minimum eligibility requirements for old age and early pensions, by 5-year step (Table A1.4);
- the formula and assumptions for the calculation of the transformation coefficients;
- transformation coefficients in force for the three-year period 2013-2015 (Table A1.5).

**Table A1.1 - Public pension system: calculation rules**

| | Earnings-related regime (DB)<br>Workers with at least 18 years of contribution at the end of 1995, limited to pensions awarded until 31st December 2011 | Mixed regime<br>Workers with less than 18 years of contribution at the end of 1995, and workers with at least 18 years of contribution limited to pensions awarded as of 1st January 2012 | Contribution-based regime (NDC)<br>New entrants into the system as of 1st January 1996 |
|---|---|---|---|
| Old age, early retirement and disability pensions (1) | Pension (P) is calculated according to the following formula:<br><br>**$P = 2\% (C_1\ W_1 + C_2\ W_2)$**<br><br>where:<br>$W_1$ and $W_2$ = reference wage<br>$C_1$ e $C_2$ = years of contribution<br><br>a) for contribution before 1992 ($C_1$), $W_1$ is the last monthly wage for public employees and the average of the last 5 or 10 years, for private employees and the self-employed, respectively(2).<br><br>b) for contribution after 1992 ($C_2$), $W_2$ is the average of the last 10 years for private and public empoyees(3) and 15 years for the self-employed (starting from 2002)(4).<br><br>The accrual rate for each year of contribution is 2% up to a fixed threshold of the reference wage(5). Beyond this limit, such a percentage decreases to 1% in the case of $W_1$ and to 0.9% in the case of $W_2$. | Pension (P) is obtained as a sum of two components:<br><br>**P = PA + PB**<br><br>The former (PA) is calculated by using the earning-related method while the latter (PB) the NDC method. In particular:<br><br>**$PA = 2\% (C_1\ W_1 + C_2\ W_2)$**<br><br>where:<br>$W_1$ and $W_2$ = reference wage<br>$C_1$ e $C_2$ = years of contribution before 1995<br><br>a) for contribution before 1992 ($C_1$), $W_1$ is last montly wage for public employees and the average of the last 5 or 10 years, respectively, for private employees and the self-employed(2).<br><br>b) for contribution between 1993-1995 ($C_2$), $W_2$ is the average wage of a number of last years progressively increasing(4).<br><br>The accrual rate for each year of contribution is 2% up to a fixed threshold of the reference wage(5). Beyond this limit, such a percentage decreases to 1% in the case of $W_1$ and to 0.9% in the case of $W_2$.<br><br>**PB = ct M**<br>(for explanation, see the box on the right hand side). | Pension (P) is calculated according to the following formula:<br><br>**P = ct M**<br><br>where: ct is the tranformation coefficient and M the life-long contributions capitalized with the growth rate of nominal GDP.<br><br>Transformation coefficients in force in the period 2010-2012 range from 4.42% at the age of 57 to 5.62% at age of 65 (above 65 they are set equal to that of 65).<br><br>They are subject to a three-year revision (two-year revision as of 2021) to take account of changes in life expectancy, according to a procedure falling entirely under the administrative sphere of competence.<br><br>As of 2013, they are extended to the age of 70(6), and then further in line with<br>the increase in the eligibility requirements linked to changes in life expectancy. Transformation coefficients in force in the period 2013-2015 range from 4.30% at the age of 57 to 5.43% at age of 65 (up to a maximum of 6.54% at age of 70).<br><br>Under 57 the transformation coefficients are set equal to that of 57.<br><br>The contribution rate is 33% for private and public employees, 20% for the self-employed in 2011, gradually increased to 24% in 2018.<br>For atypical workers the contributione rate is 27% in 2012 and 2013, gradually increased to 33% in 2018. |
| Survivors' pensions (8) | 60% of the pension calculated as above, if a survivor is a widow or widower of an employee; 60% of the deceased's pension, if a survivor is a widow or widower of a pensioner.<br><br>Such a percentage is reduced by 25%, 40% or 50% if the survivor total income exceeds, respectively, 3, 4 or 5 times the minimum pension. | as before | as before |

(1) Disability pensions include the '*assegno ordinario di invalidità*' and the '*pensione di inabilità*'. As for the latter, extra contributions are generally accrued (up to the maximum that beneficiaries would have been able to reach if they had continued to work).
(2) Wages involved in the calculation of the reference wage are indexed to prices.
(3) For the public employees, starting from 2008.
(4) Wages involved in the calculation of the reference wage are indexed to prices, plus 1%.
(5) This threshold is 45,530 euros in 2013.
(6) Indexation of age requirements is foreseen every three years from 2013 to 2019 and every two years from 2021. Changes in life expectancy are consistent with mortality assumptions underlying 2013-Europop baseline demographic projection. The 2013-indexation of the eligibility requirements was adopted by a directorial decree of the Ministry of Economy and Finance of December 14, 2011.
(7) This threshold is 99,034 euros in 2013.
(8) In the case of a surviving spouse with one or two children, the percentage of 60% is increased to 80% and 100%, respectively. Such a percentage is arranged differently where there are only surviving children. As of 2012, the percentage of 60% is reduced by 10% for each year spent unmarried during the previous 10 years, as long as the age difference between the deceased and the surviving spouse exceeds 20 years and the former was aged over 70 at the wedding date. Such a reduction is not applied in case of children, students or disabled.

**Table A1.2 - Public pension system: eligibility requirements - Earnings-related (DB) and mixed regimes**

| | | Earnings-related (DB) and mixed regimes - Workers already insured as of 1995 | | |
|---|---|---|---|---|
| | | 2004 - 2007 | Starting from 2008 (Law 243/2004 and Law 247/2007) | Starting from 2012 (Law 214/2011) |
| Old age retirement Statutory Retirement Age (SRA) (1) | Private/public sector employees and self employed | 65 years for men, 60 years for women and 20 years of contribution for both genders | as before[6] | In 2012, SRA is 66 for men and women in the public sector, 62 for women in the private sector. In all cases, 20 years of contributions are also required<br><br>From 2012 to 2018, SRA of women in the private sector is gradually aligned to that of other workers<br><br>From 2013, SRA is indexed to changes in life expectancy[7]. |
| Early retirement | Private sector employees | 35 years of contribution and 57 years of age[2] or, alternatively, 38 years of contribution, in the period 2004 - 2005, and 39 in the period 2006 - 2007[3] | 40 years of contribution regardless of age or, alternatively, 35 years of contribution and 58 years of age until 30/06/2009, 60 from 1/07/2009 to 2010 and 61 in 2011[6].<br><br>Starting from July 2009, workers are allowed to access early retirement at an age lower by 1 year with at least 36 years of contribution[4] [5] [6]. | Contribution requirement regardless of age:<br><br>- Men: 42 years and 1 month of contributions in 2012 (plus 1 month in 2013, 2 months in 2014);<br><br>- Women: 41 years and 1 month of contributions in 2012 (plus 1 month in 2013, 2 months in 2014).<br><br>From 2013, contribution requirements are indexed every three years (every 2 years as of 2021) to changes in life expectancy[7].<br><br>A penalty is applied to the quota of pension calculated according to DB method, which accounts for 1% at the age of 61, 2% at the age of 60 and then increased by 2 pp each year below 60. |
| | Public sector employees | | | |
| | Self employed | 35 years of contribution and 58 years of age or 40 years of contribution[3]. | 40 years of contribution regardless of age or, alternatively, 35 years of contribution and 59 years of age until 30/06/2009, 61 from 1/07/2009 to 2010 and 62 in 2011[6].<br><br>Starting from July 2009, workers are allowed to access early retirement at an age lower by 1 year with at least 36 years of contribution[4] [5] [6]. | |
| Disability pensions[8] | | 5 years of contribution 3 of which accrued in the last five years. | as before | as before |
| Survivors' pensions[9] | | 15 years of contribution, or alternatively, only 5 years of contribution 3 of which accrued in the last five years. | as before | as before |

(1) Before 1992, the minimum retirement age was, respectively, 60 and 55 for private sector employees, and the minimum contribution period was 15 years.
(2) The age requirement was reduced to 56 for blue-collar workers in the period 2004 - 2005.
(3) A further postponement of the retirement age was envisaged through the so-called 'exit window', ranging from 3 to 11 months.
(4) For the period 2008-2015, women under DB and mixed regimes who have satisfied the requirements laid down by legislation before law 243/2004 are allowed to retire before 60 as long as they choose the less favourable pension treatment provided by the NDC method.
(5) From 2008, the further postponement through the 'exit window' was foreseen for all regimes, averaging about 9 months for the employees and 15 months for the self-employed.
(6) In 2011, for both old age and early pensions, the retirement age was postponed through the 'exit window' by 1 year for employees and 1 year and half for the self-employed.
(7) The 2013-indexation of the eligibility requirements was adopted by a directorial decree of the Ministry of Economy and Finance of December 14, 2011, according to the automatic, administrative procedure laid down by law 122/2010. The increase in the eligibility requirements will be in force for the three-year period 2013-2015 before the next update.
(8) After the 1984-reform (law 222/84), disability pension entitlements only depend on the mental and physical impairments without considering the labour market conditions.
(9) Survivors' pensions may be also an entitlement of children up to 18 (or 26, in the case of students).

**Table A1.3 - Public pension system: eligibility requirements - Contribution-based regime (NDC)**

| | | Contribution-based regime (NDC) - New entrants into the system after 1995 | | |
|---|---|---|---|---|
| | | up to 2007 | Starting from 2008 (Law 243/2004 and Law 247/2007) | Starting from 2012 (Law 148/2011) |
| Old age retirement Statutory Retirement Age (SRA) [1] | Private/public sector employees and self employed | For both genders, retirement is allowed with at least 57 year of age and 5 years of contribution or, alternatively, 40 years of contribution regardless of age. | Men: 65, with at least 5 years of contribution [3]. Women: 60, with at least 5 years of contribution [3]. | In 2012, SRA is 66 for men and women in the public sector; is 62 for women in the private sector.<br><br>Retirement is allowed with at least 20 years of contribution and an amount of pension not inferior to 643 euro per month in 2012 ( 1.5 times the old-age allowance, in 2012). Such a threshold is indexed with the five-year average of nominal GDP.<br><br>From 2012 to 2018 (1st January), SRA of women in the private sector is gradually aligned to that of other workers<br><br>From 2013, SRA is indexed to changes in life expectancy [4]. |
| Early retirement | Private sector employees | | 40 years of contribution regardeless of age or, alternatively, 35 years of contribution and 58 years of age until 30/06/2009, 60 from 1/07/2009 to 2010 and 61 in 2011 [3].<br><br>Starting from July 2009, workers are allowed to access early retirement at an age lower by 1 year with at least 36 years of contribution [2] [3]. | Two retirement channels :<br><br>1) Contribution requirement regardless of age:<br><br>- Men: 42 years of contributions (plus 1 month in 2012, 2 months in 2013 and 3 months in 2014) ;<br><br>- Women: 41 years of contributions (plus 1 month in 2012, 2 months in 2013 and 3 months in 2014) ;<br><br>From 2013, contribution requirements are indexed every three years (every 2 years as of 2021) to changes in life expectancy [4].<br><br>2) For both gender, early retirement is also allowed, up to a maximum of three years before the SRA (63 in 2012), as long as they have matured 20 years of contributions and an amount of pension not inferior to 1,200 euro per month in 2012 ( 2.8 times the old-age allowance, in 2012). Such a threshold is indexed with the five-year average of nominal GDP. |
| | Public sector employees | | | |
| | Self employed | | 40 years of contribution regardeless of age or, alternatively, 35 years of contribution and 59 years of age until 30/06/2009, 61 from 1/07/2009 to 2010 and 62 in 2011 [3].<br><br>Starting from July 2009, workers are allowed to access early retirement at an age lower by 1 year with at least 36 years of contribution [2] [3]. | |
| Disability pensions [5] | | 5 years of contribution 3 of which accrued in the last five years. | as before | as before |
| Survivors' pensions [6] | | 15 years of contributions, or alternatively, only 5 years of contribution 3 of which accrued in the last five years. | as before | as before |

(1) Before 1992, the minimum retirement age was, respectively, 60 and 55 for private sector employees, and the minimum contribution period was 15 years.
(2) From 2008, the further postponement through the 'exit window' was foreseen for all regimes averaging about 9 months for the employees and 15 months for the self-employed.
(3) In 2011, for both old age and early pensions, the retirement age was postponed through the 'exit window' by 1 year for employees and 1 year and half for the self-employed.
(4) The 2013-indexation of the eligibility requirements was adopted by a directorial decree of the Ministry of Economy and Finance of December 14, 2011, according to the automatic, administrative procedure laid down by law 122/2010. The increase in the eligibility requirements will be in force for the three-year period 2013-2015 before the next update.
(5) After the 1984-reform (law 222/84), disability pension entitlements only depend on the mental and physical impairments without considering the labour market conditions.
(6) Survivors' pensions may be also an entitlement of children up to 18 (or 26, in the case of students).

**Table A1.4 - Statutory retirement age (SRA) and early retirement**

| Years of contribution | | 2013 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 | 2055 | 2060 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Men | SRA with 20 years of contributions[1] | | | | | | | | | | | |
| | - All sectors (DB, mixed and NDC regimes) | *66y + 3m* | *66y+3m* | *66y+9m* | *67y+3m* | *67y+7m* | *68y+1m* | *68y+5m* | *68y + 11m* | *69y+3m* | *69y + 8m* | *70y* |
| | Early retirement[1] | | | | | | | | | | | |
| | - Minimum contribution requirement regardless of age (DB, mixed and NDC regimes) | *42y+5m* | *42y + 6m* | *43y* | *43y+6m* | *43y+10m* | *44y+4m* | *44y+8m* | *45y+2m* | *45y+6m* | *45y+11m* | *46y+3m* |
| | - minimum retirement age with 20 years of contribution and a minimum amount of pension[3] (NDC alone) | - | - | - | *(64y+3m)* | *64y+7m* | *65y+1m* | *65y+5m* | *65y+11m* | *66y+3m* | *66y+8m* | *67y* |
| | Penalty in case of earliest retirement age[4] | Penalty implied by the actuarial equivalence under NDC calculation method. | | | | | | | | | | |
| Women | SRA with 20 years of contributions[1] | | | | | | | | | | | |
| | - Private sector[2] (DB, mixed and NDC regimes) | *62y+3m* | *64y* | *66y+9m* | *67y+3m* | *67y+7m* | *68y+1m* | *68y+5m* | *68y+11m* | *69y+3m* | *69y+8m* | *70y* |
| | - Public sector (DB, mixed and NDC regimes) | *66y + 3m* | *66y+3m* | *66y+9m* | *67y+3m* | *67y+7m* | *68y+1m* | *68y+5m* | *68y + 11m* | *69y+3m* | *69y + 8m* | *70y* |
| | Early retirement[1] | | | | | | | | | | | |
| | - Minimum contribution requirement regardless of age (DB, mixed and NDC regimes) | *41y+5m* | *41y + 6m* | *42y* | *42y+6m* | *42y+10m* | *43y+4m* | *43y+8m* | *44y+2m* | *44y+6m* | *44y+11m* | *45y+3m* |
| | - minimum retirement age with 20 years of contribution and a minimum amount of pension[3] (NDC alone) | - | - | - | *(64y+3m)* | *64y+7m* | *65y+1m* | *65y+5m* | *65y+11m* | *66y+3m* | *66y+8m* | *67y* |
| | Penalty in case of earliest retirement age[4] | Penalty implied by the actuarial equivalence under NDC calculation method. | | | | | | | | | | |

(1) Indexation of age requirements is foreseen every three years from 2013 to 2019 and every two years from 2021. Changes in life expectancy are consistent with mortality assumptions underlying 2013-Europop baseline demographic projection. The 2013-indexation of the eligibility requirements was adopted by a directorial decree of the Ministry of Economy and Finance of December 14, 2011.

(2) SRA of women in the private sector equalizes that of men (and women in the public sector) starting from 2018. In 2015, the SRA of the female self-employed is 1 year higher.

(3) The minimum amount of pension is 1,200 euro per month (which corresponds to 2.8 times the old age allowance, in 2012) indexed with the five-year average of nominal GDP. This early-retirement channel is actually ineffective until 2025-2030, since the required amount of pension presupposes a substantial contribution period (significantly higher than 20 years) matured under the NDC regime.

(4) In case of early pensions, a penalty is applied to the quota of pension calculated according to DB method, which accounts for 1% at the age of 61, 2% at the age of 60 and then increased by 2 pp each year below 60.

## 1.1 Transformation coefficients: formula and assumptions

The formula and parameters for the calculation of the transformation coefficients are given below:[34]

$$TC_x = \frac{1}{\Delta_x}$$

$$\Delta_x = \frac{\sum_{s=m,f} \left( a_{x,s}^{v(t)} + A_{x,s}^{v(t)} \right)}{2} - k$$

Average present value of direct pension awards:

$$a_{x,s}^{v(t)} = \sum_{t=0}^{w-x} \frac{l_{x+t,s}}{l_{x,s}} \left( \frac{1+r}{1+\sigma} \right)^{-t}$$

Average present value of reversibility pension awards:

$$A_{x,s}^{v(t)} = \sum_{t=0}^{w-x} \frac{l_{x+t,s}}{l_{x,s}} q_{x+t,s} \left( \frac{1+r}{1+\sigma} \right)^{-t} \Theta_{x+t,s} \eta \delta_s \sum_{\tau=1}^{w-x-t+\varepsilon_s} \frac{l_{x+t+\tau-\varepsilon_{x,s},\bar{s}}^{ved}}{l_{x+t+1-\varepsilon_{x,s},\bar{s}}^{ved}} \left( \frac{1+r}{1+\sigma} \right)^{-\tau}$$

Where :

$TC = transformation\ \ coefficient$

$\Delta = divisor$

$s = m, f$

$\frac{l_{x+t,s}}{l_{x,s}} = probability\ \ of\ \ surviving\ \ between\ \ ages\ \ x\ \ and\ \ x+t$

$x = retirement\ \ age$

$w = maximum\ \ age$

$q_{x+t,s} = probability\ \ of\ \ death\ \ between\ \ ages\ \ x+t\ \ and\ \ x+t+1$

$\Theta_{x+t,s} = probability\ \ of\ \ leaving\ \ a\ \ surviving\ \ spouse\ \ at\ \ the\ \ age\ \ x+t$

$\frac{l_{x+t,s}^{ved}}{l_x^{ved}} = probability\ \ for\ \ a\ \ widow\ \ or\ \ widower\ \ to\ \ be\ \ eliminated\ \ because\ \ of\ \ death\ \ or\ \ new\ \ marriage.$

$k = adjustment\ \ owing\ \ to\ \ how\ \ pension\ \ is\ \ drawn.\ \ This\ \ parameter\ \ accounts\ \ for\ \ 0.4615$

$\varepsilon_s = difference\ \ between\ \ the\ \ pensioner's\ \ age\ \ of\ \ sex\ \ s\ \ and\ \ the\ \ spouse's\ \ age$

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[34] Ministero dell'Economia e delle Finanze-RGS (2014), *Le tendenze di medio-lungo periodo del sistema pensionistico e socio-sanitario* (Mid-long term trends for the pension, health and long term care systems), Report no. 15, Appendice 1, lettera B.1, http://www.rgs.mef.gov.it/VERSIONE-I/Attivit--i/Spesa-soci/Attivita_di_previsione_RGS/2014. The 2013-revision of the transformation coefficients was adopted by a directorial decree of the Ministry of Labour and Social Policies of 14 May, 2012 according to an automatic, administrative procedure laid down by law 247/2007.

$\eta$ = *percentage of reversibility*

$\delta_s$ = *average percentage of reduction of the survivor's pension owing to income requirements.*

$r$ = *internal return rate*

$\sigma$ = *indexation rate*

$\left(\frac{1+r}{1+\sigma}-1\right) = 1.5\%$ = *discount rate*

**Table A1.5 - Transformation coefficients in force for the three-year period 2013-2015**

| Age | Transformation coefficients | Annuity factor |
|---|---|---|
| 57 | 4.304% | 23.2 |
| 58 | 4.416% | 22.6 |
| 59 | 4.535% | 22.1 |
| 60 | 4.661% | 21.5 |
| 61 | 4.796% | 20.9 |
| 62 | 4.940% | 20.2 |
| 63 | 5.094% | 19.6 |
| 64 | 5.259% | 19.0 |
| 65 | 5.435% | 18.4 |
| 70 | 6.541% | 15.3 |

Source: Directorial decree of the Ministry of Economy and Finance of December 14, 2011, published in the Official Journal (Gazzetta Ufficiale) of December 23, 2011.

# ANNEX 2 - Pension adequacy

## 2.1 Adequacy of the pension income of the elderly

**Distributive effects**. The decline in the ratio between average pension and average gross wage due to the introduction of the NDC regime mainly comes about from a reduction in high level pensions attributed to steep, unbroken careers under the DB regime, which benefited from a very generous internal rate of returns.

In this regard, it is worthwhile recalling the distributive effects brought about by the NDC calculation method, compared to the previous one[35]:

- the extension of the calculation base to life-long contributions (and, implicitly, wages) automatically produces a redistribution of pension rights in favour of the weakest workers with flat and discontinuous careers;
- the NDC calculation method allows workers to increase substantially their pension amounts by delaying retirement. For example, postponing retirement by 5 years increases the amount of pension by more than 30%;
- the fulfilment of stringent eligibility requirements, increasing through time, prevents pensioners from being entitled to a low amount of pension because of short careers or low retirement ages[36];
- worker must qualify for a minimum benefit of 1.5 times the old-age allowance in order to be able to retire at the SRA;
- on reaching the SRA, people who are in conditions of poverty will be entitled to an old age allowance and additional social assistance lump sums (safety net)[37].

According to past experience in the ambit of private sector employees, early pensions are characterised by high level amounts being paid to workers with full, regular careers. In

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[35] The NDC regime equalises the internal rate of returns across all participants, which varied considerably under the previous one.

[36] Furthermore, indexation of the eligibility requirements to changes in life expectancy allows compensation for the negative effect due to the revision of the transformation coefficients.

[37] The public pension system, through the old age allowances and additional lump sums, guarantees to the elderly over 70 a personal income not less than 8,214 euro if single, and a couple's income not less than 13,964 euro, if married, in 2013.

particular, under the DB regime, the average amount of early pensions is as much as twice that of old-age ones, and such pensions are supposed to be paid for a longer period.

This aspect can be seen in table A2.1, which provides the average amount of earnings-related pensions other than survivor's, in terms of NA average gross wage, calculated for ten-year age classes and ten-year periods. As may be seen, in 2013 the average amount of pension is significantly higher in age classes 51-60 and, to a lesser extent, 61-70, where the incidence of early pensions is relevant. Such an edge, however, tends to disappear as the DB regime is being replaced by the NDC. In fact, starting from 2035, age-class differences are much lower than those registered in the beginning of the forecasting period, mainly reflecting the effects of the indexation to price inflation.

**Theoretical replacement rate**. Apart from the distributive effects mentioned above, the adequacy of benefits needs to be assessed in terms of disposable income before and after retirement. In fact, considering that contributions paid to the public pension system are entirely deductible from income tax and income tax rates are progressive, net replacement rates are significantly higher than gross ones, all else being equal. The table A2.3 shows the evolution of net replacement rates calculated on the basis of the methodology agreed within the Indicator Subgroup of the Social Protection Committee and assuming a dynamic for wages (or labour earnings) and GDP consistent with that underlying the AWG-baseline scenario.

Calculations have been made for an employee in the private sector[38] and for a self-employed worker, in order to take account of the different contribution rate (33% against 24%). As for the former, an employee retiring with 38 years of contribution at an age 3 years lower than the SRA (early retirement under the NDC)[39] has been taken as 'base case' this being considered representative of an average behaviour in the mid-long run; In the case of a self-employed worker, the same years of contribution are have been assumed while the age of retirement has been set to the SRA.

At the end of the forecasting period, net replacement rates settle above gross ones by 9.4 percentage points for employees, and 22.1 percentage points for the self-employed.

Furthermore, still in agreement with the methodology agreed within the Indicator Subgroup, private sector employees may supplement their public pensions with additional income from private pension funds on the basis of the transfer of the annual flow of severance pay (*Trattamento di fine rapporto*), which accounts for 6.91% of gross wages.

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[38] As the contribution rate is the same, figures reported for private sector employees can also be referred to public sector employees. For more details concerning different typologies of workers and the comparison between gross and net replacement rates, see Ministero dell'Economia e delle Finanze-RGS (2014), *Le tendenze di medio-lungo periodo del sistema pensionistico e socio-sanitario* (Mid-long term trends for the pension, health and long term care systems), Report no. 15, http://www.rgs.mef.gov.it/VERSIONE-I/Attivit--i/Spesa-soci/Attivita_di_previsione_RGS/2014.

[39] In fact, in the case of the self-employed, even assuming the NA gross average wage as reference labour income, the minimum pension required to retire up to 3 years before the SRA is unlikely to be fulfilled, given the lower level of contribution rate, compared to that of employees.

For the sake of comparability, the same percentage of financing has been assumed for the self-employed.

In order to take into account eligibility requirements being temporary lower than those in the base case, replacement rates have also been calculated according to minimum eligibility requirements in force in each year. For all possible retirement channels, gross replacement rates settle, at the end of the forecasting period, close to or above 62.9% for employees, and close to or above 45.8% for the self-employed (Table A2.2). As said before, the corresponding figures account for 10 or 20 percentage points higher, when expressed net of contributions and tax revenues.

**Table A2.1: ratio between the average amount of earnings-related pensions(1) in the age-class and economy-wide average wage**

| age-class | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| **31-40** | 20.0% | 17.3% | 16.3% | 14.6% | 14.6% | 14.7% |
| **41-50** | 33.1% | 26.5% | 22.2% | 19.4% | 18.3% | 18.8% |
| **51-60** | 72.0% | 53.4% | 39.1% | 29.8% | 24.4% | 23.6% |
| **61-70** | 67.9% | 77.3% | 69.9% | 63.5% | 63.8% | 66.1% |
| **71-80** | 53.4% | 63.4% | 68.5% | 58.2% | 52.7% | 54.9% |
| **81-90** | 42.0% | 47.8% | 58.7% | 57.2% | 48.4% | 44.9% |
| **91-100** | 36.1% | 39.9% | 44.2% | 49.3% | 46.8% | 40.6% |

(1) Includes old age, early and disability pensions; does not include social assistence pensions (social pensions, old age allowances and additional lump sums) and public, supplementary pensions.

**Tab. A2.2: gross replacement rates in the public pension system - Base case and retirement with the minimum eligibility requirements[1] (values %)**

**Tab. A2.2.a: private employees**

| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| | **Contribution period: 38 anni** | | | | | |
| **Base case** | 73.7 | 69.0 | 68.7 | 62.7 | 64.4 | 64.7 |
| ***(age)*** | *(65+4m)[2]* | *(66+9m)* | *(67+7m)* | *(65+5m)* | *(66+3m)* | *(67)* |
| | **Years of contribution and age requirement increasing through time** | | | | | |
| **Old age retirement** | 68.5 | 66.6 | 67.9 | 70.2 | 73.7 | 75.7 |
| ***(age/contr. period)*** | *(65+4m/35+4m)[2]* | *(66+9m/36+9m)* | *(67+7m/37+7m)* | *(68+5m/38+5m)* | *(69+3m/39+3m)* | *(70/40)* |
| | **Years of contribution and age requirement increasing through time (NDC alone)** | | | | | |
| **Early retirement[3]** | - | - | 56.2 | 58.6 | 61.5 | 62.9 |
| ***(age/contr. period)*** | - | - | *(64+7m/34+7m)* | *(65+5m/35+5m)* | *(66+3m/36+3m)* | *(67/37)* |
| | **Contribution requirement channel (age of entry into the labor market: 19 years)** | | | | | |
| **Early retiremnet - Female[4]** | 77.5 | 69.2 | 67.3 | 66.3 | 68.7 | 71.2 |
| ***(age/contr. period)*** | *(60/41)* | *(61/42)* | *(61+10m/42+10m)* | *(62+8m/43+8m)* | *(63+6m/44+6m)* | *(64+3m/45+3m)* |
| **Early retiremnet - Male[4]** | 77.5 | 79.6 | 70.8 | 70.0 | 72.3 | 74.9 |
| ***(age/contr. period)*** | *(60/41)* | *(62/43)* | *(62+10m/43+10m)* | *(63+8m/44+8m)* | *(64+6m/45+6m)* | *(65+3m/46+3m)* |

**Tab. A2.2.b: self-employed**

| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| | **Contribution period: 38 anni** | | | | | |
| **Base case** | 72.2 | 52.8 | 47.6 | 48.1 | 51.6 | 52.3 |
| ***(age)*** | *(65+7m)[2]* | *(66+9m)* | *(67+7m)* | *(68+5m)* | *(69+3m)* | *(70)* |
| | **Years of contribution and age requirement increasing through time** | | | | | |
| **Old age retirement** | 67.7 | 50.4 | 46.9 | 48.6 | 53.1 | 55.1 |
| ***(age/contr. period)*** | *(65+7m/35+7m)[2]* | *(66+9m/36+9m)* | *(67+7m/37+7m)* | *(68+5m/38+5m)* | *(69+3m/39+3m)* | *(70/40)* |
| | **Years of contribution and age requirement increasing through time (NDC alone)** | | | | | |
| **Early retirement[5]** | - | - | (37.4) | (41.0) | (44.6) | (45.8) |
| ***(age/contr. period)*** | - | - | *(64+7m/34+7m)* | *(65+5m/35+5m)* | *(66+3m/36+3m)* | *(67/37)* |
| | **Contribution requirement channel (age of entry into the labor market: 19 years)** | | | | | |
| **Early retiremnet - Female[4]** | 75.9 | 55.6 | 49.5 | 45.2 | 48.6 | 51.7 |
| ***(age/contr. period)*** | *(60+6m/41+6m)* | *(61/42)* | *(61+10m/42+10m)* | *(62+8m/43+8m)* | *(63+6m/44+6m)* | *(64+3m/45+3m)* |
| **Early retiremnet - Male[4]** | 75.9 | 75.4 | 52.4 | 47.6 | 51.0 | 54.4 |
| ***(age/contr. period)*** | *(60+6m/41+6m)* | *(62/43)* | *(62+10m/43+10m)* | *(63+8m/44+8m)* | *(64+6m/45+6m)* | *(65+3m/46+3m)* |

*(1) Assumptions on individual wages/earnings: time series of average gross wage up to 2013; national estimate of average gross wage for 2014; for the forecasting period, the average gross wage is projected according to productivity growth underlying the 2015-AWG baseline scenario assumptions.*

*(2) The retirement age for women is 5 years lower.*

*(3) Only allowed to workers insured since 1/1/1996 (NDC regime) with an amount of pension not less than 1.200 € per month in 2012 (2.8 times the old-age allowance in the same year) indexed with the five-year average GDP growth rate.*

*(4) In 2020, men are still under the DB regime while women move to the Mixed regime, being their minimum contribution requirement 1 year lower.*

*(5) Only allowed to workers insured since 1/1/1996 (NDC regime). Given the lower level of contribution rate compared to private employees, access to early retirement requires labour income significantly above the average gross wage, in order to meet the requirement of the minimum pension. Furthermore, considering that the average taxable income of the self-employed is significantly lower than the average gross wage, it follows that access to early retirement with an age requirement up to 3 years less than the SPA, is for this category of workers, quite unlikely.*

**Tab. A2.3: net replacement rates of the public pension system - Base case and retirement with the minimum eligibility requirements[1] (values %)**

**Tab. A2.3.a: private employees - Without dependent spouse**

| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| | **Contribution period: 38 anni** | | | | | |
| **Base case** | 82.8 | 78.3 | 78.0 | 72.2 | 73.8 | 74.1 |
| ***(age)*** | *(65+4m)*[2] | *(66+9m)* | *(67+7m)* | *(65+5m)* | *(66+3m)* | *(67)* |
| | **Years of contribution and age requirement increasing through time** | | | | | |
| **Old age retirement** | 77.8 | 75.9 | 77.2 | 79.5 | 82.8 | 84.8 |
| ***(age/contr. period)*** | *(65+4m/35+4m)*[2] | *(66+9m/36+9m)* | *(67+7m/37+7m)* | *(68+5m/38+5m)* | *(69+3m/39+3m)* | *(70/40)* |
| | **Years of contribution and age requirement increasing through time (NDC alone)** | | | | | |
| **Early retirement[3]** | - | - | 65.9 | 68.2 | 71.1 | 72.4 |
| ***(age/contr. period)*** | - | - | *(64+7m/34+7m)* | *(65+5m/35+5m)* | *(66+3m/36+3m)* | *(67/37)* |
| | **Contribution requirement channel (age of entry into the labor market: 19 years)** | | | | | |
| **Early retiremnet - Female[4]** | 86.6 | 78.5 | 76.6 | 75.7 | 78.0 | 80.4 |
| ***(age/contr. period)*** | *(60/41)* | *(61/42)* | *(61+10m/42+10m)* | *(62+8m/43+8m)* | *(63+6m/44+6m)* | *(64+3m/45+3m)* |
| **Early retiremnet - Male[4]** | 86.6 | 88.5 | 80.0 | 79.2 | 81.5 | 84.0 |
| ***(age/contr. period)*** | *(60/41)* | *(62/43)* | *(62+10m/43+10m)* | *(63+8m/44+8m)* | *(64+6m/45+6m)* | *(65+3m/46+3m)* |

**Tab. A2.3.b: self-employed - Without dependent spouse**

| | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| | **Contribution period: 38 anni** | | | | | |
| **Base case** | 93.1 | 75.0 | 69.0 | 69.6 | 73.6 | 74.4 |
| ***(age)*** | *(65+7m)*[2] | *(66+9m)* | *(67+7m)* | *(68+5m)* | *(69+3m)* | *(70)* |
| | **Years of contribution and age requirement increasing through time** | | | | | |
| **Old age retirement** | 88.1 | 72.2 | 68.0 | 70.1 | 75.3 | 77.7 |
| ***(age/contr. period)*** | *(65+7m/35+7m)*[2] | *(66+9m/36+9m)* | *(67+7m/37+7m)* | *(68+5m/38+5m)* | *(69+3m/39+3m)* | *(70/40)* |
| | **Years of contribution and age requirement increasing through time (NDC alone)** | | | | | |
| **Early retirement[5]** | - | - | (55.7) | (59.8) | (64.4) | (66.0) |
| ***(age/contr. period)*** | - | - | *(64+7m/34+7m)* | *(65+5m/35+5m)* | *(66+3m/36+3m)* | *(67/37)* |
| | **Contribution requirement channel (age of entry into the labor market: 19 years)** | | | | | |
| **Early retiremnet - Female[4]** | 97.2 | 78.2 | 71.2 | 66.1 | 70.1 | 73.8 |
| ***(age/contr. period)*** | *(60+6m/41+6m)* | *(61/42)* | *(61+10m/42+10m)* | *(62+8m/43+8m)* | *(63+6m/44+6m)* | *(64+3m/45+3m)* |
| **Early retiremnet - Male[4]** | 97.2 | 101.2 | 74.6 | 68.9 | 72.9 | 76.9 |
| ***(age/contr. period)*** | *(60+6m/41+6m)* | *(62/43)* | *(62+10m/43+10m)* | *(63+8m/44+8m)* | *(64+6m/45+6m)* | *(65+3m/46+3m)* |

*(1) Assumptions on individual wages/earnings: time series of average gross wage up to 2013; national estimate of average gross wage for 2014; for the forecasting period, the average gross wage is projected according to productivity growth underlying the 2015-AWG baseline scenario assumptions. The tax legislation currently in force is applied.*

*(2) The retirement age for women is 5 years lower.*

*(3) Only allowed to workers insured since 1/1/1996 (NDC regime) with an amount of pension not less than 1.200 € per month in 2012 (2.8 times the old-age allowance in the same year) indexed with the five-year average GDP growth rate.*

*(4) In 2020, men are still under the DB regime while women move to the Mixed regime, being their minimum contribution requirement 1 year lower.*

*(5) Only allowed to workers insured since 1/1/1996 (NDC regime). Given the lower level of contribution rate compared to private employees, access to early retirement requires labour income significantly above the average gross wage, in order to meet the requirement of the minimum pension. Furthermore, considering that the average taxable income of the self-employed is significantly lower than the average gross wage, it follows that access to early retirement with an age requirement up to 3 years less than the SRA, is for this category of workers, quite unlikely.*

# ANNEX 3 -Decomposition of the pension expenditure to GDP ratio

## 3.1 A set of consistent indicators

The ratio between pension expenditure and GDP ($\psi$) can be decomposed as follows:

$$\psi = \frac{P}{\Pi}\ \frac{V}{E}\ \frac{E}{L}\ \frac{R}{V} \quad [1]$$

where: $P$ stands for the average pension amount, $\Pi$ for GDP per worker, $V$ for the old-age population (70 and over), $E$ for the population of working age (20-69), $L$ for the number of employees, and $R$ for the number of pensions. Moreover, setting: $P/\Pi = \lambda$, $V/E = \delta$, $E/L = \alpha$ and $R/V = \beta$, the ratio can be rewritten according to the following formula:

$$\psi = \lambda\ \delta\ \alpha\ \beta \quad [2]$$

Furthermore, $\beta$can be decomposed as follows:

$$\beta = \beta^{dir} + \beta^{sup} + \beta^{sur} + \beta^{less} \quad [3]$$

where: $\beta^{dir}$ stands for the number of pensioners of 70 and over entitled to a direct pension (any kind of pension other than survivor's ones), divided by the old-age population; $\beta^{sup}$ stands for the number of supplementary pensions of 70 and over divided by the old-age population. Supplementary pensions refer to the additional direct pensions (besides the main one) which are generally small in amount, insofar as they are calculated on contribution years other than those already utilised for the main direct pension; $\beta^{sur}$ stands for the number of survivor's pensions of 70 and over divided by the old-age population; $\beta^{less}$ stands for the number of pensions, regardless of the kind, below 70, divided by the old-age population.

In turn, the latter can be further decomposed as a product of two factors:

$$\beta^{less} = \beta^{less}_{norm}\ \beta^{less}_{dem} \quad [4]$$

where: $\beta^{less}_{norm}$ is the ratio between the number of pensions below 65 and the population in the age bracket (50-69), while $\beta^{less}_{dem}$ is defined as the ratio between the population in the age bracket (50-69) and the old age population.

Finally, from equations [2]-[4], we have:

$$\psi = \lambda\ \delta\ \alpha(\beta^{dir} + \beta^{sup} + \beta^{sur} + \beta^{less}_{dem} \cdot \beta^{less}_{norm}) \quad [5]$$

It is worthwhile pointing out that:

- the indicators: $\alpha, \delta$ and $\beta^{less}_{dem}$ do not depend on pension model outcome, but only on the labour market and demographic assumptions agreed within the EPC-WGA;
- the indicator $\lambda$reflects the features of the legal framework as far as calculation and indexation rules are concerned. Therefore, the analyses on replacement rates carried out within the Indicator Subgroup of the Social Protection Committee (which are based on the AWG macroeconomic and demographic assumptions), may represent a useful benchmark;
- the indicator $\beta^{less}_{norm}$ mainly reflects the effects of changes in the eligibility requirements already legislated for;
- the evolution of the indicator $\beta^{sur}$ may be almost entirely explained in terms of demographic forces, namely the increase in life expectancy for both genders, and mortality rates in the age bracket 70 and over;
- finally, the indicator $\beta^{dir}$ allows an assessment of the consistency between elderly people and pensioners in the same age bracket.

By calculating the percentage changes for a given interval of time, the equation [2] becomes:

$$\frac{\Delta\psi}{\psi} = \frac{\Delta\delta}{\delta} + \frac{\Delta\lambda}{\lambda} + \frac{\Delta\beta}{\beta} + \frac{\Delta\alpha}{\alpha} + \nu \quad [6]$$

where $\nu$ measures the interaction effect of the explicative variables.

Finally, changes in the pension expenditure to GDP ratio may be decomposed as follows:

$$\Delta\psi = \left(\frac{\Delta\delta}{\delta} + \frac{\Delta\lambda}{\lambda} + \frac{\Delta\beta}{\beta} + \frac{\Delta\alpha}{\alpha} + \nu\right)\psi \quad [7]$$

The breakdown described in equations [5], [6] and [7] is given in Tables A3.1, A3.2 and A3.3, respectively, for the baseline and all sensitivity test projections.

## 3.2 The decomposition formula agreed in the AWG

To assess the factors behind the evolution of pension expenditure, the following formula has been agreed in the AWG to decompose the pension expenditure to GDP ratio into the effects of dependency ratio, coverage ratio, employment rate and benefit ratio.

$$\frac{\text{PensionExp}}{\text{GDP}} = \overbrace{\frac{\text{Population } 65+}{\text{Population } 20-64}}^{\text{Dependency Ratio}} \times \overbrace{\frac{\text{Number of Pensioners (Pensions)}}{\text{Population } 65+}}^{\text{Coverage Ratio}}$$

$$[8] \times \overbrace{\frac{\text{Average income from pensions (Average Pension)}}{\text{GDP}}}^{\text{Benefit Ratio}} \Big/ \frac{\text{Hours Worked } 20-74}{} \times \overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / Labour Intensity}}$$

The labour market indicator can be further decomposed according to the following:

$$\overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / Labour Intensity}} = \overbrace{\frac{\text{Population } 20-64}{\text{Working People } 20-64}}^{1/\text{ Employment Rate}} \times \overbrace{\frac{\text{Working People } 20-64}{\text{Hours Worked } 20-64}}^{1/\text{ Labour intensity}} \times \overbrace{\frac{\text{Hours Worked } 20-64}{\text{Hours Worked } 20-74}}^{1/\text{ Careershift}} \quad [9]$$

Such a formula may be applied to changes over the entire forecasting period or within sub-periods. Of course, the cumulative effects calculated over the sub-periods must equal that over the entire period. This characteristic should be maintained also when the effects of the driving factors are expressed in terms of potential changes in the pension expenditure to GDP ratio.

However, this does not happen in the Commission's calculations. In fact: i) the cumulative effects over the entire forecasting period are obtained as an algebraic sum of the effects over the ten-year sub-periods, which differ from the value attainable applying the formula directly to 2010-2060 period; ii) the effects calculated for each sub-period (and the sum of them) depend on their temporal length and frequency; iii) changes occurring only to one factor are spread over the others as well[40].

Tables A3.4 compares the Commission's calculations with those consistent with the decomposition formula agreed in the AWG, Table A3.4.a refer to pension, while A3.4.b to pensioner.

[40] For instance, a reduction in the benefit ratio due to normative reasons also affects all the other driving factors, especially demography, the change of which may even outrun that in the benefit ratio.

**Table A3.1: 2015 AWG pension projections – decomposition of pension expenditure to GDP ratio through a consistent set of explanatory factors(1)**

| | baseline scenario | | | | | | lower migration | | | | | | high life expectancy | | | | | | higher employement rate | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Pension expanditure / GDP (*Y*) | 15.7% | 15.3% | 15.7% | 15.8% | 14.8% | 13.8% | 15.7% | 15.4% | 16.0% | 16.3% | 15.4% | 14.2% | 15.7% | 15.3% | 15.6% | 15.7% | 15.1% | 14.2% | 16.2% | 15.5% | 15.0% | 16.0% | 15.8% | 14.5% |
| *Average pension / GDP per worker (l)* | 18.3% | 19.4% | 20.1% | 18.4% | 16.7% | 16.1% | 18.3% | 19.4% | 20.0% | 18.2% | 16.4% | 15.8% | 18.3% | 19.4% | 20.1% | 18.5% | 16.9% | 16.4% | 19.4% | 20.0% | 19.1% | 18.2% | 17.2% | 16.5% |
| *Pension / employees (Y/l = a b d)* | 85.8% | 78.8% | 78.2% | 85.9% | 89.0% | 85.5% | 85.8% | 79.4% | 80.0% | 89.4% | 93.9% | 90.3% | 85.8% | 78.8% | 77.8% | 85.2% | 89.3% | 86.4% | 83.4% | 77.7% | 78.5% | 87.9% | 92.0% | 88.3% |
| *Old age dependency ratio pop (70+) / pop (20-69) (d)* | 28.9% | 32.1% | 38.0% | 47.6% | 52.7% | 52.6% | 28.9% | 32.4% | 39.0% | 49.7% | 55.7% | 55.4% | 29.0% | 32.3% | 38.8% | 49.3% | 55.7% | 57.0% | 28.9% | 32.1% | 38.0% | 47.6% | 52.7% | 52.6% |
| *Pop (20-69) / employees (a)* | 148.9% | 137.4% | 125.4% | 124.0% | 125.5% | 123.7% | 148.9% | 137.1% | 124.8% | 123.1% | 124.7% | 123.3% | 148.9% | 137.4% | 125.4% | 123.9% | 125.3% | 123.6% | 144.0% | 134.4% | 123.1% | 124.4% | 127.0% | 126.0% |
| *Pensions / pop (70+) ($b=b^{dir}+b^{sup}+b^{sur}+b^{less}$)* | 199.3% | 178.3% | 164.0% | 145.7% | 134.6% | 131.4% | 199.3% | 178.5% | 164.4% | 146.2% | 135.2% | 132.2% | 199.0% | 177.6% | 160.2% | 139.7% | 128.0% | 122.6% | 200.2% | 179.8% | 167.8% | 148.6% | 137.4% | 133.3% |
| *Direct pensioners (70+) / pop (70+) ($b^{dir}$)* | 84.1% | 85.0% | 84.2% | 85.9% | 86.6% | 86.7% | 84.1% | 85.1% | 84.4% | 86.1% | 86.8% | 87.1% | 84.0% | 85.1% | 84.3% | 86.0% | 86.1% | 85.0% | 84.6% | 85.5% | 85.8% | 87.7% | 88.8% | 88.7% |
| *Direct supplementary pensions (70+) / pop (70+) ($b^{sup}$)* | 7.8% | 9.9% | 7.5% | 5.6% | 4.7% | 4.0% | 7.8% | 9.9% | 7.6% | 5.7% | 4.8% | 4.1% | 7.8% | 9.8% | 7.6% | 5.6% | 4.6% | 3.8% | 7.3% | 10.1% | 9.1% | 5.8% | 4.1% | 3.7% |
| *Survivors' pensions (70+) / pop (70+) ($b^{sur}$)* | 37.1% | 35.7% | 31.7% | 26.5% | 25.3% | 25.7% | 37.1% | 35.7% | 31.8% | 26.6% | 25.5% | 26.0% | 37.1% | 35.6% | 31.2% | 25.6% | 23.7% | 23.3% | 37.4% | 35.5% | 32.2% | 27.3% | 25.5% | 25.3% |
| *Pensions (<70) / pop (70+) ($b^{less}={}_{norm}b^{less}*{}_{dem}b^{less}$)* | 70.2% | 47.7% | 40.6% | 27.7% | 18.1% | 15.0% | 70.2% | 47.7% | 40.6% | 27.8% | 18.1% | 15.0% | 70.1% | 47.1% | 37.1% | 22.5% | 13.6% | 10.6% | 71.0% | 48.8% | 40.6% | 27.9% | 19.0% | 15.7% |
| *Pensions (<70) / pop (50-69) ($_{norm}b^{less}$)* | 80.1% | 52.4% | 53.5% | 51.3% | 36.4% | 29.0% | 80.1% | 52.5% | 54.0% | 52.7% | 38.1% | 30.1% | 80.1% | 51.9% | 49.9% | 43.1% | 28.9% | 22.0% | 81.0% | 53.6% | 53.6% | 51.5% | 38.3% | 30.3% |
| *pop (50-69) / pop (70+) ($_{dem}b^{less}$)* | 87.7% | 91.0% | 75.7% | 54.1% | 49.7% | 51.9% | 87.7% | 90.9% | 75.2% | 52.7% | 47.4% | 49.7% | 87.6% | 90.7% | 74.3% | 52.3% | 47.1% | 48.0% | 87.7% | 91.0% | 75.7% | 54.1% | 49.7% | 51.9% |
| | higher employement/partecipation rate older | | | | | | Risk scenario | | | | | | higher labour productivity | | | | | | lower labour productivity | | | | | |
| | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 | 2013 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Pension expanditure / GDP (*Y*) | 15.7% | 14.7% | 14.7% | 15.0% | 14.4% | 13.3% | 15.7% | 15.4% | 16.0% | 16.3% | 15.4% | 14.3% | 15.7% | 15.3% | 15.4% | 15.3% | 14.3% | 13.3% | 15.7% | 15.4% | 16.0% | 16.3% | 15.4% | 14.3% |
| *Average pension / GDP per worker (l)* | 18.3% | 19.3% | 20.3% | 19.0% | 17.4% | 16.8% | 18.3% | 19.5% | 20.5% | 19.0% | 17.3% | 16.7% | 18.3% | 19.4% | 19.7% | 17.8% | 16.1% | 15.6% | 18.3% | 19.5% | 20.5% | 19.0% | 17.3% | 16.7% |
| *Pension / employees (Y/l = a b d)* | 85.8% | 76.0% | 72.4% | 78.9% | 82.2% | 78.8% | 85.8% | 78.8% | 78.2% | 85.9% | 89.0% | 85.4% | 85.8% | 78.8% | 78.2% | 85.9% | 89.1% | 85.5% | 85.8% | 78.8% | 78.2% | 85.9% | 89.0% | 85.4% |
| *Old age dependency ratio pop (70+) / pop (20-69) (d)* | 28.9% | 32.1% | 38.0% | 47.6% | 52.7% | 52.6% | 28.9% | 32.1% | 38.0% | 47.6% | 52.7% | 52.6% | 28.9% | 32.1% | 38.0% | 47.6% | 52.7% | 52.6% | 28.9% | 32.1% | 38.0% | 47.6% | 52.7% | 52.6% |
| *Pop (20-69) / employees (a)* | 148.9% | 133.1% | 117.2% | 115.9% | 117.9% | 116.3% | 148.9% | 137.4% | 125.4% | 124.0% | 125.5% | 123.7% | 148.9% | 137.4% | 125.4% | 124.0% | 125.5% | 123.7% | 148.9% | 137.4% | 125.4% | 124.0% | 125.5% | 123.7% |
| *Pensions / pop (70+) ($b=b^{dir}+b^{sup}+b^{sur}+b^{less}$)* | 199.3% | 177.6% | 162.5% | 143.2% | 132.4% | 128.9% | 199.3% | 178.3% | 164.0% | 145.7% | 134.5% | 131.3% | 199.3% | 178.3% | 164.0% | 145.8% | 134.7% | 131.5% | 199.3% | 178.3% | 164.0% | 145.7% | 134.5% | 131.3% |
| *Direct pensioners (70+) / pop (70+) ($b^{dir}$)* | 84.0% | 84.8% | 83.7% | 85.5% | 86.3% | 86.7% | 84.1% | 85.0% | 84.2% | 85.9% | 86.5% | 86.7% | 84.1% | 85.0% | 84.2% | 85.9% | 86.6% | 86.8% | 84.1% | 85.0% | 84.2% | 85.9% | 86.5% | 86.7% |
| *Direct supplementary pensions (70+) / pop (70+) ($b^{sup}$)* | 7.9% | 10.1% | 8.5% | 6.3% | 5.0% | 3.9% | 7.8% | 9.9% | 7.5% | 5.6% | 4.7% | 4.0% | 7.8% | 9.9% | 7.5% | 5.6% | 4.7% | 4.0% | 7.8% | 9.9% | 7.5% | 5.6% | 4.7% | 4.0% |
| *Survivors' pensions (70+) / pop (70+) ($b^{sur}$)* | 37.1% | 35.7% | 31.7% | 26.5% | 25.3% | 25.6% | 37.1% | 35.7% | 31.7% | 26.5% | 25.3% | 25.7% | 37.1% | 35.7% | 31.7% | 26.5% | 25.3% | 25.7% | 37.1% | 35.7% | 31.7% | 26.5% | 25.3% | 25.7% |
| *Pensions (<70) / pop (70+) ($b^{less}={}_{norm}b^{less}*{}_{dem}b^{less}$)* | 70.2% | 47.1% | 38.6% | 24.9% | 15.8% | 12.6% | 70.2% | 47.7% | 40.6% | 27.7% | 18.0% | 15.0% | 70.2% | 47.7% | 40.6% | 27.7% | 18.1% | 15.1% | 70.2% | 47.7% | 40.6% | 27.7% | 18.0% | 15.0% |
| *Pensions (<70) / pop (50-69) ($_{norm}b^{less}$)* | 80.1% | 51.7% | 51.0% | 46.0% | 31.7% | 24.3% | 80.1% | 52.4% | 53.5% | 51.2% | 36.3% | 28.9% | 80.1% | 52.4% | 53.6% | 51.3% | 36.4% | 29.1% | 80.1% | 52.4% | 53.5% | 51.2% | 36.3% | 28.9% |
| *pop (50-69) / pop (70+) ($_{dem}b^{less}$)* | 87.7% | 91.0% | 75.7% | 54.1% | 49.7% | 51.9% | 87.7% | 91.0% | 75.7% | 54.1% | 49.7% | 51.9% | 87.7% | 91.0% | 75.7% | 54.1% | 49.7% | 51.9% | 87.7% | 91.0% | 75.7% | 54.1% | 49.7% | 51.9% |

(1) With regard to population, pensions and pensioners, figures are referred to the end of the year.

**Table A3.2: 2015 AWG pension projections – break-down of percentage changes in pension expenditure to GDP ratio[1]**

| | baseline scenario | | | | | lower migration | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -2.6% | 2.6% | 0.6% | -6.1% | -7.0% | -2.6% | 2.6% | 0.6% | -6.1% | -7.0% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 11.1% | 18.2% | 25.1% | 10.8% | -0.3% | 11.1% | 18.2% | 25.1% | 10.8% | -0.3% |
| *Avarage pension / GDP per worker (Dl / l)* | 6.2% | 3.3% | -8.5% | -9.4% | -3.1% | 6.2% | 3.3% | -8.5% | -9.4% | -3.1% |
| *Pension / pop(70+) (Db / b)* | -10.5% | -8.0% | -11.1% | -7.6% | -2.4% | -10.5% | -8.0% | -11.1% | -7.6% | -2.4% |
| *Pop(20-69) / employees (Da / a)* | -7.7% | -8.7% | -1.2% | 1.2% | -1.4% | -7.7% | -8.7% | -1.2% | 1.2% | -1.4% |
| *Interaction (n)* | 1.0% | -4.8% | -4.3% | 5.0% | 7.2% | 1.0% | -4.8% | -4.3% | 5.0% | 7.2% |
| | high life expectancy | | | | | higher employement rate | | | | |
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -2.7% | 2.1% | 0.7% | -4.3% | -6.0% | -4.4% | -3.2% | 6.5% | -1.2% | -8.0% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 11.5% | 20.0% | 27.1% | 13.0% | 2.4% | 11.1% | 18.2% | 25.1% | 10.8% | -0.3% |
| *Avarage pension / GDP per worker (Dl / l)* | 6.1% | 3.3% | -8.0% | -8.7% | -2.8% | 2.7% | -4.2% | -4.9% | -5.6% | -4.2% |
| *Pension / pop(70+) (Db / b)* | -10.8% | -9.8% | -12.8% | -8.3% | -4.3% | -10.2% | -6.7% | -11.4% | -7.6% | -2.9% |
| *Pop(20-69) / employees (Da / a)* | -7.7% | -8.7% | -1.2% | 1.2% | -1.4% | -6.7% | -8.4% | 1.0% | 2.1% | -0.9% |
| *Interaction (n)* | 1.0% | -4.8% | -5.1% | 2.8% | 6.0% | 3.0% | 1.1% | -9.8% | 0.2% | 8.2% |
| | higher employement/partecipation rate | | | | | Risk scenario | | | | |
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -6.8% | 0.2% | 2.2% | -4.4% | -7.5% | -2.3% | 4.4% | 1.6% | -5.7% | -7.0% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 11.1% | 18.2% | 25.1% | 10.8% | -0.3% | 11.1% | 18.2% | 25.1% | 10.8% | -0.3% |
| *Avarage pension / GDP per worker (Dl / l)* | 5.3% | 5.2% | -6.2% | -8.2% | -3.5% | 6.5% | 5.1% | -7.5% | -8.9% | -3.1% |
| *Pension / pop(70+) (Db / b)* | -10.9% | -8.5% | -11.9% | -7.5% | -2.6% | -10.5% | -8.0% | -11.2% | -7.6% | -2.4% |
| *Pop(20-69) / employees (Da / a)* | -10.6% | -11.9% | -1.1% | 1.7% | -1.4% | -7.7% | -8.7% | -1.2% | 1.2% | -1.4% |
| *Interaction (n)* | 5.1% | -2.9% | -5.9% | 3.3% | 7.7% | 0.6% | -6.6% | -5.3% | 4.6% | 7.2% |
| | higher labour productivity | | | | | lower labour productivity | | | | |
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -2.9% | 0.9% | -0.5% | -6.5% | -7.0% | -2.3% | 4.4% | 1.6% | -5.7% | -7.0% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 11.1% | 18.2% | 25.1% | 10.8% | -0.3% | 11.1% | 18.2% | 25.1% | 10.8% | -0.3% |
| *Avarage pension / GDP per worker (Dl / l)* | 5.8% | 1.6% | -9.4% | -9.8% | -3.1% | 6.5% | 5.1% | -7.5% | -8.9% | -3.1% |
| *Pension / pop(70+) (Db / b)* | -10.5% | -8.0% | -11.1% | -7.6% | -2.4% | -10.5% | -8.0% | -11.2% | -7.6% | -2.4% |
| *Pop(20-69) / employees (Da / a)* | -7.7% | -8.7% | -1.2% | 1.2% | -1.4% | -7.7% | -8.7% | -1.2% | 1.2% | -1.4% |
| *Interaction (n)* | 1.3% | -3.1% | -3.4% | 5.4% | 7.2% | 0.6% | -6.6% | -5.3% | 4.6% | 7.2% |

(1) With regard to population, pensions and pensioners, figures are referred to the end of the year.

**Table A3.3: 2015 AWG pension projections – break-down of changes in pension expenditure to GDP ratio(1)**

| | baseline scenario | | | | | lower migration | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -0.4% | 0.4% | 0.1% | -1.0% | -1.0% | -0.4% | 0.4% | 0.1% | -1.0% | -1.1% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 1.7% | 2.8% | 4.0% | 1.7% | 0.0% | 1.7% | 2.8% | 4.0% | 1.8% | 0.0% |
| *Avarage pension / GDP per worker (Dl / l)* | 1.0% | 0.5% | -1.3% | -1.5% | -0.5% | 1.0% | 0.5% | -1.4% | -1.5% | -0.5% |
| *Pension / pop(70+) (Db / b)* | -1.7% | -1.2% | -1.8% | -1.2% | -0.4% | -1.7% | -1.2% | -1.8% | -1.2% | -0.4% |
| *Pop(20-69) / employees (Da / a)* | -1.2% | -1.3% | -0.2% | 0.2% | -0.2% | -1.2% | -1.3% | -0.2% | 0.2% | -0.2% |
| *Interaction (n)* | 0.1% | -0.7% | -0.7% | 0.8% | 1.1% | 0.1% | -0.7% | -0.7% | 0.8% | 1.1% |
| | high life expectancy | | | | | higher employement rate | | | | |
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -0.4% | 0.3% | 0.1% | -0.7% | -0.9% | -0.7% | -0.5% | 1.0% | -0.2% | -1.3% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 1.8% | 3.1% | 4.2% | 2.0% | 0.4% | 1.8% | 2.8% | 3.8% | 1.7% | 0.0% |
| *Avarage pension / GDP per worker (Dl / l)* | 1.0% | 0.5% | -1.3% | -1.4% | -0.4% | 0.4% | -0.7% | -0.7% | -0.9% | -0.7% |
| *Pension / pop(70+) (Db / b)* | -1.7% | -1.5% | -2.0% | -1.3% | -0.6% | -1.7% | -1.0% | -1.7% | -1.2% | -0.5% |
| *Pop(20-69) / employees (Da / a)* | -1.2% | -1.3% | -0.2% | 0.2% | -0.2% | -1.1% | -1.3% | 0.2% | 0.3% | -0.1% |
| *Interaction (n)* | 0.2% | -0.7% | -0.8% | 0.4% | 0.9% | 0.5% | 0.2% | -1.5% | 0.0% | 1.3% |
| | higher employement/partecipation | | | | | Risk scenario | | | | |
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -1.1% | 0.0% | 0.3% | -0.7% | -1.1% | -0.4% | 0.7% | 0.3% | -0.9% | -1.1% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 1.7% | 2.7% | 3.7% | 1.6% | 0.0% | 1.7% | 2.8% | 4.0% | 1.8% | 0.0% |
| *Avarage pension / GDP per worker (Dl / l)* | 0.8% | 0.8% | -0.9% | -1.2% | -0.5% | 1.0% | 0.8% | -1.2% | -1.5% | -0.5% |
| *Pension / pop(70+) (Db / b)* | -1.7% | -1.2% | -1.7% | -1.1% | -0.4% | -1.7% | -1.2% | -1.8% | -1.2% | -0.4% |
| *Pop(20-69) / employees (Da / a)* | -1.7% | -1.7% | -0.2% | 0.3% | -0.2% | -1.2% | -1.3% | -0.2% | 0.2% | -0.2% |
| *Interaction (n)* | 0.8% | -0.4% | -0.9% | 0.5% | 1.1% | 0.1% | -1.0% | -0.9% | 0.7% | 1.1% |
| | higher labour productivity | | | | | lower labour productivity | | | | |
| | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 | '20-'13 | '30-'20 | '40-'30 | '50-'40 | '60-'50 |
| Pension expanditure / GDP (DY / Y) | -0.5% | 0.1% | -0.1% | -1.0% | -1.0% | -0.4% | 0.7% | 0.3% | -0.9% | -1.1% |
| *Pop(70+) / pop(20-69) (Dd/d)* | 1.7% | 2.8% | 3.9% | 1.7% | 0.0% | 1.7% | 2.8% | 4.0% | 1.8% | 0.0% |
| *Avarage pension / GDP per worker (Dl / l)* | 0.9% | 0.2% | -1.5% | -1.5% | -0.4% | 1.0% | 0.8% | -1.2% | -1.5% | -0.5% |
| *Pension / pop(70+) (Db / b)* | -1.7% | -1.2% | -1.7% | -1.2% | -0.3% | -1.7% | -1.2% | -1.8% | -1.2% | -0.4% |
| *Pop(20-69) / employees (Da / a)* | -1.2% | -1.3% | -0.2% | 0.2% | -0.2% | -1.2% | -1.3% | -0.2% | 0.2% | -0.2% |
| *Interaction (n)* | 0.2% | -0.5% | -0.5% | 0.8% | 1.0% | 0.1% | -1.0% | -0.9% | 0.7% | 1.1% |

(1) With regard to population, pensions and pensioners, figures are referred to the end of the year.

**Table A3.4.a: 2015 AWG pension projections – factors behind the change in public pension expenditures between 2010 and 2060 (in percentage points of GDP) - Pension**

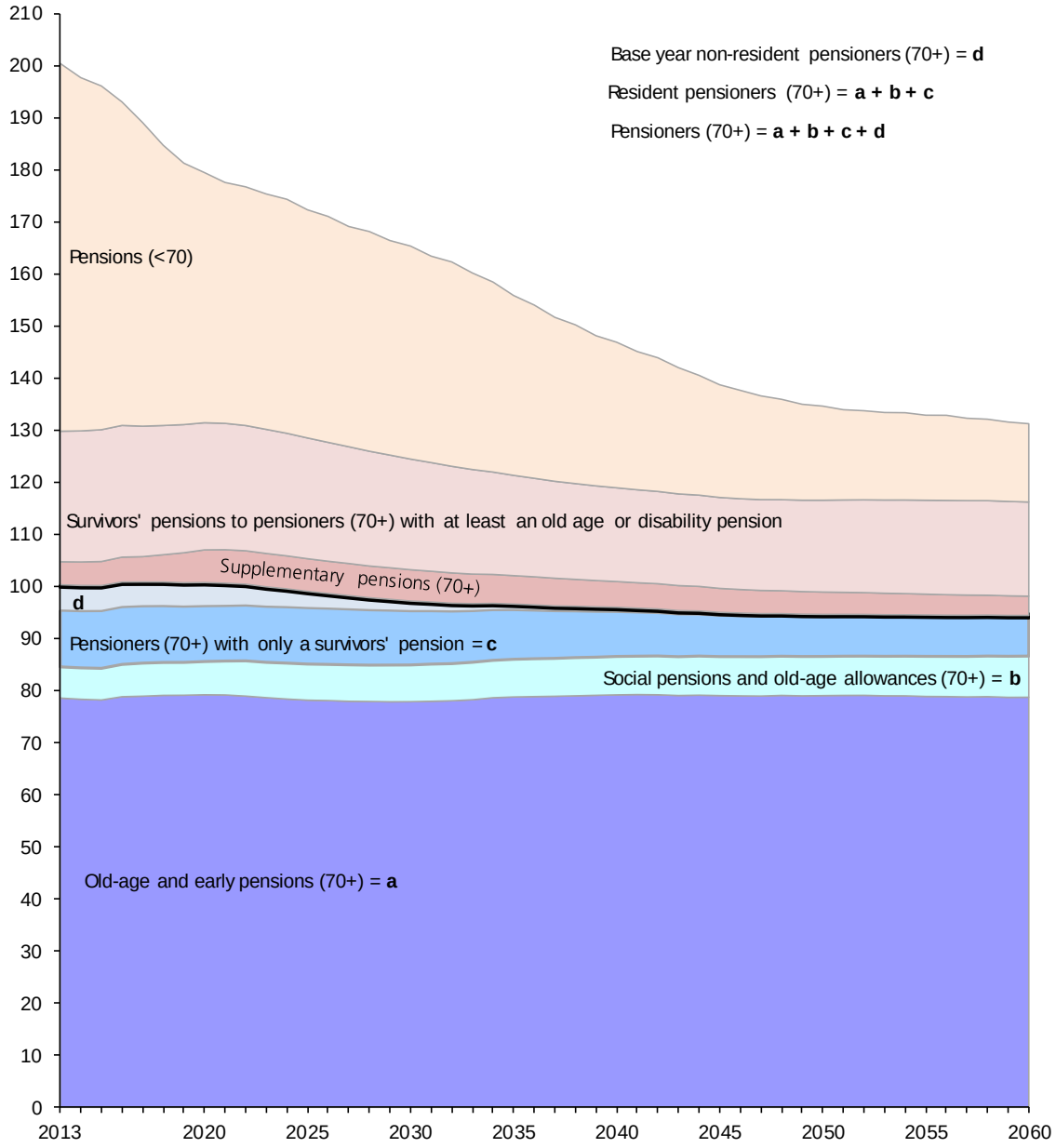
| | | 2013-20 | 2020-30 | 2030-40 | 2040-50 | 2050-60 | 2013-60 | Average annual change |
|---|---|---|---|---|---|---|---|---|
| Calculation consistent with the AWG decomposition formula | Public pensions to GDP | -0.4 | 0.4 | 0.1 | -1.0 | -1.0 | -1.9 | -0.041 |
| | Dependency ratio effect | 1.2 | 3.0 | 4.4 | 1.4 | 0.1 | 10.1 | 0.214 |
| | Coverage ratio effect | -1.4 | -1.5 | -1.0 | -0.3 | -0.4 | -4.5 | -0.097 |
| | Benefit ratio effect | 0.9 | 0.5 | -1.5 | -1.5 | -0.4 | -1.9 | -0.041 |
| | Labour Market/Labour intensity effect | -0.9 | -0.9 | -0.3 | 0.1 | -0.2 | -2.2 | -0.048 |
| | - Employment ratio effect | -0.8 | -0.4 | -0.1 | 0.0 | 0.0 | -1.4 | -0.030 |
| | - Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.001 |
| | - Career shift effect | -0.2 | -0.5 | -0.2 | 0.1 | -0.2 | -1.0 | -0.021 |
| | Residual | -0.2 | -0.8 | -1.5 | -0.7 | -0.2 | -3.3 | -0.070 |
| Commission's calculations | Public pensions to GDP | -0.4 | 0.4 | 0.1 | -1.0 | -1.0 | -1.9 | -0.031 |
| | Dependency ratio effect | 1.2 | 2.7 | 3.3 | 0.9 | 0.1 | 8.0 | 0.167 |
| | Coverage ratio effect | -1.5 | -1.6 | -1.2 | -0.4 | -0.5 | -5.2 | -0.118 |
| | Benefit ratio effect | 0.9 | 0.5 | -1.4 | -1.5 | -0.5 | -1.9 | -0.036 |
| | Labour Market/Labour intensity effect | -0.9 | -0.9 | -0.4 | 0.1 | -0.2 | -2.3 | -0.042 |
| | - Employment ratio effect | -0.8 | -0.4 | -0.2 | 0.0 | 0.0 | -1.4 | -0.024 |
| | - Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.002 |
| | - Career shift effect | -0.2 | -0.5 | -0.2 | 0.1 | -0.2 | -1.0 | -0.021 |
| | Residual | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 | -0.5 | -0.003 |
| Differences | Public pensions to GDP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.010 |
| | Dependency ratio effect | 0.0 | 0.4 | 1.1 | 0.5 | 0.0 | 2.0 | 0.047 |
| | Coverage ratio effect | 0.0 | 0.2 | 0.2 | 0.1 | 0.1 | 0.6 | 0.022 |
| | Benefit ratio effect | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | 0.0 | -0.006 |
| | Labour Market/Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.006 |
| | - Employment ratio effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.006 |
| | - Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.001 |
| | - Career shift effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 |
| | Residual | -0.1 | -0.6 | -1.3 | -0.6 | -0.2 | -2.7 | -0.067 |

**Table A3.4.b: 2015 AWG pension projections – factors behind the change in public pension expenditures between 2010 and 2060 (in percentage points of GDP) - Pensioner**

| | | 2013-20 | 2020-30 | 2030-40 | 2040-50 | 2050-60 | 2013-60 | Average annual change |
|---|---|---|---|---|---|---|---|---|
| Calculation consistent with the AWG decomposition formula | Public pensions to GDP | -0.4 | 0.4 | 0.1 | -1.0 | -1.0 | -1.9 | -0.041 |
| | Dependency ratio effect | 1.2 | 3.0 | 4.4 | 1.4 | 0.1 | 10.1 | 0.214 |
| | Coverage ratio effect | -1.6 | -1.3 | -0.8 | -0.3 | -0.4 | -4.4 | -0.093 |
| | Benefit ratio effect | 1.2 | 0.3 | -1.7 | -1.4 | -0.4 | -2.1 | -0.045 |
| | Labour Market/Labour intensity effect | -0.9 | -0.9 | -0.3 | 0.1 | -0.2 | -2.2 | -0.048 |
| | - Employment ratio effect | -0.8 | -0.4 | -0.1 | 0.0 | 0.0 | -1.4 | -0.030 |
| | - Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.001 |
| | - Career shift effect | -0.2 | -0.5 | -0.2 | 0.1 | -0.2 | -1.0 | -0.021 |
| | Residual | -0.2 | -0.8 | -1.4 | -0.7 | -0.2 | -3.2 | -0.069 |
| Commission's calculations | Public pensions to GDP | -0.4 | 0.4 | 0.1 | -1.0 | -1.0 | -1.9 | -0.031 |
| | Dependency ratio effect | 1.2 | 2.7 | 3.3 | 0.9 | 0.1 | 8.0 | 0.167 |
| | Coverage ratio effect | -1.7 | -1.4 | -1.0 | -0.4 | -0.5 | -5.0 | -0.112 |
| | Benefit ratio effect | 1.2 | 0.3 | -1.6 | -1.5 | -0.5 | -2.1 | -0.041 |
| | Labour Market/Labour intensity effect | -0.9 | -0.9 | -0.4 | 0.1 | -0.2 | -2.3 | -0.042 |
| | - Employment ratio effect | -0.8 | -0.4 | -0.2 | 0.0 | 0.0 | -1.4 | -0.024 |
| | - Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.002 |
| | - Career shift effect | -0.2 | -0.5 | -0.2 | 0.1 | -0.2 | -1.0 | -0.021 |
| | Residual | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 | -0.5 | -0.003 |
| Differences | Public pensions to GDP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.010 |
| | Dependency ratio effect | 0.0 | 0.4 | 1.1 | 0.5 | 0.0 | 2.0 | 0.047 |
| | Coverage ratio effect | 0.0 | 0.2 | 0.2 | 0.1 | 0.1 | 0.6 | 0.019 |
| | Benefit ratio effect | 0.0 | 0.0 | -0.1 | 0.1 | 0.0 | 0.0 | -0.004 |
| | Labour Market/Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.006 |
| | - Employment ratio effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.006 |
| | - Labour intensity effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.001 |
| | - Career shift effect | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.000 |
| | Residual | -0.1 | -0.6 | -1.2 | -0.6 | -0.2 | -2.7 | -0.067 |

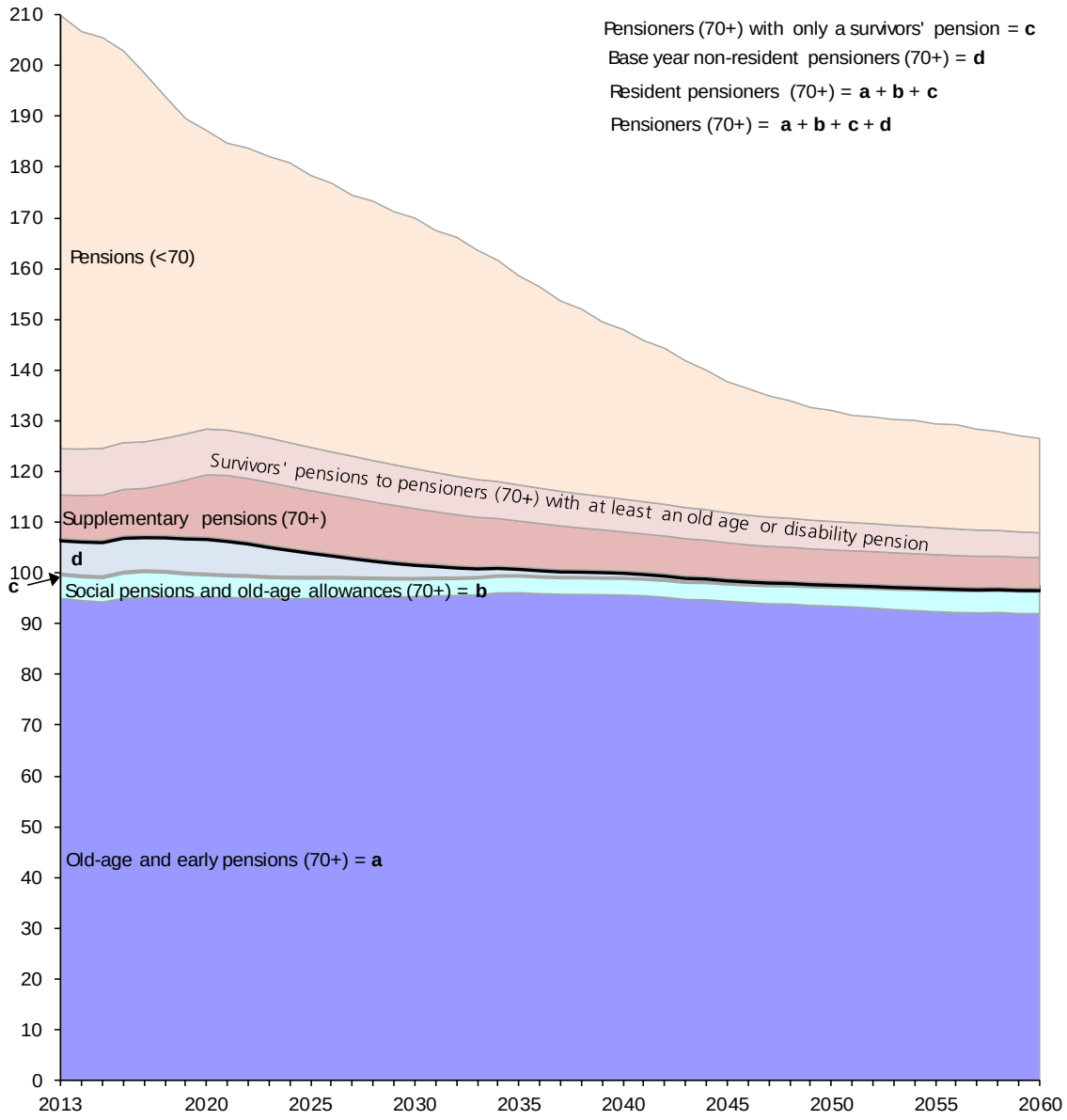
# ANNEX 4 - Pensions as a share of population 70+

**Figure A4.a: male and female[(1)]**



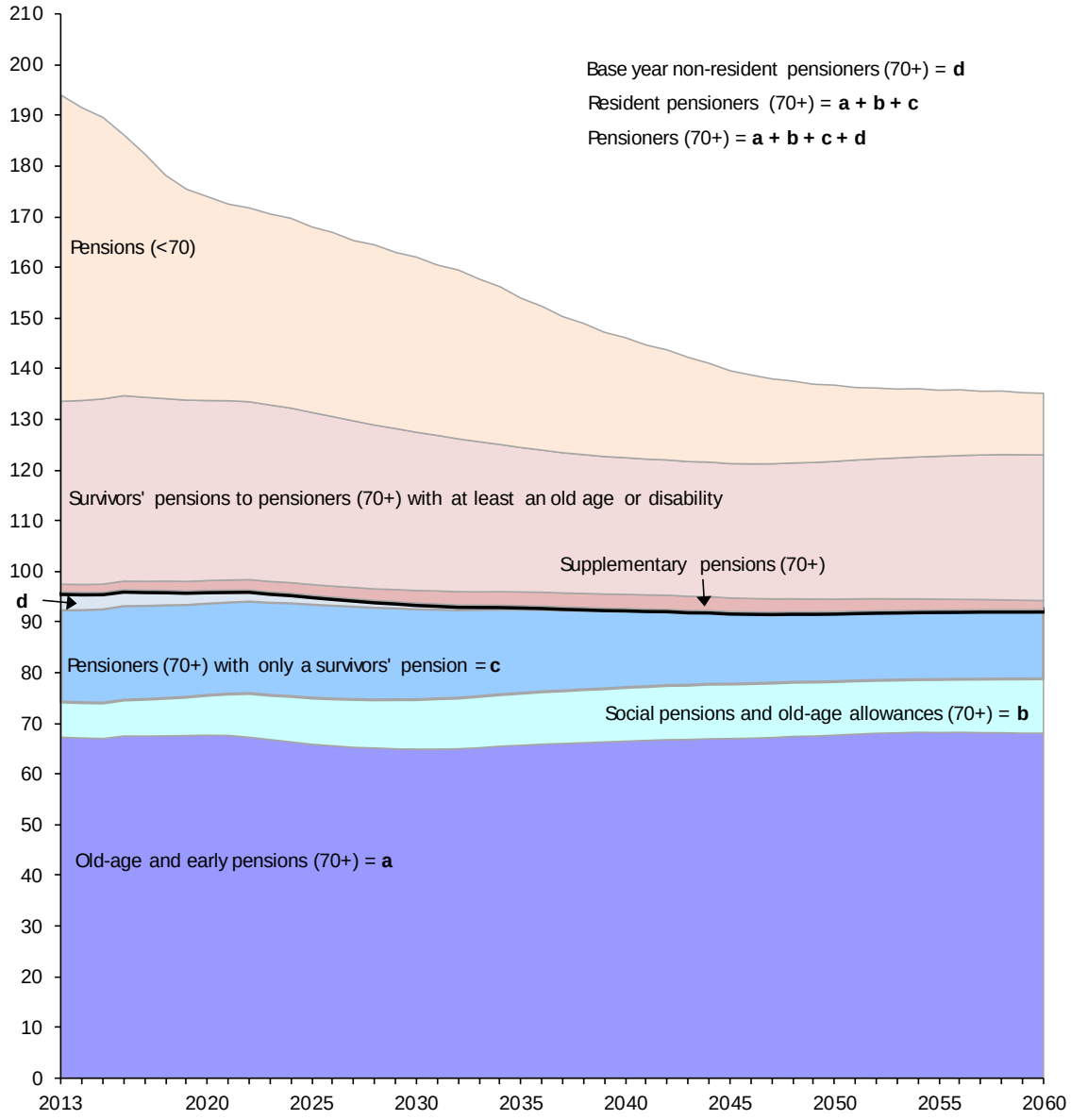

(1) Pensions, pensioners and population at the end of the year

**Figure A4.b: male**[(1)]




(1) Pensions, pensioners and population at the end of the year

**Figure A4.c: female**[(1)]



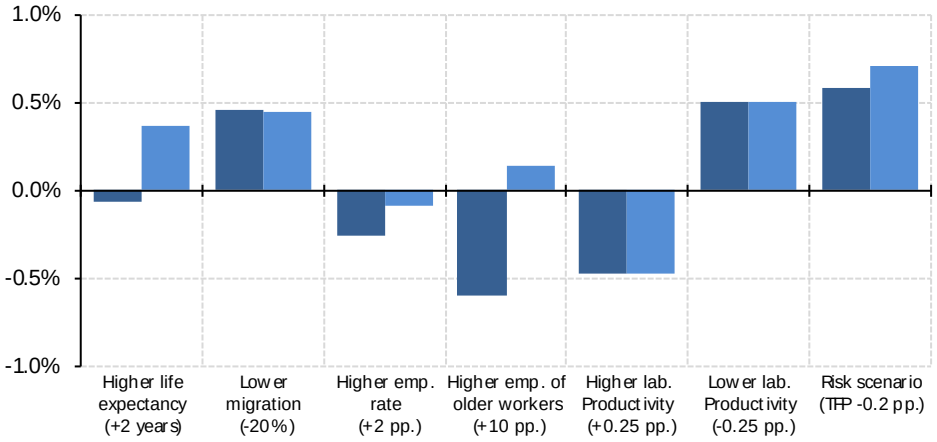

(1) Pensions, pensioners and population at the end of the year

# ANNEX 5 -Sensitivity analysis

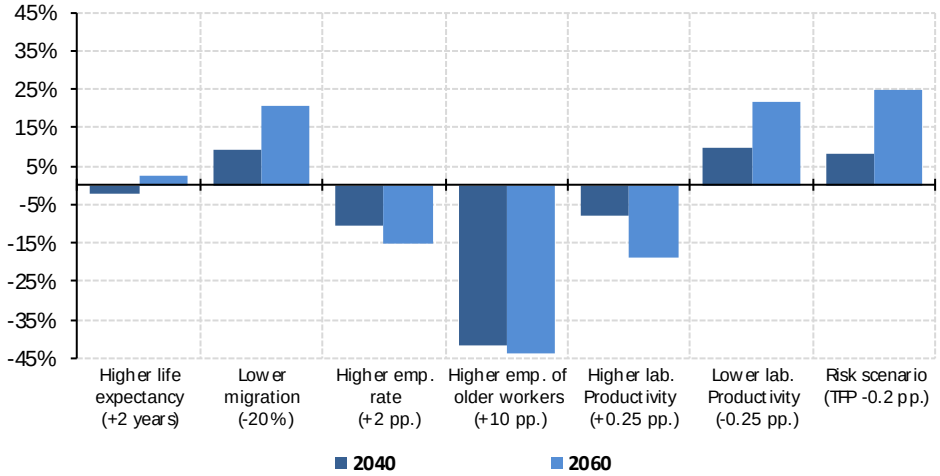
A series of graphs are given below, to complement the sensitivity analysis of the Italian pension system. In particular, graph A5.1.a compares the deviations in the pension expenditure to GDP ratio in 2040 and 2060. Graph A5.1.b reports the corresponding deviations in terms of public debt[41] as share of GDP. Finally, graphs A5.2 – A5.7 compare the evolution of the pension expenditure to GDP ratio as well as their driving factors, under the baseline and the sensitivity test assumptions.

**Figure A5.1: Sensitivity analysis**

**FigureA5.1.a: pension expendituture as percentage of GDP, year 2040 and 2060 - Comparison with the baseline scenario**




**FigureA5.1.b: differential cumulative effect on debt - Years 2040 and 2060**




[41] The effect on public debt has been projected according to the EU methodology for the calculation of the cost of ageing in the S1 and S2 indicators.

Figure A5.2: pension expenditure as a percentage of GDP and its decomposition - A comparision between two hypotheses on life expectancy

Figure A5.2.a: percentage ratio of expenditure to GDP

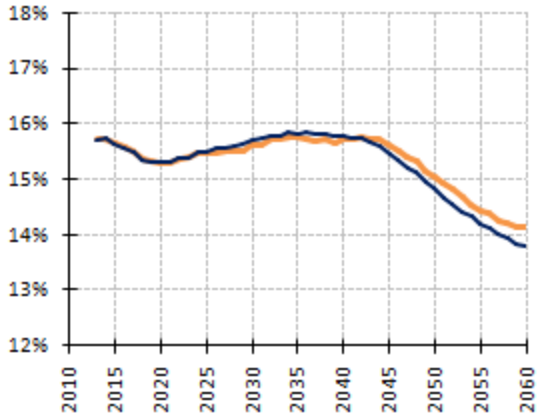



Figure A5.2.d: percentage ratio of pensions to people of 70+

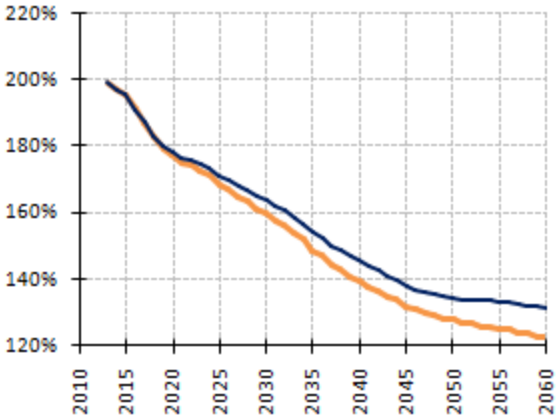



Figure A5.2.b: percentage ratio of average pension to productivity

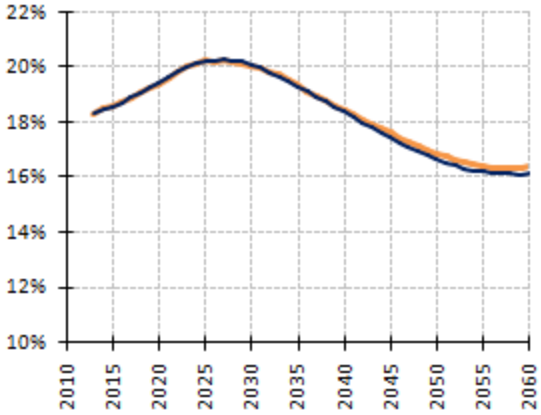



Figure A5.2.e: percentage ratio of employees to population [20-69]

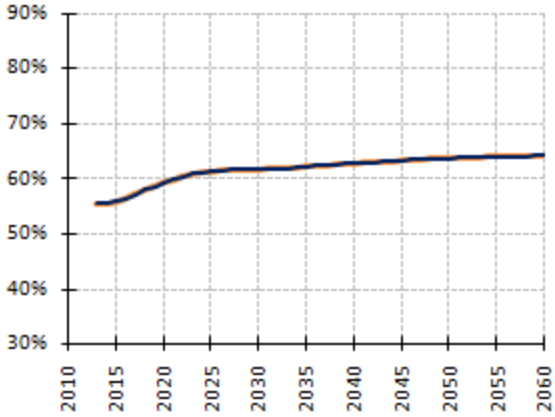



Figure A5.2.c: percentage ratio of pensions to employees

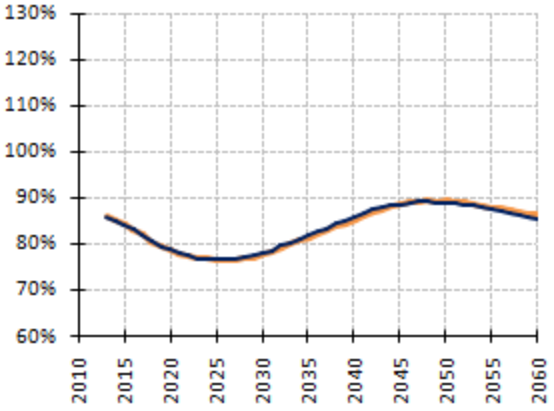
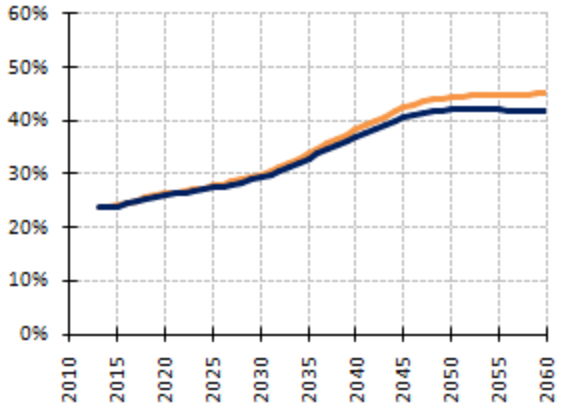



Figure A5.2.f: percentage ratio of people of 70+ to population [20-69]




Higher life expectancy (+2 years) Baseline

Figure A5.3: pension expenditure as a percentage of GDP and its decomposition - A comparision between two hypotheses on migration flows

Figure A5.3.a: percentage ratio of expenditure to GDP

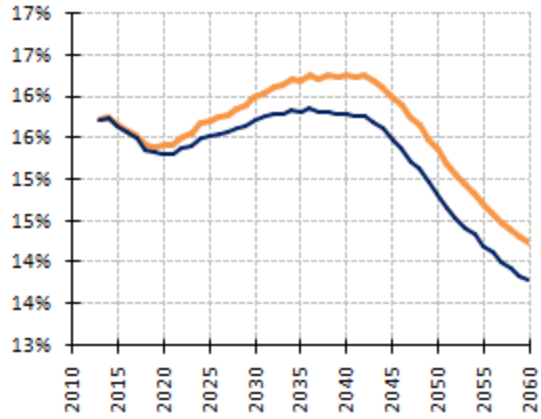



Figure A5.3.d: percentage ratio of pensions to people of 70+

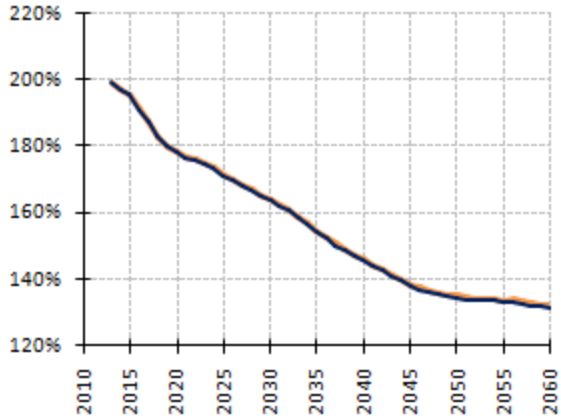



Figure A5.3.b: percentage ratio of average pension to productivity

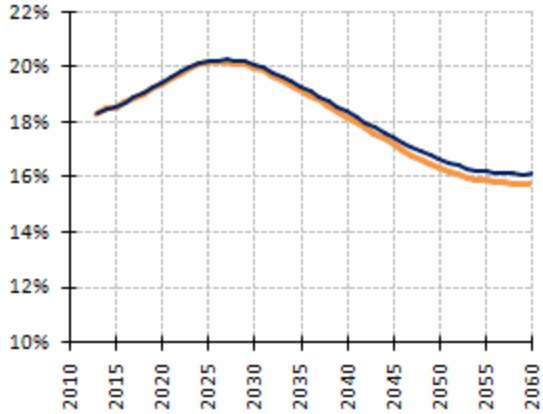



Figure A5.3.e: percentage ratio of employees to population [20-69]

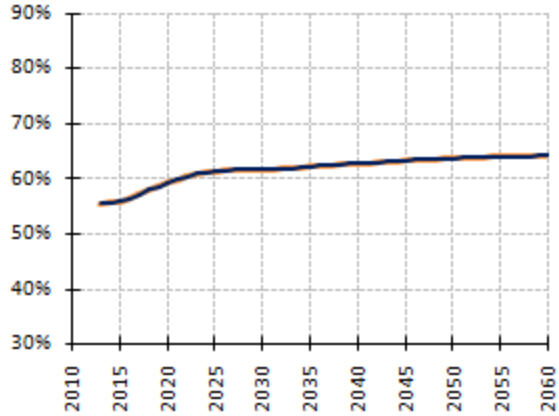



Figure A5.3.c: percentage ratio of pensions to employees

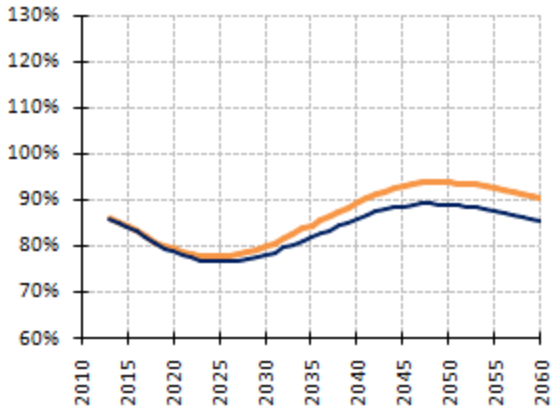
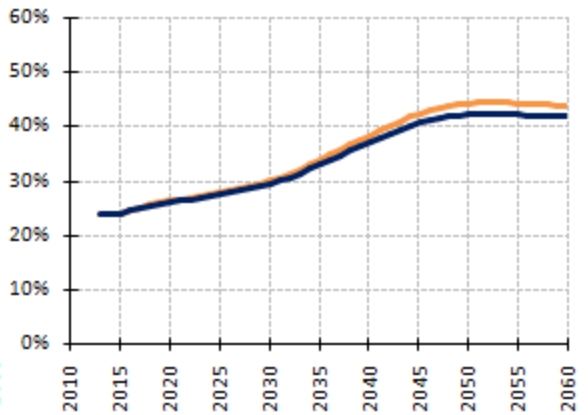



Figure A5.3.f: percentage ratio of people of 70+ to population [20-69]




Lower migration (-20%) Baseline

**Figure A5.4: pension expenditure as a percentage of GDP and its decomposition - A comparision between two hypotheses on employment rate**

**Figure A5.4.a: percentage ratio of expenditure to GDP**

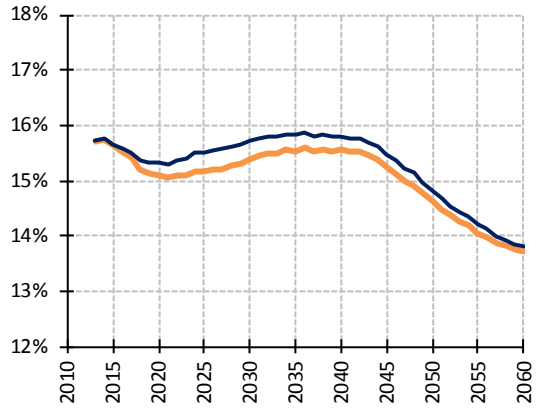



**Figure A5.4.b: percentage ratio of average pension to productivity**

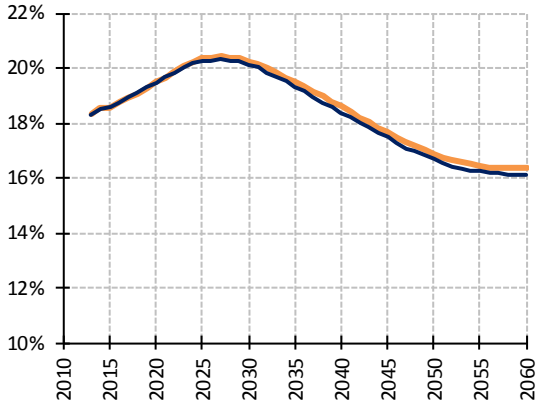



**Figure A5.4.c: percentage ratio of pensions to employees**

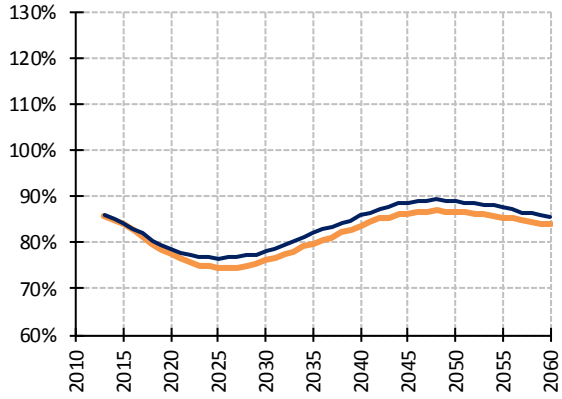



**Figure A5.4.d: percentage ratio of pensions to people of 70+**

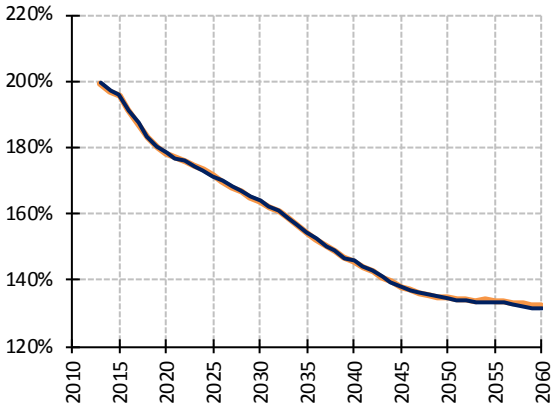



**Figure A5.4.e: percentage ratio of employees to population [20-69]**

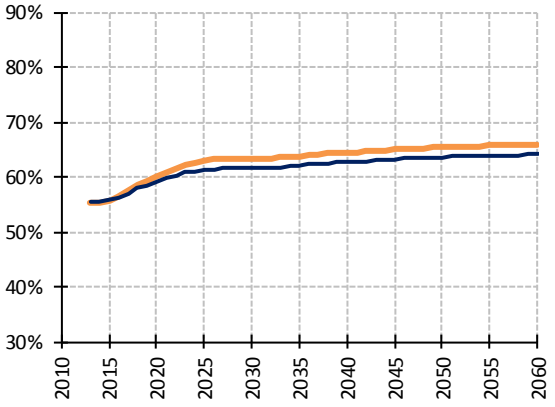
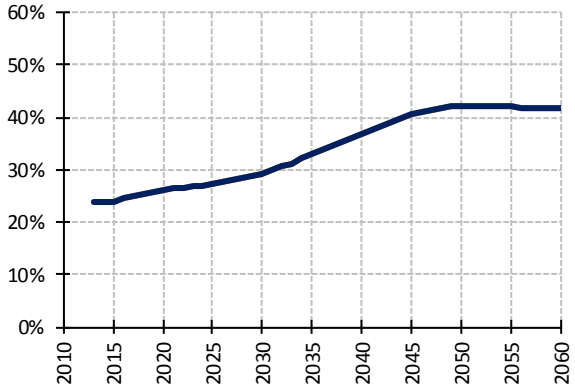



**Figure A5.4.f: percentage ratio of people of 70+ to population [20-69]**




Higher emp. rate (+2 pp.) Baseline

**Figure A5.5: pension expenditure as a percentage of GDP and its decomposition - A comparision between two hypotheses on partecipation rate**

**Figure A5.5.a: percentage ratio of expenditure to GDP**

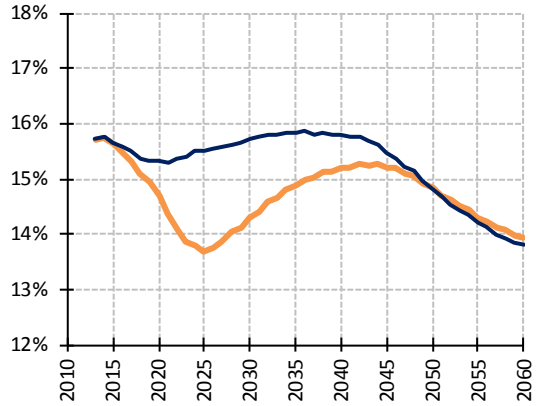



**Figure A5.5.b: percentage ratio of average pension to productivity**

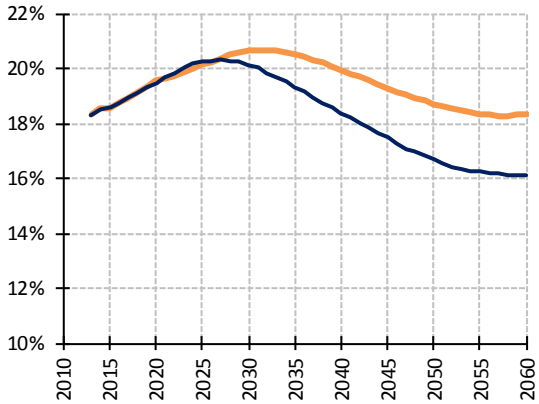



**Figure A5.5.c: percentage ratio of pensions to employees**

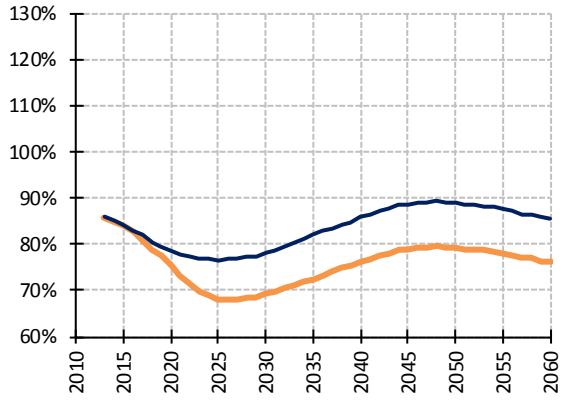



**Figure A5.5.d: percentage ratio of pensions to people of 70+**

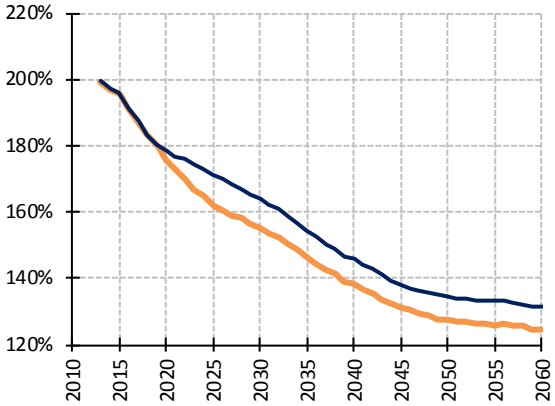
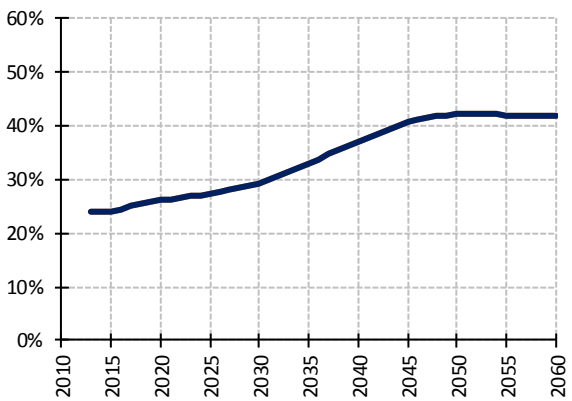



**Figure A5.5.e: percentage ratio of employees to population [20-69]**


**Figure A5.5.f: percentage ratio of people of 70+ to population [20-69]**




Higher emp. of older workers (+10 pp.) Baseline

**Figure A5.6: pension expenditure as a percentage of GDP and its decomposition - A comparision between three hypotheses on productivity**

**Figure A5.6.a: percentage ratio of expenditure to GDP**

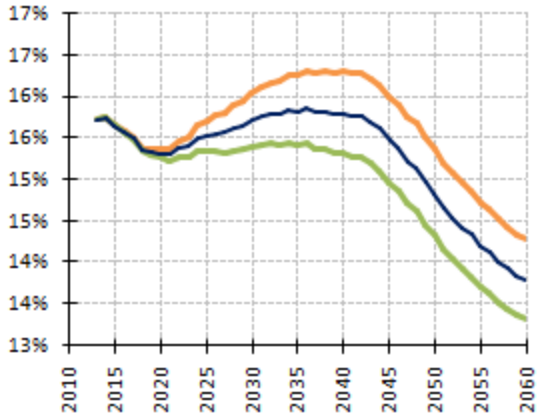



**Figure A5.6.b: percentage ratio of average pension to productivity**

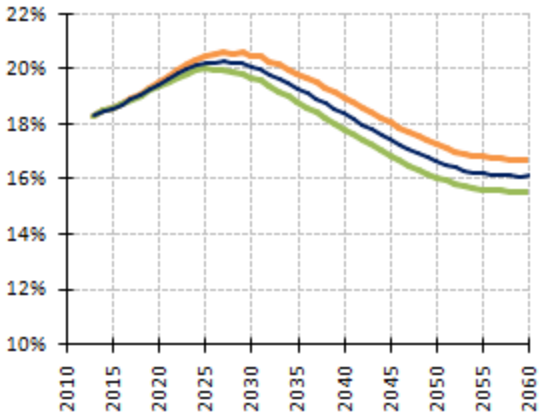



**Figure A5.6.c: percentage ratio of pensions to employees**

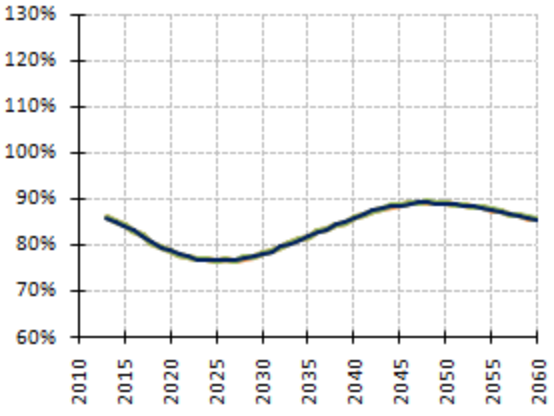



**Figure A5.6.d: percentage ratio of pensions to people of 70+**

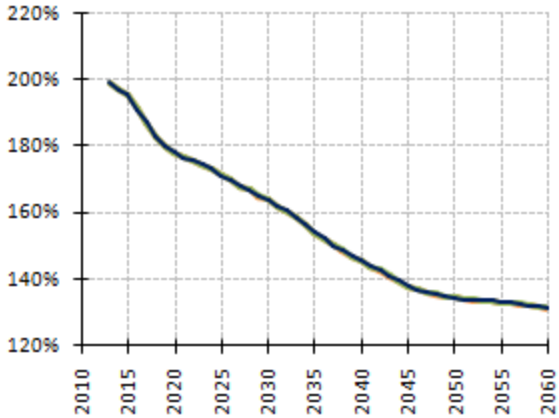



**Figure A5.6.e: percentage ratio of employees to population [20-69]**

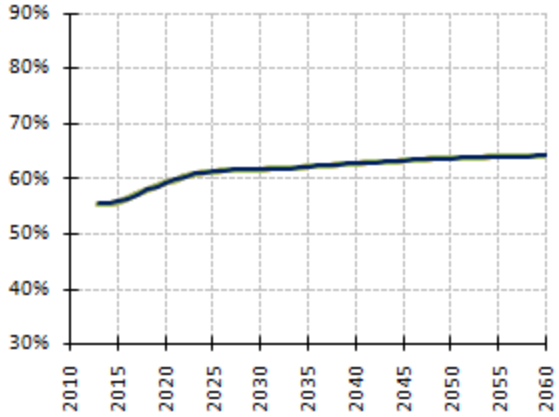
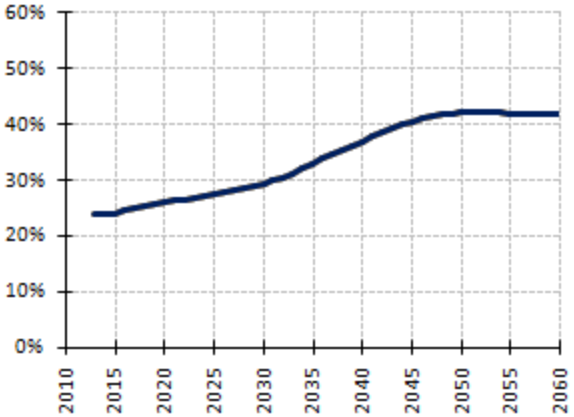



**Figure A5.6.f: percentage ratio of people of 70+ to population [20-69]**




Higher lab. productivity (+0.25 pp.) Lower lab. productivity (-0.25 pp.) Baseline

**Figure A5.7: pension expenditure as a percentage of GDP and its decomposition - A comparision between two hypotheses on total factor productivity (TFP)**

**Figure A5.7.a: percentage ratio of expenditure to GDP**

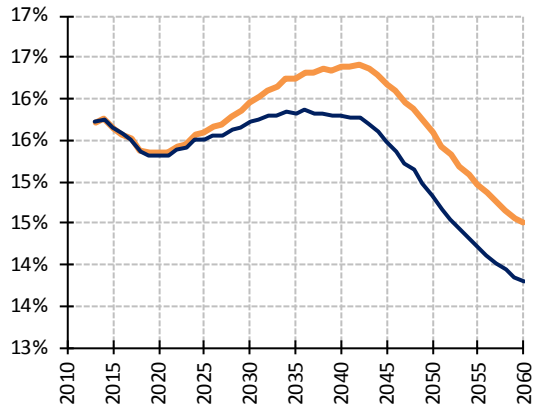



**Figure A5.7.b: percentage ratio of average pension to productivity**

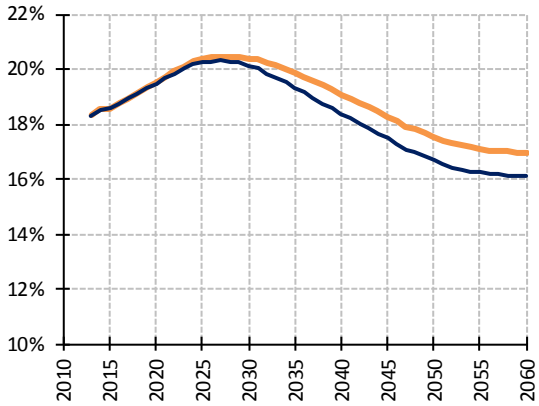



**Figure A5.7.c: percentage ratio of pensions to employees**

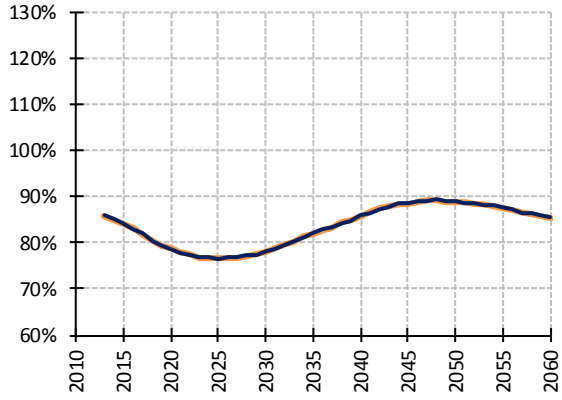



**Figure A5.7.d: percentage ratio of pensions to people of 70+**

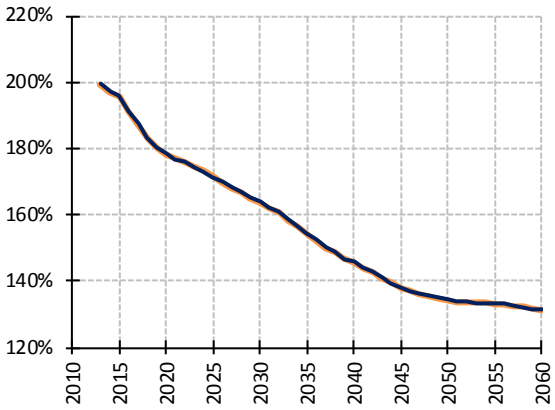



**Figure A5.7.e: percentage ratio of employees to population [20-69]**

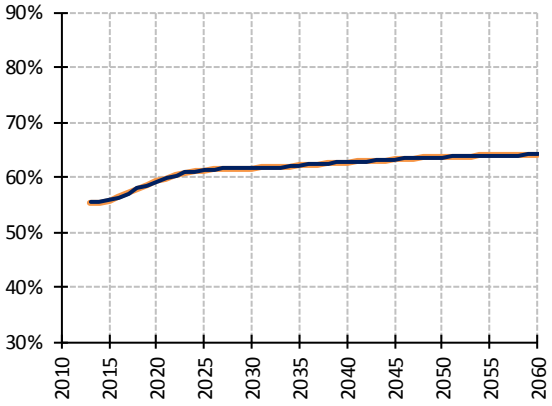
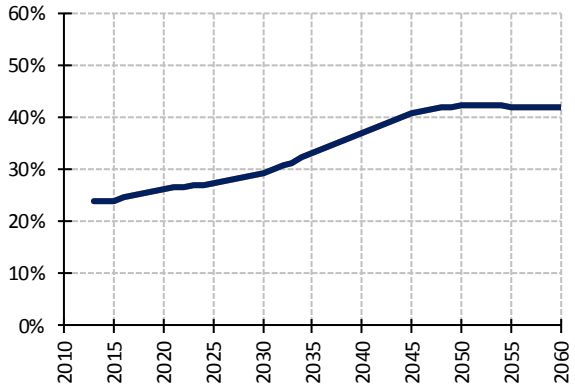



**Figure A5.7.f: percentage ratio of people of 70+ to population [20-69]**




Risk scenario (TFP-0.2pp.) Baseline

# ANNEX 6 –Pension expenditure to GDP ratio beyond 2060

Over the last two decades of the forecasting period, pension expenditure to GDP ratio is projected to decline significantly for normative reasons (NDC system, revision of the transformation coefficient, indexation of the eligibility requirements) as well as demographic ones (elimination of the baby boom generations). Therefore, it is interesting to detect what will happen beyond 2060. In this regard, both theoretical and empirical analyses may be carried out.

## 6.1 What does the theory say?

In equilibrium, a pay-as-you go pension system guarantees an Internal Rate of Return (IRR) that equals the growth rate of the contribution base (Aaron, 1996). As known, the equilibrium of a pay-as-you go pension system requires that contributions equal pension expenditure or, alternatively, the average contribution rate equals the ratio between pension expenditure and contribution base (equilibrium contribution rate).

With regard to the Italian pension system, the NDC regime foresees an IRR which approximates to the growth rate of GDP. In fact, the latter is explicitly utilized for the capitalization of contributions before retirement, while after retirement an estimate of 1.5% in real terms is envisaged, according to the 'discount rate' parameter foreseen in the transformation coefficient formula (Annex 1).

Assuming that annual growth rates of GDP converge at a level close to 1.5%, the earnings-related component of the pension system (i.e. net of social assistance benefits) will be approximately in equilibrium in the long run, except for the effects due to minor deviations from the actuarial equivalence, foreseen by current legislation.

This means that the equilibrium level of pension expenditure as a share of contribution base equals the average contribution rate, which accounts for approximately 31% (weighted average of 33% for employees, 24% for the self-employed, and 27% for atypical workers).

Given that: i) the incidence of contribution base in GDP accounts for around 39%, and ii) it is kept constant over time, in line with the methodological approach agreed in the AWG, the equilibrium level of pension expenditure (limited to the earnings-related component) as a share of GDP will settle at around 12.0-12.2%.

## 6.2 Pension projections beyond 2060

In order to assess the convergence value of the pension expenditure to GDP ratio in the very long run, the baseline pension projection has been extended beyond 2060, up to 2140. To this aim, demographic and macroeconomic scenarios have been extended as well, on the basis of the following assumptions:

1. demographic parameters have been provided by Eurostat up to 2080, and then set constant;
2. labour force projections have been prolonged consistently, according to the methodology agreed in the AWG (cohort simulation model);

3. productivity has been made consistent with an annual growth rate of GDP of about 1.5%, on average.

On the basis of these assumptions, pension expenditure to GDP ratio is projected to settle at about 13%, in the long run. The social assistance component (old age allowances and additional lump sums) explains the greater part (0.5 pp) of the difference from the theoretical estimate reported above. The remaining part mainly depends on disability and survivor's pensions awarded below 57 and the higher transformation coefficient acknowledged to women in relation to number of children they have had.

**Figure A6.1: pension expenditure to GDP ratio beyond 2060**