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Federal Planning Bureau

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Foreword

The Ageing Working Group (AWG) was established in December 1999 by the Economic Policy Committee of the European Council ECOFIN. This working group is responsible for producing common budgetary projections on age-related public expenditure items. Each Member State calculates its long-term pension expenditure based on common assumptions discussed in the AWG.

The demographic and macroeconomic assumptions in the public pension expenditure projection of Belgium for the AWG are different from those retained in the national projection of the Study Committee on Ageing, as well as the scope of pension definition. This projection is carried out using the MALTESE model of the Federal Planning Bureau.

This report presents the new Belgian pension projection 2016-2070 that will be published in the "2018 Ageing Report" next year. In addition, these results will be used in the context of the "Fiscal Sustainability Report" of the European Commission that assesses the mid-term and long-term fiscal situation of Member states.

Executive summary

The new Belgian projections of public pension expenditure 2016-2070 are based on Eurostat's 2015 population projection, released in February 2017, and on the macroeconomic assumptions discussed in the Ageing Working Group and approved at the EPC level (see "The 2018 Ageing Report: Underlying Assumptions and Projection Methodologies", to be published in European Economy). These results incorporate all pension reforms that have taken place until October 2017.

The change in gross public pension expenditure is of 2.9 percentage points of GDP between 2016 and 2070 in the new baseline projection. The dependency ratio (the population aged 65 and more related to the population aged between 20 and 64) contributes positively to this change with 6.6 percentage points of GDP. All other ratios contribute negatively: the coverage ratio (number of pensions related to the population of 65 and more) with -2.1 percentage points, the benefit ratio (the average pensions divided by the average wage) with -0.5 percentage point and the labour market effect (mostly driven by the inverse of the employment rate) with -0.9 percentage point.

In the last updated Belgian pension projection from November 2015 that integrated the 2015 pension reform (unlike the 2015 Ageing Report published in spring 2015) and was published in the 2015 Fiscal Sustainability Report, the cost of pensions was 1.3 percentage point of GDP on the period 2013-2060. Compared to the projection of November 2015, the rise of the cost of pensions in the new projection comes mostly from the dependency ratio. Indeed, the Eurostat's 2015 population projection shows a much lower increase of the population (1 800 000 less people in 2060) for Belgium, causing a bigger increase of the dependency ratio (+ 3.4 percentage points in 2060). Some other factors, like a slightly lower productivity growth on average over the whole projection period and a slightly higher unemployment rate, also contribute to a lower GDP in the new projection, causing a larger cost of pensions expressed as a percentage of GDP.

1. Overview of the Belgian pension system

1.1. General description: three pillars

1.1.1. The first pillar *(covered in the pension projections)*

Amounting to about 12.1% of GDP in 2016, the first pillar is the principal part of the Belgian pension system. It is a statutory public pension scheme with defined benefits (DB) for 99% of the expenses, i.e., except for the assistance scheme, which is means-tested. The first pillar is based on the pay-as-you-go financing (PAYG) principle.

Following the AWG definition of pension, the first pillar consists of:

- the old-age and early pension (9.7% of GDP in 2016), which are earnings-related and exist in three schemes (wage earners, self-employed and civil servants); the wage earners' scheme includes the unemployment with company allowance for non-job seekers (0.3% of GDP in 2016). In the civil servants' scheme, no distinction is made between the disability pension and old-age and early pension (in other words, the pension is calculated in the same way);
- the disability (1.3% of GDP in 2016), which is earnings-related in the wage earners' scheme and a lump-sum allowance in the self-employed scheme;
- the survivor pension (1.0% of GDP in 2016), which is earnings-related (to the earnings of the deceased);
- the assistance scheme (minimum non-contributory pension), called guaranteed income for elderly persons (0.1% of GDP in 2016), which is means-tested.

Since 1/1/1995, the financing of all social expenses in the wage earners' and self-employed schemes is carried out through a system of overall financial management (the so-called "global management"). This global management implies that there is a single contribution rate for all social security sectors (such as pensions, disability, primary incapacity, maternity leave, unemployment, etc.) and that the expenditures of each social security sector are fully covered. In the civil servants' scheme, most social benefits, among which pensions, are financed through the general budget of the federal government.

1.1.2. The second pillar *(not covered in the pension projections)*

Private occupational pension schemes (second pillar) are of minor importance. For example, the pension spending for retired wage earners (the most important part of the total expenditure in the second pillar) dependent on collective contracts with insurance companies or institutions for occupational retirement provision amounted to only 1.1% of GDP in 2016 (data about the total spending are not available). Concerning those pensions, an act was passed in 2003, i.e., the Act on supplementary pensions of 28 April 2003, centred on sectoral pension schemes and aimed at stepping up the development of these pensions by improving their accessibility and by giving more guarantees to workers.

1.1.3. The third pillar *(not covered in the pension projections)*

The private voluntary individual pension schemes constitute the third pillar.

1.2. Qualifying conditions for retiring in the first pillar

The following table summarizes information on the qualifying conditions for old-age and early retirement in the public pension scheme (wage earners, self-employed and civil servants), taking into account all the measures mentioned in the section 1.5 below. The minimum early retirement age and the minimum number of career years required for eligibility were respectively 62 and 40 years in 2016. After a short transition period, the minimum early retirement age is going to be 63 years as of 2018 and the minimum number of career years 42 years as of 2019. Nevertheless, exceptions would still be possible as of 2019, for people aged 61 with a career of 43 years and aged 60 with a career of 44 years. The statutory retirement age in the old-age public pension schemes was 65 for both men and women in 2016 and is going to raise to 66 in 2025 and to 67 in 2030. The next table presents the qualifying conditions for old-age and early retirement with a full pension. A full pension means getting a pension without paying any penalty and is not the same as the definition according to the Belgian legislation, i.e., the maximum number of career years taken into account in the pension calculation or 45 years. Although the qualifying conditions for old-age and early retirement are the same in the three schemes (wage earners, self-employed and civil servants), these three schemes have specific characteristics (see Box 1).

Table 1 Qualifying condition for old-age and early retirement in the public pension scheme (wage earners, self-employed and civil servants' schemes)

			2016	2020	2030	2040	2050	2060	2070
Qualifying conditions for retiring with a full pension (without paying a penalty)	Minimum requirements	Contributory period – men	40	42	42	42	42	42	42
		Retirement age – men	62	63	63	63	63	63	63
		Contributory period – women	40	42	42	42	42	42	42
		Retirement age – women	62	63	63	63	63	63	63
	Statutory retirement age - men		65	65	67	67	67	67	67
	Statutory retirement age - women		65	65	67	67	67	67	67

Since 1/1/2015, the new beneficiaries of unemployment with company allowance (under the wage earners' scheme) should be available on the labour market and therefore counted in the labour supply (as unemployed job seekers). However, there are still some exceptions which constitute the beneficiaries of unemployment with company allowance for non-job seekers, counted as pensioners following the AWG definition. The minimum entry age in this scheme was 62 in 2016 (for the special scheme of companies undergoing restructuring, it is going to raise from 55 in 2016 to 60 in 2020). This benefit ends at the statutory retirement age (SRA). At – and not before – the SRA, beneficiaries of the unemployment with company allowance step into the old-age pension scheme.

The disability allowance in the wage earners and the self-employed schemes exists for the people aged less than the SRA. This benefit ends at the SRA when the beneficiaries step into the old-age pension scheme (they can also step into early retirement if they satisfy the entry conditions).

The minimum age for beneficiaries of a survivor pension is 45 years, however, it is going to be increased to 50 years in 2025 and to 55 years in 2030.

It should be noted that the minimum age to benefit from the guaranteed income for elderly people is the same as the statutory retirement age.

The following table gives an overview of the number of new pensioners by age group and by gender, based on administrative data for the year 2015 in the public pension scheme.

Table 2 Number of new pensioners by age group and gender in the public pension scheme in 2015 – administrative data

Age group	All	Old age	Disability	Survivor	Other
TOTAL					
0-49	22,890	551	21,768	571	0
50-54	9,623	945	7,841	837	0
55-59	18,457	9,663	7,314	1,480	0
60-64	51,066	48,915	172	1,979	0
65-69	39,245	38,182	0	1,063	0
70-74	2,578	1,221	0	1,357	0
MALE					
0-49	8,752	208	8,465	79	0
50-54	4,063	550	3,432	81	0
55-59	10,947	7,281	3,506	160	0
60-64	26,938	26,619	86	233	0
65-69	18,123	18,003	0	120	0
70-74	336	238	0	98	0
FEMALE					
0-49	14,138	343	13,303	492	0
50-54	5,560	395	4,409	756	0
55-59	7,510	2,382	3,808	1,320	0
60-64	24,128	22,296	86	1,746	0
65-69	21,122	20,179	0	943	0
70-74	2,242	983	0	1,259	0

Source: Federal Planning Bureau, calculation on the basis of administrative data

Box 1 Public pension scheme: major characteristics of old-age and early pensions by scheme (earnings-related)

Wage earners' scheme: a low replacement rate

- A maximum career is 45 years.
- Normal accrual rate: 1.33% (60%/45) applied to wages earned during the career and adjusted only to current prices (CPI); 1.67% (75%/45) for the head of household with a dependent spouse.
- Increased accrual rate for low wages: minimum pension (not the assistance scheme) for at least 2/3 of a maximum career in the wage earners' scheme (1 212.35 EUR per month in September 2017 for a maximum career; 1 514.96 EUR per month for the head of household with a dependent spouse); minimum claim per working year (guaranteed minimum wage of 1 986.81 EUR per month in September 2017).
- Decreased accrual rate for high wages: maximum pension for a maximum career due to wage ceiling (wage ceiling of 54 648.70 EUR for the year 2016).
- Pension automatically adjusted to price index and partially adjusted to living standards.

Self-employed scheme: a low replacement rate

- Very similar to the wage earners' scheme.
- However, the reference income takes into account the much lower contribution rate. As a result, 60% of the beneficiaries are entitled to a minimum pension (not the assistance scheme) of the same amount as in the wage earners' scheme.
- Pension automatically adjusted to price index and partially adjusted to living standards.

Civil servants' scheme: a high replacement rate

- A maximum career is 45 years.
- Normal "nominal" accrual rate of 1.67% (1/60) applied to the average wage of the last 10 (5 years for people born before 1962) years of work (the "effective" accrual rate is much higher if expressed in terms of the average wage of the whole career).
- The average pension is automatically adjusted to increases in the average nominal wage of working civil servants.

More information on the pension calculation is available in annex 6.1.

1.3. Rules for indexation and living standards adjustment in the first pillar

1.3.1. Legislation

All pensions are automatically adjusted to the price index (consumer price index, CPI), unless an index jump is stipulated by legislation[1]. In addition to the indexation to prices, pensions by scheme are also adjusted to living standards in real terms:

– Civil servants' scheme: old-age and early pensions are automatically adjusted to an increase in the real wage of working civil servants, although this adjustment does not reflect a hundred percent of the average wage growth.

– Wage earners, self-employed and assistance schemes (for instance, the guaranteed income for elderly): the "Generation Pact" of December 2005 establishes the principle of an adjustment of the replacement benefits (not only pensions) to living standards. To begin with, the government must provide for a budget covering an annual growth of 1.25% for the wage ceilings and the minimum claim per working year, an adjustment to living standards of 0.5% for the non-lump-sum allowances and a real growth of 1% for the lump-sum allowances. Once this budget is calculated, concrete measures for the adjustment to living standards are proposed by the social partners. These measures must respect the abovementioned global financial constraint in each scheme (wage earners', self-employed, assistance). However, in each scheme, they can be aimed at specific sectors, categories of beneficiaries or types of allowances. Finally, the government decides on the final measures.

1.3.2. Projection

The table below presents the rules for indexation and living standards adjustment in the projection. All allowances are indexed to prices (CPI) unless otherwise decided.

Table 3 Indexation and living standards adjustment of pensions by scheme in the projection

	Indexation to prices (whole projection period)	Living standards adjustment (in addition to price indexation)	
		Till 2018	From 2019
Wage earners (including unemployment with company allowance and disability) Self-employed (including disability) Guaranteed income for elderly persons	Automatically adjusted to price index (CPI), except in 2016	All the measures decided by the government	Partially adjusted to living standards following the "Generation Pact": annual growth of 1.25% for the wage ceilings and the minimum claim; 1% for the lump-sum benefit; 0.5% for the non-lump-sum benefit
Civil servants			Adjusted to the real average wage increases of the working civil servants diminished by 0.4%

Regarding adjustment to living standards, until 2018 the projection takes into account all the measures already decided by the government by September 2017. From 2019 onwards, in the wage earners', the self-employed and the assistance schemes, social allowances are adjusted according to the parameters used for computing the budget devoted to the adjustment to living standards as stated in the Generation Pact (annual growth of 1.25% for the wage ceilings and the minimum claim, 1% for lump-sum benefits,

[1] This had been the case in 1984, 1985, 1987 and 2016. For instance, the "index jump" provided by the Act of 23 April 2015 on the employment promotion means that the 2016 adjustment of pension benefits (and of other social allowances and wages) to price evolution has been skipped. Given the 2% stepwise indexation mechanism, this corresponds to a reduction by 2% in the pension benefits in real terms over the whole projection period (the past wages as well as the future wages are devaluated by 2% in real terms).

0.5% for non-lump-sum benefits). The civil servants' pensions are adjusted to the real wage increase of the working civil servants diminished by 0.4% that corresponds to a historical trend of the difference between real wage increases and effective welfare adjustment of civil servants' pensions.

1.4. Description of the "constant policy" assumptions used in the projection

The long-term modelling of the social expenses is carried out according to the constant policy principle, which is mainly similar to the constant legislation principle. All the measures and reforms already decided by the government until September 2017 are taken into account in the projection.

1.5. Recent reforms included in the new projection[2]

The "Ageing Report 2015" was published in spring 2015 without taking into account the 2015 Belgian pension reform. Therefore, an update of this projection was made in November 2015, including this important pension reform. The results of this updated projection were published in the Belgian Country Fiche of November 2015, as in the 2015 Fiscal Sustainability Report.

1.5.1. Retirement age *(already included in the November 2015 pension projections)*

In the public pension scheme, the minimum early retirement age as well as the minimum number of career years required for eligibility have been raised since 2012 (see Table 4, by the December 2011 pension reform and by the 2015 pension reform[3]. Some more favourable special schemes in the wage earners' scheme (for instance, miners and civil aviation flying personnel) have been aligned with the general wage earners' scheme after a transition period. In some special schemes with higher accrual rates in the civil servants' scheme (teachers, magistrates, university professors …), accrual rates have been reduced and career requirements for early retirement have been increased. Moreover, in the civil servants' scheme, the service credit allocated for their higher education degrees is phased out as from 2015 for the career condition for early retirement.

Table 4 Minimum age and number of career years required for qualifying for early retirement

	2012	2013	2014	2015	2016	2017	2018	2019
minimum age/career requirement	60/35 (5 for the civil servants)	60.5/38 60/40	61/39 60/40	61.5/40 60/41	62/40 61/41 60/42	62.5/41 62/42 61/42 60/43	63/41 61/42 61/42 60/43	63/42 62/43 61/43 60/44

The 2015 pension reform has also raised the statutory retirement age from 65 to 66 years in 2025 and to 67 years in 2030, as well as the access to the disability or unemployment schemes to these ages.

Before 2015, there was no minimum age to benefit from a survivor pension. It has become 45 years as of 2015 and will gradually be raised to 50 years in 2025 and finally to 55 years in 2030.

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2 Many other measures have been announced by the government but are not included in the projection since they have not been voted yet. For instance, specific measures for heavy work, abolishment of the preferential so-called 'tantiemes' (career fraction) in the civil servants' scheme, introduction of a points-based system as from 2030 for the pension calculation, automatic adaptation of the career conditions for early and old-age retirement in line with life expectancy, etc.

3 Act of 10 August 2015 "aimed at raising the legal retirement age, conditions to early retirement pension and the minimum age for survivor's pension", Belgian Official Journal of 21 Augustus 2015.

In the unemployment with company allowance scheme for non-job seekers, the minimum access age was raised from 60 to 62 years in 2015 for the new entries in this scheme. The minimum career length requirement has been increased for men from 35 years in 2014 to 40 years in 2015, whereas it increases gradually from 28 years in 2014 to 40 years in 2024 for women. In the special scheme for companies in difficulty or undergoing restructuring, the entry age is going to increase from 55 years in 2015 to 60 years in 2020.

1.5.2. Other reforms *(already included in the November 2015 pension projections)*

- The pension bonus, which benefitted people working after the age of 60 while complying with the requirement for early retirement, was abolished as of 1/1/2015. It was a lump-sum amount for each additional effectively worked day as of the second year, increasing with the number of additional working days (from 1.5 EUR by day during the first 12 months up to 2.5 EUR by day after 60 months; these amounts were indexed to prices).
- As of 2015, the last months before retiring are taken into account for the calculation of the pension in the wage earners' and self-employed schemes. For instance, for a pensioner who will retire the 1st May 2018, the first four months of 2018 will be counted in the pension calculation, while the latter would only have considered earnings received till the 31 December 2017 before the reform.
- In the wage earners' scheme, some periods (third period of unemployment, some periods of unemployment with company allowance before the age of 60, some periods of career break or time credit) have been valued according to the minimum claim per working year as from 1 January 2012, instead of a notional wage. The periods of career break taken into account for pension entitlements have also been limited.
- Since the 1/1/2015, the beneficiaries of unemployment with company allowance for job seekers must be available on the labour market (they are subject to control procedures) and therefore counted in the labour supply.
- In the civil servants' scheme, some periods of career break and of absence after 31 December 2011 are taken into account in the pension rights and in the pension calculation for a maximum of 12 months in the entire career (and no longer 5 years as before). Moreover, the reference wage taken into account for the pension calculation will correspond to the average wage over the last 10 career years and no longer the last 5 years (except for those born before 1962).

1.5.3. New reform *(in comparison with the November 2015 pension projections)*

The validation of higher degree study periods for the pension calculation[4] in the three old-age pension schemes is going to be harmonized as from 1/12/2017. In the civil servants' scheme, the validation was free before the reform. After the reform, the civil servants will have to pay some contributions to validate these periods. Before the reform, the wage earners could validate these periods if they had paid contributions within ten years after graduation. After the reform, the higher degree study periods will be valid if contributions are paid, even later than ten years after the graduation.

[4] Act of 2 October 2017 "Loi relative à l'harmonisation de la prise en compte des périodes d'études pour le calcul de la pension", Belgian Official Journal of 24 October 2017.

2. Demographic and labour force projections

2.1. Demographic development

The next table presents the evolution of the main demographic variables for Belgium coming from Eurostat's 2015 population projection, released in February 2017. Population is expected to rise from 11.3 million people in 2016 to 13.9 million in 2070, i.e., by nearly 23% or at an annual growth rate of 0.4%. All age groups are contributing to this increase but not to the same extent: the 0-14 group rises by almost 15% between 2016 and 2070, the working-age population (15-64) by 10% and the group aged 65 or older by 75%. Consequently, the share of the young people slightly declines by 1 percentage point during the projection period while the proportion of persons aged 15-64 decreases by almost 7 percentage points and the proportion of persons aged 65 and over increases by 8 percentage points. This explains the 59% rise of the old-age dependency ratio from 28% in 2016 to more than 45% in 2070. This means that, whilst we had 3.6 working-age people for one person aged 65 or older in 2016, this ratio falls to 2.2 in 2070. The increased ageing of elderly people (the ratio between the number of those aged 80+ compared to those aged 65+) is also important, rising from 30% in 2016 to almost 41% in 2070.

Table 5 Main demographic variables evolution

	2016	2020	2030	2040	2050	2060	2070	Peak year
Population (in thousands)	11,325	11,616	12,296	12,870	13,290	13,596	13,904	2070
Population growth rate (in %)	0.7	0.6	0.5	0.4	0.3	0.2	0.2	2016
Old-age dependency ratio (65+/15-64)	28.4	30.2	36.2	39.9	41.5	43.5	45.2	2070
Ageing of the elderly (80+/65+)	30.0	29.6	29.3	34.3	39.0	38.8	40.7	2070
Men - Life expectancy at birth	78.8	79.5	81.0	82.4	83.8	85.0	86.2	2070
Men - Life expectancy at 65	18.3	18.8	19.8	20.7	21.7	22.6	23.4	2070
Women - Life expectancy at birth	83.7	84.3	85.7	86.9	88.1	89.2	90.2	2070
Women - Life expectancy at 65	21.7	22.1	23.1	24.0	24.9	25.8	26.6	2070
Men - Survivor rate at 65+	86.2	87.0	89.0	90.6	91.9	93.1	94.1	2070
Men - Survivor rate at 80+	58.0	60.1	65.0	69.4	73.3	76.8	79.9	2070
Women - Survivor rate at 65+	91.8	92.3	93.4	94.4	95.2	95.9	96.5	2070
Women - Survivor rate at 80+	73.5	75.1	78.6	81.7	84.4	86.7	88.7	2070
Net migration (in thousands)	55.2	53.2	48.3	41.5	32.8	29.5	26.2	2016
Net migration over population change	0.7	0.7	0.8	0.8	1.0	1.0	0.8	2056

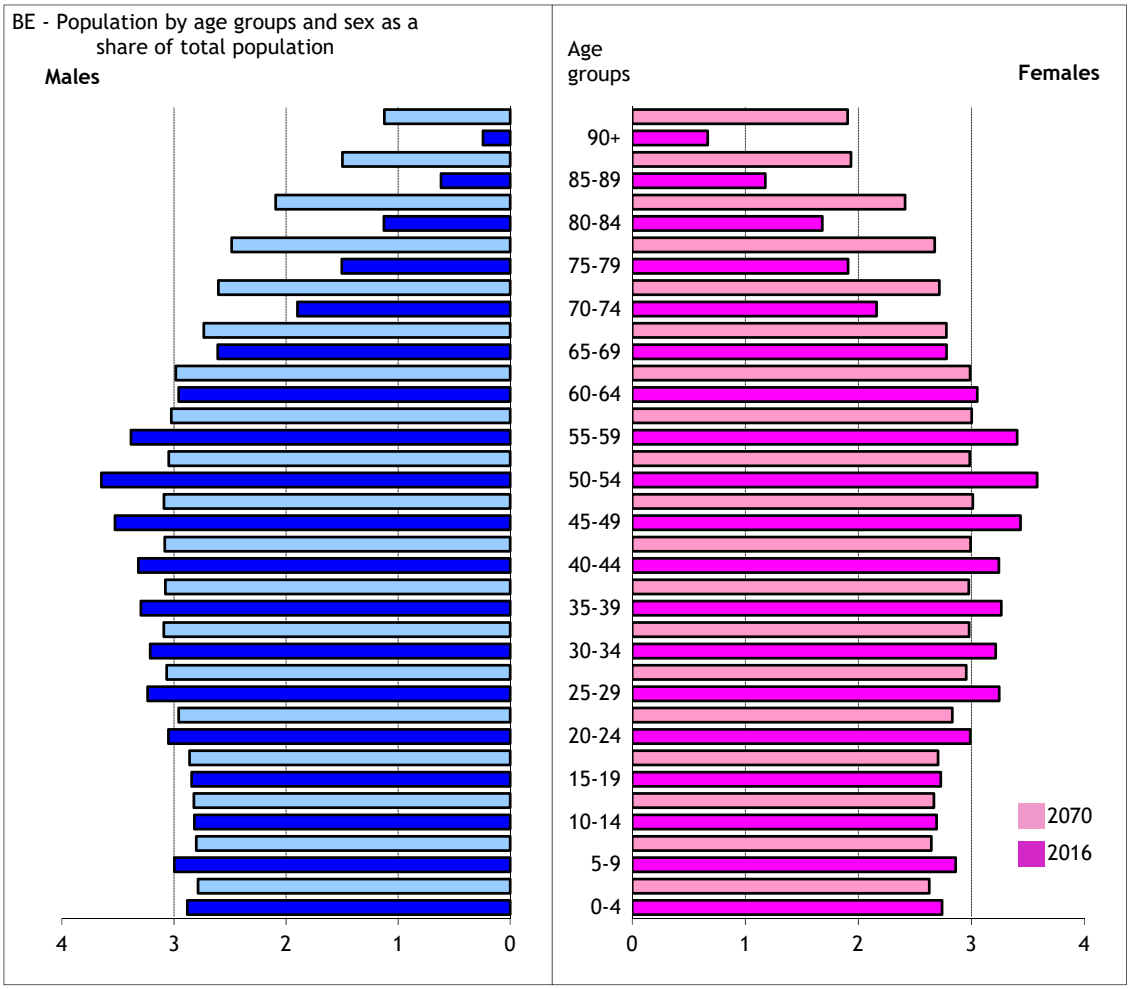
Source: European Commission services based on Eurostat 2015 population projection

The gain in life expectancy at birth is 7.4 years for men and 6.5 years for women between 2016 and 2070, reducing the gap between men and women from 4.9 years in 2016 to 4.0 years in 2070. Life expectancy at 65 increases by around 5 years for both men and women between 2016 and 2070, keeping the gap between men and women nearly unchanged during the projection period. The survivor rates or the proportions of people who will survive the next year increase during the projection period due to gains in life expectancy.

The projected net migration flow declines from 55 000 people in 2016 to 26 000 people in 2070, which is nevertheless a significant flow. The increase of the total population is mainly due to this net migration flow, amounting to between 70 and 100% (see the ratio of net migration to the variation of the total population).

The next graph shows the proportions of age groups as shares of the total population or the age pyramid by gender for 2016 and 2070. Already in 2016 it is not a pyramid (the base has shrunk). By 2070 the pyramid has been transformed into a tube.

Graph 1 **Age pyramid comparison: 2016 vs 2070**
In % of total population



Source: European Commission services based on Eurostat 2015 population projection

This graph shows that the age structure of the Belgian population is going to change in a significant way. The proportions of the 0-19 years old do not dramatically change between 2016 and 2070, for both men and women. The proportions of the five-yearly age groups between 20 and 59 years of age decrease between 2016 and 2070. Consequently, the shares of the 60+ sharply increase during the projection period.

It should be noted that there are some substantial changes in comparison with the previous population projection, namely the EUROPOP2013 projection (see section 3.6).

2.2. Labour force

Following the baseline assumptions of the European Commission for Belgium, using the cohort simulation model (CSM), the total participation rate (20-64) is expected to increase from 73.4% in 2016 to 77.3% in 2070, i.e., with +4 percentage points. The participation rate of the 25-54 remains almost unchanged in the projection, while that of young people (20-24) slightly increases by 2 percentage points. The participation rate of the age group 55-64 substantially rises by 17.6 percentage points between 2016 and 2070. Therefore, the employment rate of the age group 55-64 also largely increases. The participation rate of the age group 65-74 is also boosted with an increase by 7.6 percentage points between 2016 and 2070. The median age of the labour force increases by 1 year during the projection period.

Table 6 Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74

	2016	2020	2030	2040	2050	2060	2070	Peak year
Labour force participation rate 55-64	48.2	55.6	65.8	66.0	66.0	65.8	65.8	2037
Employment rate 55-64	45.5	52.6	62.2	62.4	62.5	62.4	62.4	2037
Share of workers aged 55-64 on the total labour force	94.4	94.6	94.6	94.7	94.7	94.8	94.8	2070
Labour force participation rate 65-74	3.5	3.4	10.3	11.0	11.2	11.1	11.1	2057
Employment rate 65-74	3.5	3.4	10.3	11.0	11.2	11.1	11.1	2057
Share of workers aged 65-74 on the total labour force	100.0	100.0	100.0	100.0	100.0	100.0	100.0	2021
Median age of the labour force	40.0	40.0	41.0	41.0	41.0	41.0	41.0	2021

Source: European Commission services

The next table presents the evolution of the working career duration (contributory period) and of the life spent at retirement for both men and women. The average contributory period comes from the results of the pension questionnaire that each country had to provide. It is a longitudinal concept that represents the past career of new pensioners in year t (up to 45 years), used to calculate pension expenditure.

All other indicators are calculated by the Commission: average effective exit age from the labour market (cross-sectional concept), duration of retirement as the difference between the life expectancy at average effective exit age and the average effective exit age itself, percentage of adult life spent at retirement as the ratio between the duration of retirement and the life expectancy minus 18 years, early/late exit in the specific year as the ratio of those who retired and are aged less than the statutory retirement age (67 in Belgium as from 2030) to those who retired and are aged more than the statutory retirement age.

Table 7 Labour market entry age, exit age and expected duration of life spent at retirement

	2017	2020	2030	2040	2050	2060	2070	Peak year
MEN								
Average effective exit age (CSM)	61.8	63.3	64.3	64.3	64.3	64.3	64.3	2030
Contributory period	39.2	39.2	40.7	40.8	40.7	40.5	40.6	2035
Duration of retirement	20.8	20.3	20.6	21.6	22.5	23.4	24.3	2070
Duration of retirement/contributory period	0.5	0.5	0.5	0.5	0.6	0.6	0.6	2070
Percentage of adult life spent at retirement	32.2	30.9	30.8	31.8	32.7	33.6	34.4	2070
Early/late exit	3.2	2.6	2.2	1.5	1.6	1.5	1.4	2017
WOMEN								
Average effective exit age (CSM)	61.8	63.5	64.3	64.3	64.3	64.3	64.3	2030
Contributory period	34.2	35.0	40.5	38.8	39.0	38.9	39.0	2030
Duration of retirement	24.4	23.0	24.0	24.9	25.8	26.7	27.5	2069
Duration of retirement/contributory period	0.7	0.7	0.6	0.6	0.7	0.7	0.7	2016
Percentage of adult life spent at retirement	35.8	33.6	34.1	35.0	35.8	36.6	37.2	2069
Early/late exit	4.8	3.1	2.1	1.5	1.6	1.5	1.4	2017

Source: European Commission services

The average effective exit age from the labour market increases by 2.5 years between 2017 and 2070, for both men and women. This increase cannot be compared to the rise of the average contributory period. Indeed, the average effective exit age (calculated from the CSM model) does not reflect the past career of the new pensioners as the average contributory period does.

Without the pension reforms regarding the (early) retirement age, the contributory period depends on the participation profile of the generation, based on historical data regarding participation rates by 5-year age group, namely a decreasing contributory period for men due to an extension of education years of the younger generations and an increasing contributory period for women due to a decline of career breaks. With the pension reforms, the contributory period increases for men and women, respectively by 1.4 year and 4.8 years between 2017 and 2070. Note that the year 2030 can be considered as an outlier (as well as the year 2025), being a year of raise of the statutory retirement age. This induces a postponement of entry into retirement for the people with a short career. Consequently, the new pensioners of this year have a relatively long career which increases the average contributory period.

The number of years spent in retirement for men is expected to rise from 20.8 years in 2017 to 24.3 years in 2070 due to gains in life expectancy. Consequently, the share of adult life spent in retirement increases from 32% in 2017 to more than 34% in 2070 for men. The duration of retirement for women increases by 3.1 years between 2017 and 2070 because of the rise in life expectancy. The female share of adult life spent in retirement would increase from almost 36% in 2017 to 37% in 2070.

Box 2 Assumptions on structural unemployment, labour productivity and potential GDP

In order to get a comprehensive view of the macroeconomic scenario elaborated by the European Commission, assumptions about the structural unemployment rate, the labour productivity growth and consequently the potential GDP growth have to be mentioned. The short-term evolution is based on the Spring 2017 Economic Forecast by the European Commission. The medium-term (until 2026) is based on the T+10 methodology developed by the Output Gap Working Group (OGWG), attached to the EPC.

The estimation of the structural unemployment rate is based on the results of the OGWG. The actual unemployment rate (Eurostat definition) is assumed to converge to NAWRU rate by 2018 corresponding to the closure of the output gap. Afterwards, the NAWRU rate is assumed to gradually converge in T+10 (2026) to an Anchor which is a country-specific value for the NAWRU. The anchor is calculated assuming that non-structural variables are set at their average value and that structural variables remain unchanged at their last observed value. To avoid too high long-term unemployment rates, the unemployment rate of countries whose anchor is superior to the median anchor of all Member states is progressively reduced to this median (7.9%) by 2050 (in addition, if the value in 2026 is lower than the country-specific anchor, the long-term unemployment rate is kept at the value of 2026 for the rest of the projection). Given these assumptions, the unemployment rate for Belgium has a rather particular profile: firstly, it slightly decreases from 7.9% in 2016 to 7.7% in 2018 to increase afterwards to 8.2% (the Belgian anchor) in 2026. Then it slightly decreases to 7.9% (the median anchor of all Member states) by 2050 and remains stable at this value (that is slightly superior than the unemployment rate of 7.4% in the 2015 Ageing Report) till the end of the period projection.

To project potential GDP over the long term, a Cobb-Douglas production function is used. GDP growth results from the evolution of the employment and the labour productivity. In the long term, the growth of labour force leads the growth of employment. The evolution of the labour productivity results from the total factor productivity and the capital stock per worker. With respect to total factor productivity, the baseline scenario presents a convergence to a TFP growth rate of 1% by 2045 for Belgium. With regard to capital deepening, the capital to labour ratio is assumed constant in the long run, which leads to a capital deepening contribution of about 0.5%, and a total labour productivity of 1.5% per year in the long term. In result, the potential GDP growth rate for Belgium is 1.6% per year between 2016 and 2070, with a 1.3% growth of labour productivity and a 0.3% growth of employment. In comparison with the projection of the 2015 Ageing Report (updated projection for Belgium) on the period 2016-2060, the average growth rate of GDP is inferior by 0.4% per year, due to a lower productivity growth (-0.1% per year) and a much weaker employment growth (-0.3% per year) resulting mostly from a much lower population.

Average annual growth rate *In %*	AR 2018: 2016-2070	AR 2018: 2016-2060	2016-2060: AR 2018 - AR 2015
Population	0.38	0.42	-0.26
Employment	0.30	0.34	-0.29
Labour productivity	1.26	1.20	-0.08
GDP	1.55	1.53	-0.40

Source: European Commission, AWG baseline assumptions for Belgium

3. Pension projection results

3.1. Extent of the coverage of the pension schemes in the projections

The Belgian pension projection covers the statutory public pension scheme (first pillar), which comprises the old-age and early pension schemes (wage earners – including the unemployment with company allowance scheme for non-job seekers, self-employed and civil servants), the disability benefits, the survivor pension and the guaranteed income for elderly persons (assistance scheme), according to the AWG definition of pension expenditure.

The table below shows the pension expenditure in % of GDP between 2007 and 2014, according to Eurostat's ESSPROS database and data provided by Belgium to the Ageing Working Group.

Table 8 Eurostat (ESSPROS) vs Ageing Working Group definition of pension expenditure
% of GDP

	2007	2008	2009	2010	2011	2012	2013	2014
1. Eurostat total pension expenditure	10.5	11.1	11.9	11.8	12.1	12.0	12.5	12.5
2. Eurostat public pension expenditure	10.1	10.8	11.5	11.5	11.7	11.7	12.1	12.2
3. Public pension expenditure AWG	9.7	10.2	10.9	10.8	11.0	11.4	11.8	11.9
4. Difference (2-3)	0.4	0.6	0.6	0.6	0.7	0.2	0.3	0.3
= benefits for handicapped persons and for occupational diseases								

Source: European Commission services and Belgian pension questionnaire

Till 2011, the difference between the Eurostat's ESSPROS database and the data provided by Belgium to the Ageing Working Group lies in the disability function. Eurostat's ESSPROS public expenditure for disability registers the expenses for occupational diseases and all expenses related to handicapped persons, while that is not the case in the database used for AWG (according to the AWG definition of disability pensions).

3.2. Overview of projection results – public pension scheme

Gross public pension expenditure increases by 2.9 percentage points of GDP between 2016 and 2070 (see Table 9). This increase takes largely place between 2016 and 2040 (+2.4 p.p. of GDP). The peak year is 2069. The net public pension expenditure (excluding contributions and taxes paid by the pensioners) represents around 87% of the gross public pension expenditure.

As mentioned in point 1.1.1. and in point 3.4, the pension contributions are not available. All contributions are gathered by the Global management and redistributed among the different social allowance categories according to their needs.

Table 9 Projected gross and net pension spending and contributions
% of GDP

	2016	2020	2030	2040	2050	2060	2070	Peak year
Expenditure								
Gross public pension expenditure	12.1	12.6	13.8	14.5	14.7	14.9	15.0	2069
Private occupational pensions	:	:	:	:	:	:	:	:
Private individual pensions	:	:	:	:	:	:	:	:
Mandatory private	0	0	0	0	0	0	0	0
Non-mandatory private	:	:	:	:	:	:	:	:
Gross total pension expenditure	12.1	12.6	13.8	14.5	14.7	14.9	15.0	2069
Net public pension expenditure	10.6	11.0	12.1	12.6	12.7	12.9	13.0	2069
Net total pension expenditure	10.6	11.0	12.1	12.6	12.7	12.9	13.0	2069
Contributions								
Public pensions contributions	:	:	:	:	:	:	:	:
Total pension contributions	:	:	:	:	:	:	:	:

Source: European Commission services based on Belgian pension questionnaire

The following table offers a more comprehensive overview of the public pension spending by scheme.

Table 10 Projected gross public pension spending by scheme
% of GDP

	2016	2020	2030	2040	2050	2060	2070	Peak year
Total public pension scheme	12.1	12.6	13.8	14.5	14.7	14.9	15.0	2069
of which								
Old-age and early pensions[a]	9.8	10.1	11.5	12.7	13.0	13.4	13.5	2069
Flat component	0	0	0	0	0	0	0	0
Earnings related	9.7	10.0	11.4	12.6	12.9	13.3	13.4	2069
Minimum pension (non-contributory)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2024
Disability pensions	1.3	1.6	1.6	1.4	1.3	1.2	1.2	2026
Survivor pensions	1.0	0.9	0.7	0.5	0.4	0.3	0.3	2016
Other pensions	0	0	0	0	0	0	0	0
Public pension by scheme								
- Wage earners' scheme	7.3	7.8	8.7	9.2	9.2	9.2	9.2	2059
old-age and early pensions[a] - earnings related	5.6	5.8	6.9	7.7	7.9	8.0	8.0	2060
disability	1.2	1.5	1.5	1.3	1.2	1.1	1.1	2026
survivor	0.5	0.5	0.3	0.2	0.1	0.1	0.1	2016
- Self-employed scheme	0.9	1.0	1.1	1.2	1.2	1.2	1.2	2061
old-age and early pensions - earnings related	0.7	0.8	0.9	1.1	1.1	1.1	1.1	2068
disability	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2026
survivor	0.1	0.1	0.1	0.1	0.1	0.0	0.0	2016
- Civil servants' scheme	3.9	3.9	4.0	4.2	4.2	4.4	4.6	2069
old-age and early pensions - earnings related	3.4	3.4	3.6	3.8	3.9	4.1	4.4	2069
Minimum pension (non-contributory)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2024
survivor	0.4	0.4	0.3	0.3	0.2	0.2	0.2	2016

a. Including unemployment with company allowance scheme for non-job seekers.
Source: European Commission services based on Belgian pension questionnaire

The global increase in pension expenditure of 2.9 p.p. of GDP between 2016 and 2070 comes entirely from the earnings-related old-age and early pensions (+3.8 p.p. of GDP), while the expenditure of the assistance scheme very slightly decreases over the whole period. The decomposition of the earnings-related old-age and early pension by scheme[5] shows an increase by 2.4 p.p. of GDP in the wage earners' scheme, followed by the civil servants' scheme (+1 p.p. of GDP) and the self-employed scheme (+0.4 p.p. of GDP).

[5] The number of old-age pensioners by scheme is driven by the evolution of employment by scheme (see section 4 on model description). In the long run, the evolution of public sector employment results from on the one hand, the evolution of the labour force that drives the employment of the public administration and on the other hand, the evolution of the school population that drives the employment in the education sector. The growth of self-employment is also driven by the labour force. Over the whole projection period, employment growth is the same in the three schemes (0.3% annual average growth).

Disability expenditure decreases incrementally in percentage points of GDP (-0.1 p.p.) over the whole period, however it increases until the mid-2020s, followed by a decrease until the end of the projection period. Two factors increase the expenditure: on the one hand, the last observed high entry probabilities and probabilities of remaining disabled (influenced by the changed economic environment due to the crisis) are maintained till 2020 in accordance with the National Institute for Health and Disability Insurance, implying increased disability rates. On the other hand, the raise of the statutory retirement age implies an increase of the number of disabled. Conversely, two factors decrease the disability expenditure expressed in % of GDP. Firstly, the entry probabilities and the probabilities of remaining disabled progressively decline as of 2021 until the mid-2030s, assuming reasonably that they return to their average pre-crisis level (afterwards, they remain constant). Secondly, more than two thirds of the disabled benefit from a minimum amount (two thirds of the beneficiaries in the wage earners' scheme in 2016 and all the beneficiaries in the self-employed scheme) which is adjusted by 1% per year in real terms, and thus grows more slowly than the GDP, decreasing the weight of the disability expenditure expressed in % of GDP over the whole projection period.

Survivors' expenditure[6] decreases by 0.7 p.p. of GDP between 2016 and 2070 because of three reasons. Firstly, the increasing participation rates of women imply that a growing number of women receive an old-age pension. Secondly, it is necessary to have been married in order to receive a survivor pension and the number of married pensioners decreases in the projection. Finally, the increase of the minimum age to benefit from a survivor pension also reduces this expenditure, but to a minor extent.

3.3. Description of the main driving forces behind the projection results

3.3.1. Factors behind the change in public pension expenditure

The tables below (the analysis is similar with the number of pensions in Table 11 or the number of pensioners in Table 12) show the breakdown of the increase in public pension expenditure according to 5 explanatory factors: the dependency ratio, the coverage ratio, the benefit ratio, the labour intensity effect and a residual.

Over the whole projection period, the rise in public pension expenditure (+2.9 p.p. of GDP) results from the dependency ratio (+6.6 p.p.), while all other ratios contribute negatively to the overall result (-2.1 p.p. for the coverage ratio, -0.9 p.p. for the labour intensity effect and -0.5 p.p. for the benefit ratio).

The most substantial pension expenditure increase occurs between 2016 and 2040 because of the strong increase in the dependency ratio (+4.7 p.p.) and because of the rise in the benefit ratio (+0.7 p.p.), although this increase is partially compensated by the decreasing coverage ratio (-1.9 p.p.) and labour intensity effect (-0.9 p.p., mostly due to an increase of the employment rate).

After 2040, the pension expenditure only increases by 0.5 p.p. of GDP, due to a moderate positive contribution of the dependency ratio (+1.8 p.p.), partially offset by the negative contribution of the benefit

[6] Survivors' expenditure concerns "pure" survivor pensions: people who cumulate an old-age pension and a survivor pension are included in the category "old-age pension".

ratio (-1.2 p.p.) till the end of the projection period. The contrasting evolution of the benefit ratio by sub-periods is explained in the next section.

Table 11 Factors behind the change in public pension expenditure between 2016 and 2070 - number of pensions
In percentage points of GDP

	2016-2020	2020-2030	2030-2040	2040-2050	2050-2060	2060-2070	2016-2070	Aver-age annual change
Public pensions to GDP	0.5	1.2	0.7	0.1	0.2	0.2	2.9	0.056
Dependency ratio effect (pop. 65+/pop. 20-64)	0.8	2.5	1.4	0.5	0.8	0.5	6.6	12.1%
Coverage ratio effect (pensions/pop. 65+)	-0.1	-1.1	-0.7	0.0	-0.1	0.0	-2.1	-3.9%
*Coverage ratio old-age (pensions 65+/pop. 65+)**	0.1	-0.2	0.1	0.1	0.1	0.1	0.3	0.5%
*Coverage ratio early-age (pensions <=65/pop. 50-64)**	-0.4	-1.5	-3.3	-0.8	-0.4	0.0	-6.4	-12.1%
*Cohort effect (pop. 50-64/pop. 65+)**	-0.6	-2.8	-1.5	-0.3	-0.8	-0.3	-6.4	-12.2%
Benefit ratio effect (average pension/(GDP/hours worked 20-74))	0.2	0.4	0.1	-0.4	-0.4	-0.4	-0.5	-0.8%
Labour market/Labour intensity effect	-0.3	-0.5	-0.1	0.0	0.0	0.0	-0.9	-1.8%
Employment ratio effect (pop.20-64/employment 20-64)	-0.3	-0.3	-0.1	0.0	0.0	0.0	-0.6	-1.4%
Labour intensity effect (employment 20-64/hours worked 20-64)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1%
Career shift effect (hours worked 20-64/hours worked 20-74)	0.0	-0.3	0.0	0.0	0.0	0.0	-0.3	-0.5%
Residual	0.0	-0.1	0.0	0.0	0.0	0.0	-0.2	-0.1%

* Sub components of the coverage ratio effect do not add up necessarily.
Source: European Commission services based on Belgian pension questionnaire

The decreasing coverage ratio is subdivided between the old-age coverage ratio (number of pensions 65+ divided by the population 65+), the early age coverage ratio (number of pensions not exceeding the age 65 divided by population 50-64) and a cohort effect (the population 50-64 divided by the population 65+). The old-age coverage ratio remains relatively stable between 2016 and 2070. On the contrary, the early age coverage ratio decreases (because of the pension reforms), as well as the cohort effect.

Table 12 Factors behind the change in public pension expenditure between 2016 and 2070 - number of pensioners
In percentage points of GDP

	2016-2020	2020-2030	2030-2040	2040-2050	2050-2060	2060-2070	2016-2070	Aver-age annual change
Public pensions to GDP	0.5	1.2	0.7	0.1	0.2	0.2	2.9	0.056
Dependency ratio effect (pop. 65+/pop. 20-64)	0.8	2.5	1.4	0.5	0.8	0.5	6.6	12.1%
Coverage ratio effect (pensioners/pop. 65+)	-0.1	-1.0	-0.7	0.0	-0.1	0.0	-1.9	-3.6%
*Coverage ratio old-age (pensioners 65+/pop. 65+)**	0.1	-0.1	0.2	0.2	0.1	0.1	0.6	1.2%
*Coverage ratio early-age (pensioners <=65/pop. 50-64)**	-0.2	-1.2	-3.2	-0.9	-0.4	0.0	-6.0	-11.3%
*Cohort effect (pop. 50-64/pop. 65+)**	-0.6	-2.8	-1.5	-0.3	-0.8	-0.3	-6.4	-12.2%
Benefit ratio effect (average pension/(GDP/hours worked 20-74))	0.2	0.3	0.1	-0.4	-0.4	-0.4	-0.7	-1.1%
Labour market/Labour intensity effect	-0.3	-0.5	-0.1	0.0	0.0	0.0	-0.9	-1.8%
Employment ratio effect (pop.20-64/employment 20-64)	-0.3	-0.3	-0.1	0.0	0.0	0.0	-0.6	-1.4%
Labour intensity effect (employment 20-64/hours worked 20-64)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1%
Career shift effect (hours worked 20-64/hours worked 20-74)	0.0	-0.3	0.0	0.0	0.0	0.0	-0.3	-0.5%
Residual	0.0	-0.1	0.0	0.0	0.0	0.0	-0.2	-0.1%

* Sub components of the coverage ratio effect do not add up necessarily.
Source: European Commission services based on Belgian pension questionnaire

3.3.2. Replacement rate at retirement and benefit ratio

Table 13 illustrates, on the one hand, the evolution of the replacement rate at retirement (the first pension related to the last wage) and, on the other hand, the evolution of the benefit ratio or the average pension benefit divided by the economy-wide average wage. The replacement rate at retirement refers

only to old-age earnings-related pensions[7], while the benefit ratio is calculated for the total pension benefits (including the disability allowances, the survivor pensions and the non-earnings-related benefits) and also the old-age earnings-related pensions.

The average wage at retirement is provided by the pension model (see point 5.1 of the methodological annex). An economy-wide average wage is provided by the Commission services in the pension projection questionnaire. However, for the sake of consistency between the replacement rate and the benefit ratio, the economy-wide average wage from the Belgian National Accounts is used in the observed data. Its evolution runs parallel to the evolution of the labour productivity in the projection.

Notably, the level of the benefit ratio is higher than the level of the replacement rate at retirement. This is due to a large difference between the average wage at retirement (seniority wage scale) and the economy-wide average wage, while the average pension of the new pensioners is not that much higher than the average pension of all pensioners.

Table 13 Public scheme: replacement rate at retirement, benefit ratio and coverage
In %

	2016	2020	2030	2040	2050	2060	2070
Replacement rate at retirement - Public scheme	:	:	:	:	:	:	:
Coverage	77.0	76.2	79.1	83.9	86.1	87.3	87.7
of which old-age earnings-related	40.2	40.5	42.3	40.2	39.1	37.8	37.1
Benefit ratio - Public scheme	41.8	42.3	43.6	43.9	42.8	41.6	40.4
Coverage	100.0	100.0	100.0	100.0	100.0	100.0	100.0
of which old-age earnings-related	44.4	45.0	46.1	46.2	44.7	43.2	41.8

Source: European Commission services based on Belgian pension questionnaire

The evolution of the replacement rate at retirement, namely an increase till 2030, followed by a decrease until the end of the projection, is explained by four factors:

– the increasing average career length notably due to the pension reform.

– The relatively low average wage growth in the past and during the projection period (since the early 2000s till the beginning of the 2020s) tends to raise the replacement rate at retirement in the wage earners' scheme (which is the most important scheme in terms of pension expenditures) and in the self-employed scheme. Indeed, the reference wage in these schemes (the wages earned during the whole career) of new generations of pensioners grows faster than the last wage. Conversely, in the longer term, when average wages are going to grow faster again (converging to their long-term growth rate of 1.5%), this period of low wage growth will have a downward effect on the replacement rate at retirement.

– In the wage earners' scheme (and in the self-employed scheme), the living standards adjustment of the minima and ceilings by respectively 1% and 1.25% per year (see section 1.3.2), in a context of low wage growth, will tend to raise the replacement rate at retirement. A reverse trend is observed when wages grow more rapidly.

[7] A total replacement rate would include the disability pensions of the wage earners' scheme and the survivor pensions. The average wage at retirement (end of the career) used to calculate the replacement rate is not relevant for these two kinds of benefits. Indeed, the disability pensions in the wage earners' scheme exist for people aged between 18 years and the statutory retirement age (for instance, the benefit of a 35 years disabled is not calculated on the basis of the wage at retirement). The same applies to the survivor pensions: the survivor pension of a new 80 years old widow is not calculated on the basis of the wage at retirement.

– Finally, in the wage earners' scheme (and in the self-employed scheme), the decreasing proportion of male pensioners with a dependent spouse benefiting from a higher pension (rate of 75%), given the growing participation of women on the labour market and the decreasing number of married persons, results in a decreasing replacement rate at retirement over the whole period.

It should be noted that the large increase of the replacement rate at retirement in 2030 can be considered as an outlier. It results from the raise of the statutory retirement age in this year, which induces a postponement of entry into retirement for the people with a short career. Consequently, the new pensioners of this year have a relatively long career, which increases the average contributory period and the replacement rate at retirement.

The evolution of the benefit ratio follows the evolution of the replacement rate at retirement. Moreover, in the wage earners' scheme (which is the most important scheme in terms of pension expenditure) and to a lesser extent in the self-employed scheme, its evolution is also influenced by the partial adjustment of the non-lump-sum social benefits to living standards (0.5% per year in projection). This adjustment has a positive impact on the benefit ratio as long as the system does not reach maturity (around the mid-2020s). This maturation takes place in a context of a low wage growth. The subsequent wage growth recovery will tend to reduce the benefit ratio given the fixed adjustment of 0.5% per year for non-lump-sum social benefits.

3.3.3. System dependency ratio and old-age dependency ratio

Table 14 presents some indicators that shed some light on the dependency of the public pension system (system dependency ratio or SDR) through the ratio between the number of pensioners and the number of employees and on the efficiency of the system by comparing this system dependency ratio with the demographic old-age dependency ratio (ODR = 65+ over the 15-64).

Table 14 System dependency ratio and old-age dependency ratio

	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (I)	2792.7	2968.9	3340.3	3585.9	3802.9	4010.5	4217.6
Employment (II)	4605.2	4774.6	5045.2	5184.7	5302.0	5352.5	5416.9
Pension system dependency ratio (SDR) (I)/(II)	60.6	62.2	66.2	69.2	71.7	74.9	77.9
Number of people aged 65+ (III)	2080.9	2236.6	2726.2	3076.9	3263.3	3462.7	3638.5
Working age population 15-64 (IV)	7319.6	7401.0	7539.5	7705.4	7870.5	7952.2	8058.7
Old-age dependency ratio (ODR) (III)/(IV)	28.4	30.2	36.2	39.9	41.5	43.5	45.2
System efficiency (SDR/ODR)	2.1	2.1	1.8	1.7	1.7	1.7	1.7

Source: European Commission services based on Belgian pension questionnaire

The number of pensioners is growing fast between 2016 and 2040 (average annual growth rate of 1.0%). This growth is slower between 2040 and 2070 (average annual growth rate of 0.5%), but anyway faster than the employment, which grows respectively by 0.5% and 0.1% a year during the periods 2016-2040 and 2040-2070. This leads to an increasing pension system dependency ratio from 60.6% in 2016 to almost 80% in 2070 (+17.3 percentage points). Regarding the old-age dependency ratio, it increases from more than 28% in 2016 to 45% in 2070, which represents an increase of 16.8 percentage points. This means that the system efficiency, namely the ratio between the SDR and the ODR, decreases by 0.4 percentage points during the projection period.

3.3.4. Number of pensioners in proportion to the (inactive) population

The next two tables present respectively the ratio of the number of pensioners to the inactive population (Table 15) and the ratio of the number of pensioners to the population (Table 16). The inactive population[8] is defined as the difference between the total population and the labour force, as defined in the "Labour Force Survey", while the number of pensioners is based on administrative data.

Note that the levels of the pensioners to inactive population ratio in the age groups 55-59 and 60-64 are relatively low in 2016 due to two factors. Firstly, some inactive individuals benefit from social allowances other than pension (short-term disability, handicapped people…). Secondly, the Belgian model uses administrative definitions for employment and unemployment (this model provides an exhaustive breakdown of the population into different socio-economic groups). In particular, the unemployment rate on the basis of administrative data is much higher in these age groups than in the EUROSTAT definition. The corresponding public expenditure is nevertheless taken into account in the projection via a higher average unemployment benefit. The employment rate on the basis of administrative data is also higher than on the basis of the Eurostat definition, which contributes to a higher inactive population in the AWG projection.

Table 15 Pensioners (public schemes) to inactive population ratio by age group
In %

	2016	2020	2030	2040	2050	2060	2070
Age group -54	7.2	7.8	6.5	5.2	4.8	4.8	4.7
Age group 55-59	59.1	69.1	79.4	57.8	54.6	53.1	53.0
Age group 60-64	74.5	75.3	89.0	74.0	68.8	66.9	66.2
Age group 65-69	98.3	100.2	105.5	103.4	102.8	102.9	102.6
Age group 70-74	97.2	97.4	101.0	102.9	105.8	106.1	106.0
Age group 75+	99.6	100.7	102.6	104.9	106.0	106.8	107.1

Source: European Commission services based on Belgian pension questionnaire

Table 16 Pensioners (public schemes) to population ratio by age group
In %

	2016	2020	2030	2040	2050	2060	2070
Age group -54	3.3	3.6	3.0	2.4	2.2	2.2	2.2
Age group 55-59	19.2	18.7	18.1	14.0	12.9	12.5	12.5
Age group 60-64	54.8	47.8	40.5	32.8	30.8	30.0	29.7
Age group 65-69	93.6	94.3	86.3	82.8	82.4	82.6	81.9
Age group 70-74	95.4	96.7	99.7	101.1	103.9	104.2	104.1
Age group 75+	99.6	100.7	102.6	104.9	106.0	106.8	107.1

Source: European Commission services based on Belgian pension questionnaire

To fully understand the evolution of the ratios for the age groups below 65, the evolution of the average annual growth rate of both the numerator and the denominator are presented in Table 17. The number of pensioners below 65 consists of the disabled, the unemployed with company allowance, the old-age pensioners and survivor pensioners.

[8] Inactive population of -54 is the population aged between 0 and 54 years diminished with the labour supply 15-54.

Table 17 Average annual growth rate of the number of pensioners, the inactive population and the population, below 65
In %

	2016-2020	2021-2030	2031-2040	2041-2050	2051-2060	2061-2070
Pensioners*						
-54	2.2	-1.4	-2.1	-0.5	0.2	-0.1
55-59	0.5	-1.0	-2.4	-0.2	-0.6	0.5
60-64	-1.6	-1.3	-2.5	0.0	-0.3	0.4
Inactive population**						
-54	0.2	0.4	0.3	0.2	0.2	0.1
55-59	-3.4	-2.4	0.7	0.3	-0.3	0.5
60-64	-1.9	-3.0	-0.7	0.7	-0.0	0.5
Population***						
-54	0.2	0.3	0.3	0.2	0.2	0.1
55-59	1.1	-0.7	0.1	0.6	-0.3	0.5
60-64	1.8	0.3	-0.5	0.6	-0.0	0.5

Source: * Belgian pension questionnaire; ** CSM and Eurostat 2015 population projection; *** Eurostat 2015 population projection

For those aged under 54, the evolution of the ratio number of pensioners to (inactive) population is explained by the evolution of the number of disabled which increases till 2020, and then decreases till 2050 (see Table 26, section 4.3.1.d).

The increase of the ratio number of pensioners to inactive population in the age group 55-59 till 2030 is due to the decrease of the inactive population (large increase of the labour supply). During this period, despite the increasing number of disabled persons, the total number of pensioners declines due to the unemployed with company allowance non-job seekers and the survivor pensioners. Between 2030 and 2040, the evolution of the ratio number of pensioners to inactive population is mostly driven by the evolution of the number of pensioners (especially by the number of disabled persons).

In the age group 60-64, despite the increasing number of disabled persons, the total number of pensioners declines until 2040 due to the pension reform. The increase in the ratio pensioners to inactive till 2030 is due to the declining inactive population. Between 2040 and 2050, the decrease in this ratio reflects the evolution of the inactive population.

For the age group 65-69, the total pensioners to population ratio decreases between 2020 and 2040 because of the raise in the statutory retirement age. It should be noted that ratios above 64 sometimes exceed 100%, which can be explained on the one hand, by pensioners living abroad, and on the other hand, by some double counting of pensioners (that is impossible to avoid due to the lack of data) within the civil servants' scheme (some receiving both old-age and survivor benefits, or benefits from different public sub-sectors).

The analysis of the ratio of the female pensioners to the (inactive) population (Table 18 and Table 19) is similar to the analysis of the global ratio.

Table 18 Female pensioners to inactive population ratio by age group
In %

	2016	2020	2030	2040	2050	2060	2070
Age group -54	8.3	9.1	7.4	5.8	5.3	5.3	5.2
Age group 55-59	52.9	66.1	77.0	54.1	50.5	49.2	48.8
Age group 60-64	61.4	66.8	83.4	67.2	61.7	59.8	59.5
Age group 65-69	87.2	90.9	97.2	96.5	96.4	97.0	96.8
Age group 70-74	83.9	88.1	94.8	95.9	99.8	100.6	100.4
Age group 75+	92.8	94.6	98.9	102.3	103.0	103.5	103.9

Source: European Commission services based on Belgian pension questionnaire

Table 19 Female pensioners to population ratio by age group
In %

	2016	2020	2030	2040	2050	2060	2070
Age group -54	4.0	4.4	3.6	2.8	2.6	2.6	2.5
Age group 55-59	20.1	21.8	21.5	15.3	13.8	13.4	13.3
Age group 60-64	48.2	44.4	41.2	32.0	29.4	28.5	28.4
Age group 65-69	84.8	86.9	80.9	78.6	78.3	78.7	78.2
Age group 70-74	83.3	87.7	93.7	94.2	98.1	98.8	98.7
Age group 75+	92.8	94.6	98.9	102.3	103.0	103.5	103.9

Source: European Commission services based on Belgian pension questionnaire

3.3.5. New public pension expenditure disaggregation

Table 20 illustrates the disaggregation of the new public pension expenditure by gender (old-age and early earnings-related) between the number of new pensions, the average contributory period, the average accrual rate and the average pensionable earning. The average accrual rate is an average of the accrual rates by scheme: 1.67% (1/60) in the civil servants' scheme, 1.33% (60%/45) in the wage earners' and the self-employed schemes (1.67% for head of a household with dependent spouse (75%/45)) (see Box 1). Taking into account the average contributory period and the average accrual rate as separate factors in the calculation of the new pension expenditure, the average pensionable earning can be considered as a reference wage for a maximum career. In the reporting pension questionnaire that Belgium fills in for the AWG, the new pension expenditure is given for a full year, namely 12 months, although in reality, not all new pensioners receive a pension in all 12 months the first year. The monthly average wage at retirement and economy-wide average wage are based on the National Accounts and are provided by the Belgian questionnaire.

As for men, the average contributory period increases by more than one year over the whole projection period as a result of the pension reform. The number of new pensions tends to increase over the whole projection period (it should be noted that 2030 is an outlier, being a year when the raise in the statutory retirement age takes place). Over the whole projection period, the average accrual rate slightly declines due to the replacement of male pensioners heads of household with a dependent spouse (75% of the reference wage) by single pensioners (60% of the reference wage) in the wage earners' and self-employed schemes.

As far as women are concerned, the evolution of the number of new pensions is similar to that of men. The average contributory period of women increases from 34.4 years in 2016 to 39 years in 2070. It represents a strong rise by 4.6 years due to the growing female participation rate and to the pension reform. The average accrual rate remains stable around 1.38.

In total, the number of new pensions increases quickly between 2016 and 2040 (0.9% average annual growth rate) and then increases slightly (0.3% average annual growth rate), because of the demographic evolution. The average contributory period increases by 2.5 years between 2016 and 2070, thanks to the increase of female participation rate and to the pension reform. The average accrual rate falls slightly due to a decrease in the average male accrual rate.

Table 20 Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions)

	2016	2020	2030	2040	2050	2060	2070
MEN							
Projected new pension expenditure (million EUR)*	1265.4	1400.8	1818.6	3102.4	4454.6	6373.9	8767.3
I. Average contributory period (years)	39.3	39.2	40.7	40.8	40.7	40.5	40.6
II. Monthly average pensionable earnings (‘000 EUR)	2.7	3.2	3.9	5.4	7.5	10.3	14.2
III. Average accrual rates (%)	1.5	1.4	1.4	1.4	1.4	1.4	1.4
IV. Number of new pensions (in thousands)	67.2	65.5	65.9	82.8	85.9	89.9	89.4
V. Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
VI. Sustainability/Adjustment factor	0	0	0	0	0	0	0
Monthly average pensionable earnings/Monthly average wage at retirement**	0.8	0.8	0.7	0.7	0.7	0.7	0.7
Monthly average pensionable earnings/Monthly economy-wide average wage**	0.9	0.9	0.8	0.8	0.8	0.8	0.8
WOMEN							
Projected new pension expenditure (million EUR)*	917.6	1062.8	1329.7	2496.9	3691.4	5428.3	7529.4
I. Average contributory period (years)	34.4	35.0	40.5	38.8	39.0	38.9	39.0
II. Monthly average pensionable earnings (‘000 EUR)	2.8	3.1	3.9	5.3	7.3	10.1	14.2
III. Average accrual rates (%)	1.4	1.4	1.4	1.4	1.4	1.4	1.4
IV. Number of new pensions (in thousands)	57.0	60.2	49.8	72.9	78.3	83.1	81.7
V. Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
VI. Sustainability/Adjustment factor	0	0	0	0	0	0	0
Monthly average pensionable earnings/Monthly average wage at retirement**	0.8	0.8	0.7	0.7	0.7	0.7	0.7
Monthly average pensionable earnings/Monthly economy-wide average wage**	0.9	0.9	0.8	0.8	0.8	0.8	0.8
TOTAL							
Projected new pension expenditure (million EUR)*	2183.0	2463.6	3148.3	5599.4	8145.9	11802.1	16296.7
I. Average contributory period (years)	37.4	37.5	40.7	40.0	40.0	39.9	39.9
II. Monthly average pensionable earnings (‘000 EUR)	2.7	3.1	3.9	5.3	7.4	10.2	14.2
III. Average accrual rates (%)	1.4	1.4	1.4	1.4	1.4	1.4	1.4
IV. Number of new pensions (in thousands)	124.2	125.7	115.7	155.8	164.3	173.0	171.1
V. Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0	12.0
VI. Sustainability/Adjustment factor	0	0	0	0	0	0	0
Monthly average pensionable earnings/Monthly average wage at retirement**	0.8	0.8	0.7	0.7	0.7	0.7	0.7
Monthly average pensionable earnings/Monthly economy-wide average wage**	0.9	0.9	0.8	0.8	0.8	0.8	0.8

* new pension expenditure = I x II x (III/100) x IV x V with four decimal places

** average wage at retirement and economy-wide average wage: figures from the Belgian pension questionnaire

Source: European Commission services based on Belgian pension questionnaire

3.4. Financing of the pension system

In Belgium, the financing of all social expenses for the wage earners' and self-employed schemes is carried out, since 1/1/1995, through an overall financial management (the so-called "global management"). This global management implies that there is a single contribution rate for all social security sectors (pensions, disability, primary incapacity, maternity leave, unemployment, etc.) and that each sector is financed according to its expenditure. The main financial resources consist of social security contributions (75.2% and 64.8% of the resources in 2016 in the wage earners' and self-employed schemes, respectively), a government grant (10.5% and 21.4% for each of these two schemes respectively) and alternative financing or dedicated tax revenues (10.4% in both schemes). So, the government finances the public pension deficit if necessary.

In the civil servants' scheme, most social benefits, among which pensions, are financed through the general budget of the federal government.

Table 21 Financing of the system

	Public employees	Private employees	Self-employed
Contribution base		All gross earnings	Gross annual income minus professional expenses
Contribution rate/contribution			
Employer		24.92% for all social security sectors	21% for revenues from 13 296 to 57 416 EUR in 2017; 14.16% for revenues from 57 416 to 84 613 EUR
Employee		13.07% for all social security sectors	
State	Budget of the federal government	State subsidies and alternative financing	State subsidies and alternative financing
Other revenues			
Maximum contribution			
Minimum contribution			

Source: European Commission services

The abovementioned financing of the pensions explains why Table 22 does not present figures for the contributions. In Belgium, the number of contributors is equal to the number of working people, so that the ratio between contributors and employment is 100%.

Table 22 Revenue from contribution (million), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)

	2016	2020	2030	2040	2050	2060	2070
Public contribution	:	:	:	:	:	:	:
Employer contribution	:	:	:	:	:	:	:
Employee contribution	:	:	:	:	:	:	:
State contribution	:	:	:	:	:	:	:
Other revenues							
Number of contributors (I)	4605	4775	5045	5185	5302	5353	5417
Employment Labour force survey (II)	4605	4775	5045	5185	5302	5353	5417
Ratio (I)/(II)	100	100	100	100	100	100	100

Source: European Commission services based on Belgian pension questionnaire

3.5. Sensitivity analysis

The next table shows the sensitivity of public pension expenditure to various scenarios, expressed in deviation from the baseline in percentage points of GDP. In all scenarios, the parameters regarding the living standards adjustment are the same as in the baseline.

Table 23 Public pension expenditures under different scenarios (deviation from the baseline)
Baseline in % of GDP; sensitivity analysis in percentage points of GDP

	2016	2020	2030	2040	2050	2060	2070
Public pension expenditure							
Baseline in % of GDP	12.1	12.6	13.8	14.5	14.7	14.9	15.0
Sensitivity analysis: deviation from the baseline in percentage points of GDP							
Higher life expectancy (+2 extra years)	0.0	0.0	0.1	0.2	0.4	0.6	0.8
Lower fertility rate (-20%)	0.0	0.0	0.0	0.2	0.7	1.2	2.0
Higher TFP (+0.4 pp.)	0.0	0.0	0.0	-0.3	-0.9	-1.3	-1.8
Lower TFP (-0.4 pp.)	0.0	0.0	0.0	0.4	0.9	1.5	2.1
Higher employment rate (+2 pp.)	0.0	-0.1	-0.4	-0.4	-0.4	-0.4	-0.4
Lower employment rate (-2 pp.)	0.0	0.1	0.4	0.4	0.4	0.4	0.4
Higher employment of older workers (+10 pp.)	0.0	-0.3	-1.3	-1.3	-1.3	-1.4	-1.4
Higher migration (+33%)	0.0	-0.1	-0.4	-0.6	-0.8	-0.7	-0.6
Lower migration (-33%)	0.0	0.1	0.4	0.7	0.8	0.8	0.6
RISK (lower TFP -0.2 pp.)	0.0	0.0	0.1	0.3	0.6	0.9	1.1
Policy scenario: linking retirement age to increases in life expectancy	0.0	0.0	0.0	0.0	-0.3	-0.7	-1.1

Source: European Commission services based on Belgian pension questionnaire

3.5.1. Higher or lower TFP scenarios and risk scenario

The total factor productivity growth changes on the long run with +0.4, -0.4 and -0.2 percentage point in the higher, lower and risk TFP growth scenario respectively, implying a change of +0.6, -0.6 and -0.3 percentage point of productivity growth.

Public pension expenditure decreases (increases) by 1.8 (2.1 and 1.1) percentage point of GDP in 2070 in the higher (lower and risk) total factor productivity scenario in comparison with the baseline. This results from the wage earners' and self-employed schemes, where the pension is calculated on the basis of the income earned over the whole career, meaning that it only progressively reflects the effect of a higher (lower) productivity, whereas GDP increases (decreases) immediately. In result, the weight of these pensions expressed as a percentage of GDP is lower (higher). On the contrary, in the civil servants' scheme, the change in wages is directly mirrored in pensions (the reference wage for new retirees is the average wage over the last ten working years and the average pensions are automatically indexed to the average nominal wages), so that the change in the TFP assumptions has practically no impact on the cost of pension for the civil servants.

The results of the higher/lower TFP growth by 0.4 percentage point are not entirely symmetrical due to the GDP (assumptions file from the Commission) that in 2070 is 24% higher and 19% lower (in the higher and lower TFP sensitivity analysis respectively) than in the baseline.

3.5.2. Higher or lower employment rate and higher employment rate of older workers scenarios

A higher (lower) employment rate of two percentage points leads to a decrease (increase) in pension expenditure by 0.4 percentage point of GDP by 2070 in comparison with the baseline. The scenario of a higher employment rate of ten percentage points for older workers leads to a decrease by 1.4 percentage point of GDP by 2070 compared to the baseline. In each scenario, the change in economic growth is the main cause of the deviation. In the higher employment rate of older workers scenario, the reduction of the number of pensioners also contributes to this deviation.

3.5.3. Demographic scenarios: higher life expectancy, lower fertility rate and higher/lower migration

The higher life expectancy (by 2 years) scenario generates higher public pension expenditure compared to the baseline scenario (+0.8 percentage point of GDP in 2070), because of the higher number of pensioners (higher old-age dependency ratio).

With a higher (lower) migration of 33%, public pension spending decreases (increases) by 0.6 percentage point of GDP with respect to the baseline in 2070. A higher (lower) working age population leads to higher (lower) employment, hence higher (lower) economic growth, which decreases (increases) the relative weight of pension expenditure as a percentage of GDP.

In the lower fertility scenario (-20%), public pension expenditure is higher by 2.0 percentage points of GDP in 2070 compared to the baseline. With unchanged participation rates, a lower population aged between 0 and 66 years decreases the labour supply, and thus employment and GDP.

3.5.4. Linking retirement age to increases in life expectancy

This scenario begins around 2050 and reduces the pension expenditure by 1.1 percentage point of GDP in 2070 due to a decrease in the number of pensioners and to an increase of employment and GDP.

3.6. Description of the changes in the 2006, 2009, 2012, 2015 and 2018 projections

The main result of the new pension projection is that the public pension expenditure increases by 2.9 percentage points of GDP between 2016 and 2070, due to the old-age and early pensions of the wage earners' and the civil servants' schemes. This rise results from the increase of the old-age dependency ratio (contribution of 6.6 percentage points of GDP), while the coverage ratio, the employment effect and the benefit ratio contribute negatively to this rise.

Table 24 Average annual change in public pension expenditure to GDP during the projection period under the 2006, 2009, 2012 (July update), 2015 (November update) and 2018 Ageing Report
In percentage points of GDP

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
AR 2006 (2004-2050)	5.1	7.7	-0.4	-0.9	-1.2	:	-0.1
AR 2009 (2007-2060)	4.8	7.4	-0.9	-0.5	-1.0	:	-0.2
July 2012 round (2010-2060)	5.1	7.4	-1.1	-0.5	-0.5	0.0	-0.2
AR 2015 (2013-2060)	3.3	5.6	-1.3	-0.6	-0.3	0.0	-0.1
Update November 2015 (2013-2060)	1.3	5.0	-2.0	-0.9	-0.4	0.0	-0.4
AR 2018 (2016-2070)	**2.9**	**6.6**	**-2.1**	**-0.6**	**-0.5**	**0.1**	**-0.5**

Source: European Commission services based on Belgian pension questionnaire

The pension expenditure resulting from the current projection is 1.6 percentage point of GDP higher than that in the November update of the 2015 Ageing Report. The difference is mostly due to the change in the contribution of the dependency ratio (6.6 p.p. instead of 5.0 p.p.). The employment effect contributes less negatively because the unemployment rate does not decrease in the new projection (there was a slight decline in the 2015 projection).

In comparison with the 2015 Ageing Report, the November 2015 update had brought a reduction of the cost of public pension by 2 percentage points of GDP between 2013 and 2060, resulting from the 2015 pension reform, which notably increased the minimum age and the career conditions to benefit from an early pension, as well as the statutory retirement age (the coverage ratio and the employment effect have a stronger negative contribution).

The pension expenditure of the 2015 Ageing Report was 1.8 percentage point of GDP less than in the 2012 exercise of July, mainly due to the change in the population projection (lower contribution of the dependency ratio).

There are not very significant differences between the 2006, 2009 and 2012 exercises in terms of cost of pension. The slight difference between the 2012 and 2009 exercises (+0.3 percentage point of GDP) is attributable to a less negative contribution of the benefit ratio due to a change of assumption regarding productivity growth (1.5% annual growth between 2010 and 2060 instead of 1.7% in the 2009 projection). The slightly smaller cost of pension in the 2009 round (4.8 percentage points of GDP) than in the 2006 exercise (5.1 percentage points of GDP) is mainly due to a lower positive contribution of the dependency ratio.

Table 25 presents the factors behind the difference between the November update of the 2015 Ageing Report projection and the new one. The cost of pension between 2016 and 2060 in the 2018 Ageing Report is 1.5 percentage point of GDP higher than in the updated projection of November 2015, due to the change in the assumptions. The factor policy related changes, namely the reform of the validation of higher degree study periods for the pension calculation (see section 1.5.3), reduces the pension expenditure by 0.1 percentage point of GDP in 2060.

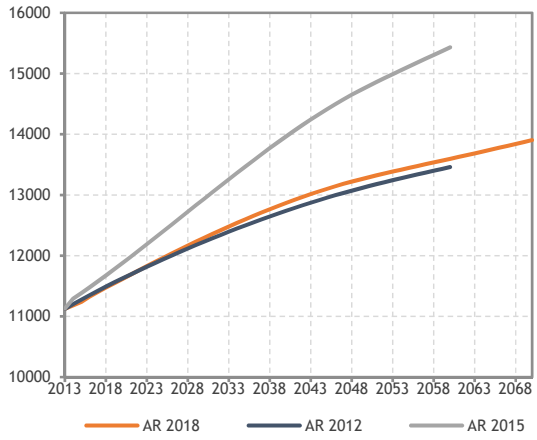
Table 25 **Breakdown of the difference between AR 2015 (November update) and the new public pension projection**
% of GDP

	2013	2016	2020	2030	2040	2050	2060	2016-2060	2070	2016-2070
Ageing report 2015 (November update)	**11.8**	**11.7**	**11.8**	**12.3**	**13.0**	**12.9**	**13.0**	**+1.3**	:	:
Change in assumptions	:	0.4	0.8	1.5	1.5	1.8	2.0	+1.6	:	:
Improvement in the coverage or in the modelling	:	:	:	:	:	:	:	:	:	:
Change in the interpretation of constant policy	:	:	:	:	:	:	:	:	:	:
Policy related changes	:	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1		
New projection AR 2018	**11.8**	12.1	12.6	13.8	14.5	14.7	14.9	**+2.8**	15.0	**2.9**

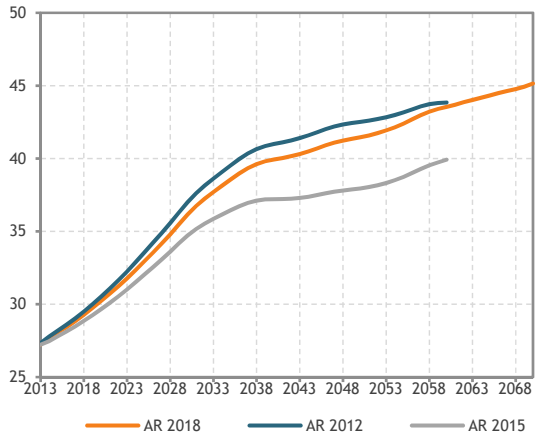
Source: Belgian pension questionnaire

The assumptions have been changed with respect to the Eurostat 2015 population projection, the total factor productivity growth (that reach 1% in 2045 instead of 2035 in the previous projection) and the unemployment rate (that does not decrease). Comparison of these assumptions following the 2015 and 2018 releases are shown in the graphs below.

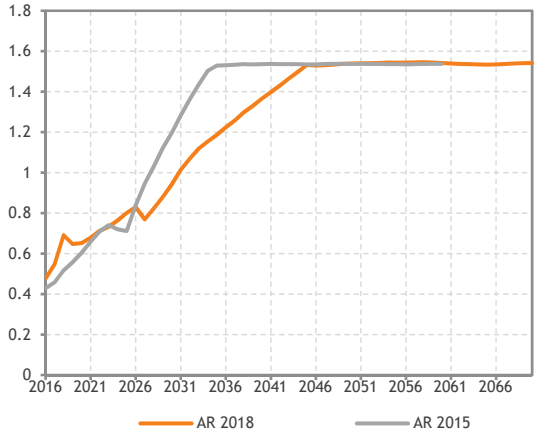
Graph 2 **Population**
In thousands



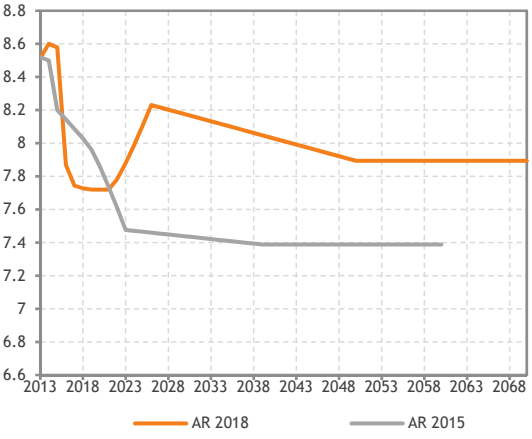
Graph 3 **Old-age dependency ratio**
In %



Graph 4 **Productivity growth**
In %

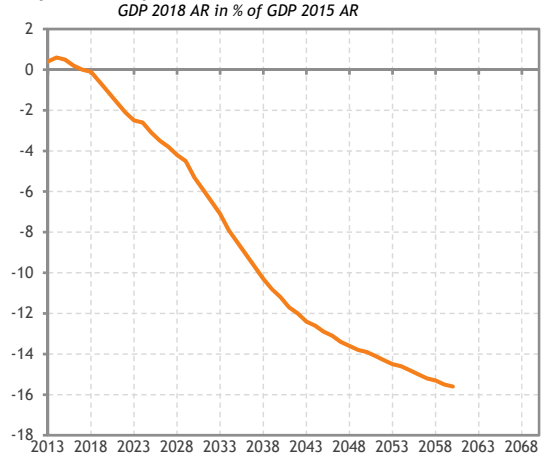


Graph 5 **Unemployment rate**
In %



Graph 6 **Impact on the GDP**

GDP 2018 AR in % of GDP 2015 AR



Finally, the last graph shows the impact of the change in assumptions on the GDP.

4. Description of the pension projection model and its database

4.1. Institutional context

The AWG pension projection exercise results from the Belgian MALTESE system of models, developed by the Federal Planning Bureau. This system of models produces projections of the pension expenditure for the first pillar using the national methodology, however relying on the AWG assumptions. As part of other (non-AWG) projection activities, this model also provides projections for other kinds of social expenditure as well as for the entire Belgian government's budget.

The Federal Planning Bureau started developing the MALTESE system of models in 1987, at the request of the government, in order to estimate long-term social expenditure within the overall framework of public finance. This was done within the scope of the statutory mission of the FPB to support economic policy-making. In the early period, between 1987 and 2001, it was used several times, either on the initiative of the FPB or to support economic policy-making (especially for measuring the impact of the public pension reforms of 1990 and 1996). Since its creation in 1987, the MALTESE system has undergone permanent improvement and adjustment to the changing legislative environment.

In 2001, the Act "guaranteeing a continuous reduction in public debt and the setting up of the Ageing Fund" created the Study Committee on Ageing (SCA), that has to publish a yearly report on the budgetary and social implications of ageing (budgetary cost of ageing, living conditions of pensioners, etc.). The yearly Advice of the "Borrowing requirements of the Public Sector" department of the High Council of Finance and the yearly "Memorandum on Ageing" of the Federal Government are based on the annual report of the SCA, as well as the long-term aspect of the Stability Programme. The Federal Planning Bureau has been entrusted with the technical and administrative work of the SCA. Consequently, the MALTESE system of models is used every year to produce a long-term projection of all social expenditure for the yearly report of the SCA.

The Law of 21 May 2015 established a National Pension Committee, a Knowledge Centre and an Academic Council. The Knowledge Centre gathers all pension knowledge available within administrations and public bodies. The secretariat of its steering committee is managed by the FPB and the MALTESE model is frequently used for the reports of the Knowledge Centre.

4.2. General description of the whole model

4.2.1. Type and structure of the whole model

MALTESE is a system of meso-economic models with one central model and several specific peripheral models (computing the number of pensioners, average pensions, health care expenditures, etc.). The global accounting framework of the system relies on the National Accounts. The central model and the peripheral models are accounting models, adequate for estimating budgetary implications of demographic projections, such as the implications for the social security account and the overall public finance account. Special attention is paid to modelling social expenses by scheme, gender, age and categories (old-age, survivor, pension based on the rate for individuals "with dependants" and pension based on the rate for singles) for the number of beneficiaries (new and other) and the corresponding average benefits according to the calculation rules (ceiling, minimum, indexation rules, etc.). A very detailed database is used for this purpose. The baseline assumes no change in legislation, rules or policy.

The projection proceeds in five steps:

- In the first place, a projection of the population by age and gender is required given the assumptions on fertility rates, life expectancy and migration flows.
- Given the behavioural assumptions, legal parameters of eligibility and the macroeconomic framework, in a second step the population is split up into different socio-economic groups: school population, labour force (working and unemployed), unemployed with company allowance (job seeker and non-job seeker), people on a full-time career break, disabled persons, pensioners and other non-participating population (see section 6.2 for the data sources).

  This socio-economic projection results from transition probabilities from one status to another. It is a generalisation of the AWG methodology that is used to produce the labour force projection. The participation and retirement behaviour of the different generations in the different age and gender classes is based on assumptions regarding participation rates (as defined by the AWG) and on present retirement behaviour, taking into account the effects of the reforms. The socio-demographic projection leads to a coherent projection of the number of beneficiaries in the different social security schemes.
- In a third step, the benefits in the various schemes are projected on the basis of the number of beneficiaries and of the different institutional arrangements (wage ceilings, adjustment to living standards, etc.). Average benefits are calculated by branch, gender, age group and category (except for healthcare and long-term care expenditure which are estimated using econometric modelling in the national projection).
- In a fourth step, the dynamics (and not the level) of the benefits obtained in the third step are applied to the corresponding aggregates of the National Accounts.
- Finally, in the national projection, social expenditure is included in a projection of the public budget because on the one hand, social expenditure is financed by contributions, taxes and transfers from the federal budget, and on the other hand, the civil servants' pensions are financed by the public budget. The evolution of all revenues and primary expenditure leads to the calculation of public debt and interest payments.

Box 3 The main characteristics of the MALTESE system of models:

- Modelling social expenses and global public finances in their entirety
- System of mechanical and accounting models adequate for converting demographic projections into budgetary implications
- Special attention is paid to modelling social expenses according to the calculation rules (legislation), by scheme, gender and age: number of beneficiaries (new and other), average benefits (ceiling, minimum, indexation rules, etc.)
- Baseline with no change in legislation, rules and policy
- Number of beneficiaries: the fundamental principle is cohort modelling by gender and age, using transition probabilities from one status to another
- Average benefit: for each main representative socioeconomic group, in particular, for pensions, using detailed data by scheme.

4.2.2. Coverage of the whole model

The whole model MALTESE generates the following different social expenditure categories (the categories retained for the AWG pension projection are in bold):

Pensions:
- wage earners
- self-employed
- civil servants
- guaranteed income for elderly (assistance)
Health care
- acute care
- long-term care
Disability allowances (wage earners and self-employed)
- primary incapacity allowances (first year of disability)
- disability allowances (subsequent years of disability)
- maternity leave
Unemployment benefits (wage earners' scheme)
Unemployment with company allowance non-job seekers **(wage earners' scheme)**
Unemployment with company allowance job seekers (wage earners' scheme)
Family allowances
Other social expenditure (mainly subsistence support, accidents at work, occupational diseases, handicapped persons)
Education

4.2.3. Assumptions made in the AWG labour force projection

The labour force projection, including the projection of employment and unemployment, is given by the AWG on the basis of Eurostat Statistics. Importing this AWG projection into the MALTESE system raises two main issues. Firstly, the MALTESE system normally produces a consistent projection of the various socio-economic groups, and not only the labour force, which is an important feature for simulating the evolution of the number of pensioners. Secondly, this socioeconomic projection results in an exhaustive breakdown of the population by age and gender, which ensures the consistency between the demographic and the socio-economic projection. Both properties of the MALTESE system imply the use of the original data and definitions concerning the socio-economic groups, in particular, the administrative employment and unemployment data. Otherwise, the transition probabilities from the labour force and from employment to other socio-economic statuses (for instance, retirement) should be re-estimated, and the consistency between the demographic and the socio-economic projections would be lost.

The projection of administrative employment and unemployment is aligned with the AWG labour force projection at two levels: the participation rate of the population aged 55 to 71 and the global employment rate. The administrative participation rate among the population aged 55 to 71 is supposed to follow, over the 2016-2070 period, a similar evolution to that simulated in the AWG projection for this age group. This assumption ensures the greatest possible consistency between the evolution of labour force and evolution of the retired population. The tendency of the administrative participation rate of the younger age groups is not aligned with the evolution shown in the AWG projection. Yet, the participation rates remain in both cases relatively stable over the period considered and hardly influence the future ratio of pensioners to population of the considered age group (see the following section). However, the administrative unemployment rate is adjusted, such that global administrative employment and global employment from the AWG projection grow at the same rate between 2016 and 2070.

4.3. Assumptions and methodologies applied to the pension model

4.3.1. Number of pensions

The key principle used to model the number of pensions is to let the existing number of pensions grow old and to add new pensions based on recent "entry behaviour" and historical participation rates. The projection of the number of pensions is carried out at a disaggregated level per scheme, gender and age or age group.

a. Entries in the old-age pension system

The statutory retirement age is 65 years before 2025, 66 years from 2025 to 2029 and 67 years from 2030 onwards. As far as men are concerned, **the overall pension rate at the statutory retirement age** (number of pensions in the first pillar to population aged 65 before 2025, 66 between 2025 and 2029 and 67 from 2030 onwards) is kept constant (because of the almost universal coverage of the legal pension). For women, a "total coverage rate" at the statutory retirement age is defined and supposed to be constant. This "total coverage rate" is the ratio of the number of women benefiting either by their own pension

(old-age or survivor pension) or their husband's pension (calculated at the household rate[9]) to the overall number of women aged 65, 66 or 67.

The **distribution by scheme** (wage earners, self-employed and civil servants) **of the beneficiaries at the statutory retirement age** is determined according to the historical evolution of activity by scheme of the corresponding generation.

In a situation without the reform, entries in old-age pension occur mainly between 60 and 65 years. The **entry profile for old-age pension between 60 and 65 years** depends on the socio-economic status (employment, unemployment, unemployment with company allowance or disability) and on the future pension scheme from which the population aged between 59 and 64 years will draw pension. Implicitly, retirements occur at varying ages; for example, wage-earners retire at a younger age than beneficiaries of a disability allowance. In a second step, this entry profile explicitly takes into account the pension reform. It is adjusted to take into account the increase in the career conditions for early retirement before the statutory retirement age. Moreover, the effective entry age in the pension schemes increases by about one year (and subsequently by about two years) according to the labour force projection of the AWG, due to the rise in the statutory retirement age.

b. Entries in the survivor pension system

Before the age of 60, (female) entries in the survivor pension system are determined by scheme (wage earners, self-employed and civil servants) and 5-year age group, in function of the evolution of the female labour force, the widowed population and the distribution of the male labour force of the same age group by scheme. The projection also takes into account the survivor pension reform with the gradual increase of the minimum entry age (to 55 in 2030).

From the age of 60 onwards, the number of new female pensions in the survivor pension system is determined by the number of pensions attributed to deceased married men in the scheme concerned.

c. Entries into unemployment with company allowance non-job seeker

Entries into the unemployment with company allowance system for non-jobs seekers are calculated on the basis of an entry probability by age and gender based on the number of wage earners. These probabilities are adjusted in order to take into account the 2015 pension reform.

d. Entries into disability

The disability rates (the shares of disabled persons per gender and age category in the demographic population) are calculated using the principle of cohorts. As a first step, the entry probabilities in the primary incapacity benefit system (the disabled for less than one year, which are not taken into account in the pension expenditure) are calculated from the potential labour force[10]. Subsequently, the entry probabilities in the disability benefit system (after a year primary incapacity) are calculated from the

[9] The household rate in the wage-earners' and self-employed pension schemes exceeds the singles rate (see Box 1). It is used in the pension calculation if it results in a higher than the combined pension of both spouses calculated at the singles' rate.

[10] Working and unemployed people, people in unemployment with company allowance for non-job seekers and people on a full-time career break.

primary disabled category. Finally, probabilities of remaining in the disability system are calculated. These probabilities are adjusted in order to take into account the pension reform. The number of primary disabled and disabled persons by age category and gender is computed by applying these rates to the demographic projection. The distribution of the number of primary disabled and disabled persons in the wage earners' scheme and the self-employed scheme is carried out proportionally to the number of workers in the respective schemes.

The next table shows the disability rates by age group (ratios of the disabled to the corresponding population). The maximum age to receive a disability allowance is 64 till 2024, 65 between 2025 and 2029 and 66 from 2030 onwards (beyond that age, the beneficiary gets an old-age pension).

Table 26 Disability rates by age group
In %

	2010	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.1	2.9	3.2	2.9	2.3	2.1	2.1	2.1
Age group 55-59	8.5	11.2	13.7	14.3	11.5	10.4	10.3	10.2
Age group 60-64	8.2	10.5	14.4	20.5	19.0	16.8	16.1	16.1
Age group 65-69	0.1	0.0	0.0	4.2	6.6	5.8	5.3	5.7
Age group 70-74	0	0	0	0	0	0	0	0
Age group 75+	0	0	0	0	0	0	0	0

Source: Belgian pension model

The last observed data show increasing disability rates. In accordance with the National Institute for Health and Disability Insurance, the entry probabilities and the probabilities of remaining disabled remain stable till 2020 (as a consequence of the global economic crisis, which generated more occurrences of illness due to the stressful labour market environment), implying increasing disability rates. Later on in the projection, the entry probabilities and the probabilities of remaining disabled progressively decrease until the mid-2030s to their pre-crisis level and then remain constant. The cohort modelling implies increasing disability rates till 2030 for the individuals aged 60 to 64. At the end of the projection period, the disability rates return approximately to their levels of the first part of the 2010s, except for the age groups 60-64 and 65-69, which are influenced by the pension reform.

4.3.2. Average pension

The average pension amount in the different pension schemes is estimated by modelling as accurately as possible the main legislative parameters for the successive cohorts of persons entitled to a pension. For each pension scheme (wage earners, self-employed, civil servants), an average pension is estimated for each career profile (maximum career or not, retirement age), each category (old-age, survivor) and according to the legal replacement rate (pension at the household rate or pension at the rate of a single person in the wage earners' and self-employed schemes).

The evolution of the profile of the new pensioners depends namely on the socio-economic and macroeconomic projections. For instance, the increase in the female participation rate results in a growing number of women building up full pension rights. As a consequence, a growing number of pensioners, both in the wage earners' and self-employed schemes, claim a single pensioner's allowance, which is calculated at a lower legal replacement rate (60%), instead of a household rate pension (75%).

The assumption concerning the productivity growth has also an impact on the evolution of the average pension amounts through the evolution of average wages. This effect occurs faster in the case of pensioners from the civil servants' scheme, because their reference wages are calculated on the basis of their incomes over the last ten working years. As for the wage earners and the self-employed, this wage evolution is reflected in the long run, as their pension is calculated on the basis of the average income over their whole career, which, at the start of the projection period, is almost completely situated in the past.

The income distribution remains constant in the projection. It is used, among other things, to compute the percentages of recipients with incomes above the wage ceiling and below the minimum pension.

In the wage earners' scheme, the average unemployment with company allowance for non-job seekers (only the part paid by the National Employment Office) and disability benefits are calculated per gender and age group, taking into account the respective ceilings. Disability allowances in the self-employed scheme are lump-sum benefits.

4.3.3. Career length or contributory period

Without the 2015 pension reform, it was assumed that the average career length of men taking their pension depended, within the various systems, on the participation profile of the generation (historical participation rate for 5-year age groups). For women, the average career length was assumed to converge to that of men (without actually reaching that level). These evolutions are adjusted in relation to the postponed entries in old-age pension due to the pension reform.

4.3.4. Indexation and social policy assumptions - See section 1.3.

4.3.5. Reforms incorporated in the model - See section 1.5.

4.4. Pension data used to run the model

From a general point of view, the model is fully consistent with the Belgian national accounts and covers all expenses of the global public finance account. The following table presents the data sources used in the MALTESE model for the number of beneficiaries and the pension expenditure. Administrative sources are used for the number of beneficiaries and the detailed benefits (gender, age, minimum or not, etc.). The pension expenditure is consistent with the National Accounts.

Administrative data concerning beneficiaries and benefits	
Old-age pension and survivor:	
- wage earners' scheme by category (and details about the career)	Federal Service of Pensions
of which unemployment with company allowance non-job seekers	National Employment Office
- self-employed scheme by category	Federal Service of Pensions
of which details about the career	National Institute for the Social Security of the Self-Employed
- civil servants' scheme by category (and details about the career)	Federal Service of Pensions
Guaranteed income for elderly people (assistance scheme)	Federal Service of Pensions
Disabled population (wage earners' and self-employed schemes)	National Institute for Health and Disability Insurance
Expenditure: National Accounts	
Old-age, survivor, assistance scheme, disability	National Accounts

5. Methodological annex

Information about survivor and disability pensions is mentioned in sections 4.3.1.b and 4.3.1.d.

5.1. Economy-wide average wage at retirement

The next table presents the economy-wide average wage globally and at retirement. The AWG questionnaire only provides a global economy-wide average wage. As expected by the AWG, the economy-wide average wage at retirement is provided by the country. Its level is consistent with the economy-wide average wage from the National Accounts also provided in this table.

Table 27 Economy wide average wage at retirement evolution
In thousand euro at constant 2006 prices

	2016	2020	2030	2040	2050	2060	2070
Economy-wide average wage (AWG)	34.3	34.9	37.8	42.6	49.4	57.6	67.1
Economy-wide average wage - National Accounts	32.8	33.7	36.5	41.1	47.7	55.6	64.7
Economy-wide average wage at retirement	37.4	38.4	42.0	47.8	55.6	64.9	75.7

Source: Belgian model

The economy-wide average wage at retirement is based on the average wages at retirement by scheme. In the wage earners' scheme, the average wage at retirement is based on the gross average wage multiplied by the ratio of the average wage of people aged between 60 and 64 years to the global average wage. The latter ratio, by gender and blue/white-collar workers, changes in parallel with the evolution of the ratio men-to-women and blue-to-white-collar workers.

In the self-employed scheme, we use coefficients that express how the self-employed income, by 5-year age groups, compares to the overall average. These coefficients are different for men and women and are differentiated over various types of professions (agriculture and fishing, industry and crafts, commerce, liberal professions and services). The coefficients are assumed to be constant throughout the whole projection period, but linking them to the average projected income of each projection year, results in an average "end of career income" that is both gender- and profession-specific. These gender- and profession-specific averages are then aggregated into an overall "end of career" average for each projection year.

The observations of the average wages that civil servants receive at the end of their career are provided by the Federal Service of Pensions – Civil Servants. They are the reference wages used to calculate the pensions of the new pensioners. They are available by type of civil servant employment (public administration, education). The FPB introduces a correction on these wages to take into account mixed careers, since the wages provided by the Federal Service of Pensions are those of civil servants who did not have a mixed career.

5.2. Pensioners vs pensions

The methodology behind the calculation of the number of pensions is presented in section 4.3.1. This number of pensions is a hybrid concept combining the number of pensions and the number of pensioners. Double counting of pensioners receiving benefits from both the wage earners' and the self-employed scheme is avoided (when pensioners receive a pension from both schemes, pensions are classified either in the wage earners' scheme or in the self-employed scheme, taking into account the average benefit in both schemes for "mixed" pensions). However, double counting between pensioners of the civil servants' scheme and pensioners of the general scheme for wage earners and the self-employed could not be avoided.

To obtain the number of pensioners, we firstly assume that there is no double counting at the ages below 60. For the ages above 59, the number of pensioners is obtained on the basis of observed data related to double counting between pensions of the civil servants' scheme and the wage earners' scheme (15% of wage earners' pensions) and between pensions of the civil servants' scheme and the self-employed scheme (7% of the self-employed pensions). In the assistance scheme (guaranteed income for the elderly), the double counting rates with the other schemes are much higher: 78% for women, 92% for men and 83% globally. We assume that these double counting rates are the same by age group and remain unchanged during the whole projection period.

5.3. Pension taxation

Gross pension is subject to contributions: 3.55% for health care if the pension benefit exceeds a threshold, solidarity contribution between 0 and 2% according to the pension benefit and contribution of 0.5% for funeral expenses in the civil servants' scheme. The implicit contribution rate is 2.7% in 2016.

Pension benefit is taxed if above a minimum amount varying according to the number of dependent children. The implicit tax rate is 11.7% in 2016.

5.4. Non-earnings-related minimum pension

The non-earnings-related pension is the guaranteed income for elderly persons (the assistance scheme). The driving forces behind its expenditure are the number of beneficiaries and their average benefit amount. The number of beneficiaries is dependent on the growth of older population and number of pensioners. Since the minimum income guarantee is a means-tested scheme and that more than 80% of its beneficiaries also receive a pension benefit (almost exclusively in the wage-earners' or self-employed scheme), the average benefit amount is influenced by the maximum amount of this social assistance scheme and the evolution of pension benefits in the wage earners' and self-employed scheme. The maximum amount of the minimum income guarantee evolves in line with the stipulations foreseen in the "Generation Pact", which is 1% per year in real terms.

5.5. Contributions – See section 3.4.

5.6. Alternative pension spending decomposition

Reduction of the residual is not allowed in the next two tables. The analysis of these tables is similar to the one regarding Table 11 and Table 12.

Table 28 Factors behind the change in public pension expenditures between 2016 and 2070 - pensions
In percentage points of GDP

	2016-2020	2020-2030	2030-2040	2040-2050	2050-2060	2060-2070	2016-2070
Public pensions to GDP	0.5	1.2	0.7	0.1	0.2	0.2	2.9
Dependency ratio effect (pop. 65+/pop. 20-64)	0.8	2.6	1.6	0.6	0.9	0.7	7.3
Coverage ratio effect (pensions/pop. 65+)	-0.1	-1.0	-0.6	0.0	-0.1	0.0	-1.8
Coverage ratio old-age	0.1	-0.2	0.1	0.1	0.0	0.1	0.2
Coverage ratio early-age	-0.4	-1.3	-2.3	-0.5	-0.2	0.0	-4.6
Cohort effect	-0.6	-2.4	-1.0	-0.2	-0.4	-0.2	-4.7
Benefit ratio effect (average pension/(GDP/hours worked 20-74))	0.2	0.4	0.1	-0.3	-0.4	-0.3	-0.3
Labour market/Labour intensity effect	-0.3	-0.5	-0.1	0.0	0.0	0.0	-0.8
Employment ratio effect (pop.20-64/employment 20-64)	-0.3	-0.3	-0.1	0.0	0.0	0.0	-0.6
Labour intensity effect (employment 20-64/hours worked 20-64)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Career shift effect (hours worked 20-64/hours worked 20-74)	0.0	-0.2	0.0	0.0	0.0	0.0	-0.3
Residual	0.0	-0.4	-0.4	-0.2	-0.3	-0.2	-1.5

Source: European Commission services based on Belgian pension questionnaire

Table 29 Factors behind the change in public pension expenditures between 2016 and 2070 - pensioners
In percentage points of GDP

	2016-2020	2020-2030	2030-2040	2040-2050	2050-2060	2060-2070	2016-2070
Public pensions to GDP	0.5	1.2	0.7	0.1	0.2	0.2	2.9
Dependency ratio effect (pop. 65+/pop. 20-64)	0.8	2.6	1.6	0.6	0.9	0.7	7.3
Coverage ratio effect (pensions/pop. 65+)	-0.1	-0.9	-0.5	0.0	-0.1	0.0	-1.7
Coverage ratio old-age	0.1	-0.1	0.2	0.2	0.1	0.1	0.6
Coverage ratio early-age	-0.2	-1.1	-2.4	-0.5	-0.2	0.0	-4.4
Cohort effect	-0.6	-2.4	-1.0	-0.2	-0.4	-0.2	-4.7
Benefit ratio effect (average pension/(GDP/hours worked 20-74))	0.2	0.3	0.1	-0.4	-0.4	-0.3	-0.5
Labour market/Labour intensity effect	-0.3	-0.5	-0.1	0.0	0.0	0.0	-0.8
Employment ratio effect (pop.20-64/employment 20-64)	-0.3	-0.3	-0.1	0.0	0.0	0.0	-0.6
Labour intensity effect (employment 20-64/hours worked 20-64)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Career shift effect (hours worked 20-64/hours worked 20-74)	0.0	-0.2	0.0	0.0	0.0	0.0	-0.3
Residual	0.0	-0.4	-0.4	-0.2	-0.3	-0.2	-1.4

Source: European Commission services based on Belgian pension questionnaire

6. Annexes

6.1. The characteristics of the different public pension schemes

Pension scheme for wage earners

1) Old-age and survivor pension

Formula for old-age pension:

$$P = 75\% \text{ or } 60\% \text{ x reference wage} \quad (1)$$

with reference wage =

$$\sum_{t=1}^{n} \frac{1}{45} \text{ x wage in year t up to the wage ceiling x } \frac{\text{price index in year n}}{\text{price index in year t}} \quad (2)$$

(n: year of retirement)

The pension is computed at 75% of the reference wage for the head of household with a dependent spouse and 60% in all other cases.

For each year of the career, the reference wage is calculated on the basis of the effectively earned annual gross wage not exceeding the wage ceiling (54648.70 EUR for the year 2016). This wage is adjusted to current prices in the year of retirement n using the CPI. The sum of those adjusted wages over the career is multiplied by 1/45th (a maximum career is 45 years). Some periods of unemployment, disability, etc. are valued at the last corresponding earned wage and some others at the minimum claim per working year.

A guaranteed minimum pension exists for the pensions acquired over a career of at least two thirds of a maximum career in the wage earners' scheme (1514.96 EUR per month for the head of household with a dependent spouse and 1212.35 EUR per month in all other cases, in September 2017 for a maximum career).

A minimum claim per working year also exists (guaranteed minimum wage of 1986.81 EUR per month in September 2017), as long as the beneficiary can prove he/she has worked at least 15 years in the wage earners' scheme, and provided his/her job was at least one third of a full-time job. In September 2017, the pension of new pensioners meeting these requirements and whose annual wage was lower than 23841.73 EUR is calculated for this year of career on the basis of this amount of the minimum claim per working year. The total pension cannot exceed 1263.97 EUR per month (1579.96 EUR per month for the head of household with a dependent spouse).

The survivor pension is calculated as 80% of the deceased person's retirement pension, computed at the household rate (which means 80% of 75%), that is 60% of the reference wage.

Statutory retirement age: 65 for men and women until 2024, 66 from 2025 till 2029 and 67 from 2030 onwards. At cruising speed, early retirement is allowed at the age of 63 for a minimum career length of 42 years as from 2019 onwards (exceptions for long career are still possible).

Pension benefits are automatically adjusted to the price index and partially adjusted to living standards following the "Generation Pact".

2) Unemployment with company allowance scheme for non-job seekers

The unemployment with company allowance consists of an unemployment benefit, paid by the public authorities (National Employment Office), which amounts to 60% of the last gross wage earned, limited by a ceiling (different from that used in the pension scheme). The beneficiaries also receive a company allowance, paid by the employer, which is not taken into account in the model.

Minimum age: 62 from 2015 onwards, provided the career length as a wage earner is minimum 40 years for men in 2015 and 31 years for women (afterwards increasing till 40 years in 2024). The benefit ends at the statutory retirement age when the beneficiary step into the old-age pension scheme.

Unemployment benefit with company allowance is automatically adjusted to the CPI and partially adapted to living standards following the Generation Pact.

Old-age and survivor pension scheme for the self-employed

Formula for old-age pension:

$$P = 75\% \text{ or } 60\% \text{ x reference income} \tag{3}$$

with reference income =

$$\sum_{t=1}^{n} \frac{1}{45} \text{ x income in year t x } \frac{\text{price index in year n}}{\text{price index in year t}} \text{ x correction coefficients} \tag{4}$$

(n: year of retirement)

The pension is computed at 75% of the reference income for the head of household with a dependent spouse and 60% in all other cases, just like in the wage earners' scheme.

With regards to the reference income, the working years before 1984 are valued at a fixed income, while for the working years as from 1984 (during which a self-employed professional activity has been performed), it is calculated on the basis of the business income used to compute social security contributions and income tax, up to an income ceiling.

The correction coefficients (reduction coefficients) reflect the discrepancy between the contributions paid by wage earners and by the self-employed.

A minimum pension exists (the same amounts as in the wage earners' scheme), which is granted in proportion to the career fraction and for at least two thirds of a maximum career as a self-employed and/or wage earner. When pensions (from the wage earners' scheme and the self-employed scheme) are cumulated, the total amount of the pension cannot exceed a ceiling. There is no minimum claim per year.

Statutory retirement age and early retirement age: see wage earners' scheme.

Survivor pension, adjustments to price index and living standards: similar to the wage earners' scheme.

Old-age and survivor pension scheme for civil servants

Formula for old-age pension and disability pension (civil servants declared permanently unfit to continue their career, regardless of their age or seniority):

$$P = \frac{\text{considered service years (max 45 years)}}{60 \text{ (reference career fraction)}} \text{ x reference wage} = \text{ maximum } 75\% \text{ x reference wage} \tag{1}$$

The reference wage is the average wage over the last ten years (five years for people born before 1962) of work, on the basis of the wage brackets.

The maximum replacement rate of 75% of the reference wage is obtained with a numerator of a maximum career length of 45 years and a reference career fraction of 60 (so-called tantieme). Some have a preferential tantieme (55 in teaching and less for other specific categories like magistrates and academic services). The December 2011 reform raises these last preferential tantiemes to at least 48.

To benefit from a minimum pension, 20 years of services are required.

The survivor pension is calculated as 60% of the reference wage.

Statutory retirement age and early retirement age: see wage earners' scheme.

Pension benefit is automatically adjusted to the CPI and to the real wage increases of the working civil servants.

Assistance scheme: guaranteed income for elderly persons (GIEP)

The elderly people with no income or an insufficient income (pension) can receive the so-called guaranteed income for elderly persons (GIEP). In September 2017, the maximum amount of the GIEP is 1083.28 EUR per month for singles and 722.18 EUR per month for cohabitants (for each person). Before granting the GIEP, the financial means of the person are checked.

Minimum age: 65 for men and women until 2024, 66 from 2025 till 2029 and 67 from 2030 onwards.

GIEP benefit is automatically adjusted to the CPI and partially adapted to living standards following the Generation Pact.

Disability

If a person's disability keeps him/her away from work during more than one year (if less than one year, it is called "primary incapacity", which is not taken into account in the projection), a disability benefit is paid.

In the wage earners' scheme, disability benefits are calculated at 65% of the limited lost wage (limited by a ceiling different from that used in the pension scheme) for beneficiaries who are heads of household, 55% for singles, and 40% for cohabitants. A minimum amount also exists.

In the self-employed scheme, the disability benefits are fixed (lump-sum), but differ according to whether the beneficiary is a head of the household or not.

Age: less than the statutory retirement age. At the statutory retirement age, the beneficiary step into the old-age pension scheme (or into early retirement if the entry conditions are satisfied).

Disability benefit is automatically adjusted to the CPI and partially adapted to living standards following the Generation Pact.

6.2. Data sources of the socio-economic projection of the MALTESE model

The basic idea is to perform an exhaustive and consistent breakdown of the projected population into different socio-economic groups that are important for the projections. The projection of the labour force – which is at the basis of the projection of the economic growth – is thus consistent with the projection of the socio-economic groups receiving social benefits.

The four major socio-economic groups that are identified in the MALTESE model are the following: the school population, the potential labour force (further disaggregated into employment by professional status, unemployment, unemployment with company allowance and full-time career break), the disabled population (subdivided in primary disability and disability) and pensioners.

Data for the different relevant socio-economic groups come from administrative records issued by the different competent social security bodies (see the next table). In contrast to this approach, groups may be based on a single source (like the Eurostat Labour Force Survey, LFS in short). However, not all types of social security beneficiaries and socio-economic categories can be readily distinguished by means of the LFS.

All data are collected by gender and 5-year age groups, sometimes even per age year.

Table 30 MALTESE model: sources of data for the overall socio-economic projection

Socio-economic groups	Sources of data	Remarks
School population	Labour Force Survey, NIS of Belgium	
Potentially labour force		
of which:		
- full-time career breaks	National Employment Office	
- unemployment with company allowance non-job seekers	National Employment Office	
- older unemployed exempt from job search requirements	National Employment Office	Beware: the definitions differ from those used in the LFS and by the AWG
- unemployed job-seekers	National Employment Office	
- employment: wage earners	National Accounts and Crossroads Bank for Social Security for the breakdown by sex and age groups	
- employment: self-employed	National Accounts and Crossroads Bank for Social Security for the breakdown by sex and age groups	Beware: the definitions differ from those used in the LFS and by the AWG
- civil servants (with a distinction between statutory and non-statutory)	National Accounts and Crossroads Bank for Social Security for the breakdown by sex and age groups	
Disabled population (primary disability and disability):		
- wage earners' scheme	National Institute for Disability and Health Insurance	
- self-employed scheme	National Institute for Disability and Health Insurance	
Old-age and survivor pension beneficiaries:		
- wage earners' scheme by category*	Federal Service of Pensions	
details about the career	Federal Service of Pensions	
- self-employed scheme by category*	Federal Service of Pensions	
details about the career	National Institute for the Social Security of the Self-Employed	
- civil servants' scheme by category	Federal Service of Pensions	
details about the career	Federal Service of Pensions	
Guaranteed income for elderly people	Federal Service of Pensions	

* head of household, lone person