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Accrued-to-date pension entitlements in Belgium

May 2017

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Abstract - Supplementary table 29, "Accrued-to-date pension entitlements in social insurance" for Belgium will be published for the first time in 2017. This table covers the pension schemes in social insurance: statutory pensions and occupational pensions, whether they are funded or not. Table 29 shows the pensions entitlements on an accrued-to-date basis. These are present values of the pension entitlements of the retired population and the part of pension entitlements that is already accrued by the future beneficiaries. As such, accrued-to-date liabilities do not represent public debt and are not an indicator of the fiscal or financial sustainability of the pension systems and are only appropriate for national accounts purposes. Accrued-to-date liabilities should only be interpreted as an asset from the households in national accounts' terminology. An assessment of the sustainability of the pension systems can be found in the reports of the Ageing Working Group or the Belgian Study Commission for Ageing.

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Executive summary

Supplementary table 29, "Accrued-to-date pension entitlements in social insurance" for Belgium will be published for the first time in 2017. This table covers the pension schemes in social insurance: statutory pensions and occupational pensions, whether they are funded or not. Table 29 shows the pensions entitlements on an accrued-to-date basis. These are present values of the pension entitlements of the retired population and the part of pension entitlements that is already accrued by the future beneficiaries. As such, accrued-to-date liabilities do not represent public debt and are not an indicator of the fiscal or financial sustainability of the pension systems and are only appropriate for national accounts purposes. Accrued-to-date liabilities should only be interpreted as an asset from the households in national accounts' terminology. An assessment of the sustainability of the pension systems can be found in the reports of the Ageing Working Group or the Belgian Study Commission for Ageing.

Table 29 is the most recent addition to the mandatory data transmission programme towards Eurostat, described by ESA 2010, the European System of Accounts 2010 (2008 System of National Accounts for non-European countries). The idea behind the table is to establish complete and consistent coverage of pension entitlements in a country and to promote comparability across countries. Therefore, the table brings together information already shown in the standard or 'core' national accounts (columns A to F of Table 29) with information on unfunded pension systems, which are not reported in the core accounts (columns G and H of Table 29).

For Belgium, the National Accounts Institute is responsible for the delivery of this table to Eurostat. It has entrusted the National Bank of Belgium and the Federal Planning Bureau with the completion of the supplementary table. The contribution of the Federal Planning Bureau to Table 29 concerns columns G and H, which contain the statutory pension schemes.

The methodologies discussed in this paper have been the subject of a presentation to the joint reunion of the Scientific committee on national accounts and the Scientific committee of public sector accounts of the National Accounts Institute. In this reunion, a formal approval was given to the implementation of the methodologies.

To allow consistent comparability across countries, the supplementary table covers only the pension part of social insurance. For Belgium, columns G and H will contain old-age pensions and survivors' pensions as they are an integral part of the pension scheme. The assistance scheme (guaranteed income for the elderly), disability benefits and unemployment benefits with company allowance non-job seeker are excluded. Individual personal pensions are also excluded as they are no part of social insurance.

This working paper comments a first completion of columns G and H and handles on the MIDAS microsimulation model and the necessary modifications to compute accrued-to-date liabilities (ADLs), the underlying assumptions of the modelling and the detailed estimation methodology of the values. The Federal Planning Bureau has taken a very strict position in the application of the minimal career duration criteria for the guaranteed minimum pensions and the minimum claim per working year. Those minimum provisions will only enter into force when their criteria are already met by the career durations as they are reported for each individual in the dataset.

The working paper concludes by commenting on the sensitivity analysis on the discount rate and the benchmarking of the obtained results.

The presented values in this working paper might still change before final delivery to Eurostat. Depending on the timing of the publication of the Ageing Working Group report, the model will be aligned to the projections of this last report. The final version of columns G and H of the supplementary table will then be published in a future report of the Federal Planning Bureau.

1. Introduction

The supplementary table 29 "Accrued-to-date pension entitlements in social insurance" is the most recent addition to the data transmission programme towards Eurostat, described by ESA 2010, the European System of Accounts 2010 (2008 System of National Accounts for non-European countries). The idea behind the table is to establish complete and consistent coverage of pension entitlements in a country and to promote comparability across countries. Therefore, it brings together information already shown in the standard national accounts (columns A to F of Table 29) with information on unfunded pension systems, which are not reported in the standard national accounts (columns G and H of Table 29).

For Belgium, the National Accounts Institute is responsible for delivering this table to Eurostat. It has entrusted the National Bank of Belgium and the Federal Planning Bureau with the completion of the supplementary table. The contribution of the Federal Planning Bureau to Table 29 concerns columns G and H, which contain the statutory pension schemes.

After the introduction, the second chapter of this working paper sketches the Belgian pension system. This is followed in the third chapter by a presentation of the MIDAS microsimulation model and the modifications applied to the basic model to compute accrued-to-date liabilities (ADLs). Chapter four discusses on the assumptions taken concerning the number of projection years, the retirement age, the pension schemes for which the benefits are included in the table, the mortality rates used, the growth rate of future wages, as well as the way how the minimum pension provisions are taken into account under the ADL approach.

Chapter five and six describe the columns and rows of the table with the methodology used to calculate each of the rows. The table is accompanied in chapter seven by the sensitivity analysis on the discount rate as required by Eurostat. In chapter eight, the ADLs are expressed in terms of GDP which allows a benchmarking of these values to support the results obtained. This benchmarking is presented in chapter nine.

Chapter ten sketches possible future developments of MIDAS and their consequences for Table 29. Chapter eleven comments on the three-yearly publication frequency, while a yearly publication frequency can be envisaged.

Annexed to this working paper are detailed discussions on the methodologies applied to some rows and the information that will be provided to Eurostat: the columns G and H of the supplementary table on pension schemes in social insurance, the two tables with alternative discount rates and the fact sheets covering the pensions schemes in columns G and H.

2. The pension landscape in Belgium

2.1. Introduction[1]

The Belgian pension system is divided into three pillars:

– The first pillar is a statutory public pension scheme with defined benefits (DB) for 99% of its expenses (only the assistance scheme is means-tested) and based on the pay-as-you-go financing (PAYG) principle. This pillar is the most important, with total expenditure reaching 12.2% of GDP in 2013.

  This 12.2% should be interpreted with caution as the Ageing Working Group's definition of pension expenditure was followed. This means that, besides the three pension schemes, this total expenditure also comprises the 'guaranteed income for the elderly' assistance scheme (1% of total pension expenditure in 2013 – AWG definition), the unemployment benefit with company allowance non-job seeker under the wage earners' scheme (4%) and the disability benefits under the wage earners' and self-employed schemes (9%).

  The three main pension schemes in the first pillar are the scheme for wage earners (47% of total pension expenditure in 2013 – AWG definition), the scheme for the self-employed (7%) and the scheme for civil servants (32%). For a more detailed description of these three schemes, see section 2.2.

  Since 1 January 1995, the financing of all social expenses for the general schemes for wage earners and the self-employed has been carried out via the so-called 'overall financial management' (contributions and some tax revenues), which implies that there is a global contribution rate for all social security schemes and no longer a contribution rate by scheme. Most social benefits for civil servants, including pensions, are financed through the general budget of the federal government.

– Private occupational pension schemes (the second pillar) are of minor importance: pension spending only amounts to 1.2% of GDP in 2012 for retired wage earners dependent on collective contracts entered into with insurance companies or institutions for occupational retirement provision (no data available for total spending).

  Concerning these pensions, an act was passed in 2003, the Act on supplementary pensions of 28 April 2003, which focused on sectoral pension schemes. This act aimed at stepping up their development by improving access to them and by giving more guarantees to workers.

– Private voluntary individual pension schemes constitute the third pillar.

[1] This text is taken from: Federal Planning Bureau (2015).

2.2. Description of the first pillar pension schemes

2.2.1. Pension scheme for civil servants

The public pension scheme consists of the old-age pension, the survivors' pension, and the disability pension (when civil servants are declared permanently unfit to continue their career, regardless of their age or seniority). The disability pension is not included in the Table 29.

The statutory retirement age for civil servants is 65 (there are some exceptions, in particular for the armed forces). This age will be raised to 66 from 2025 to 2029 and to 67 from 2030 onwards. Early retirement is allowed at the age of 62 for a minimum career length of 40 years. As from 2019 onwards, this will be allowed at 63 for a minimum career length of 42 years.

The pension is calculated as follows:

$$Pension = reference\ wage\ .\ \frac{considered\ service\ years\ (max\ 45\ years\ )}{tantième} \quad (1)$$

= max 75% reference wage

The retirement pension is calculated in proportion to the reference wage, i.e. the average wage of the last ten years of work (five years for people born before 1962), based on wage brackets. The basic denominator is 60 (the *tantième*) but some have a preferential denominator (55 in teaching and 48 years for magistrates and academic services). With a maximum career length of 45 years, a *tantième* of 60 leads to a maximum replacement rate of 75% of the reference wage.

Civil servants can benefit from a minimum pension, which is a fixed amount, provided they have 20 years of service. If applicable, a pension supplement is added to the retirement pension to reach this minimum amount.

Besides the relative maximum of 75% of the reference wage, pensions are also capped at an absolute maximal pension, which is also a fixed amount.

The rules on survivors' pensions were changed in 2015. If an (ex-)civil servant dies, the surviving partner becomes eligible for a survivor's pension. If case the surviving partner has reached a certain minimum age, she/he will receive the survivor's pension. If the surviving partner is younger than this minimum age, she/he will not receive a survivor's pension but a transitional allocation benefit. The minimum age was 45 for the year 2015 and will be gradually raised to 55 by 2030.

A divorced spouse can also be entitled to a survivor's pension under certain conditions. These conditions will not be discussed here. The minimum age condition plays a similar role in these situations. This minimum age was also 45 for the year 2015 and will be gradually raised to 55 by 2030.

Survivors can cumulate (up to a ceiling) a survivor's pension with their own old-age pension. Moreover, the pension is compatible with a professional activity, provided that the income from that activity does

not exceed a certain limit. Up to the age of 65, the limit for someone receiving a survivor's pension is higher.

The survivor's pension is calculated as follows:

$$Pension = 60\% \,.\, Reference\ wage \,.\, \frac{considered\ service\ years}{reference\ period} \tag{2}$$

The reference wage and the equivalent service years are determined in the same way as the retirement pension. The reference period consists of the number of months between the first day of the month after the 20th birthday of the deceased spouse and the last day of the month of his/her death, with a maximum of 480 months (40 years).

A guaranteed minimum pension also applies here, which is only granted to the surviving spouse (not to orphans or divorced spouses).

Civil servants' pensions are automatically adjusted to the evolution of prices by the health index (unless otherwise decided – see index jump in 2015) and to the real wage increases of active civil servants (the so-called *péréquation*). Retired civil servants therefore share in the benefits of productivity increases. Additional discretionary increases can also be decided on.

2.2.2. Pension scheme for wage earners

For this Table 29, the first pillar pension scheme for wage earners consists of old-age pensions and survivors' pensions.

The pension is linked to occupation and is essentially function of the past career. The pension benefit is based on past wages corrected for the development in prices and wealth increase, but lies within a range comprised between minimum provisions and ceilings.

The statutory retirement age is 65 for men and women until 2024, 66 from 2025 to 2029 and 67 from 2030 onwards. Early retirement is allowed at the age of 62 for a minimum career length of 40 years. As from 2019 onwards, this will be allowed at the age of 63 for a minimum career length of 42 years.

The pension is calculated as follows:

$$Pension = 75\%\ or\ 60\% \,.\, \frac{1}{45} \sum_{j=1}^{n} Wage_j^{ceil} \,.\, \frac{PI_n}{PI_j} \tag{3}$$

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.

The reference wage is calculated on the wages effectively earned during the career up to a wage ceiling. These wages are adjusted to current prices and wealth increase. The sum of those adjusted wages over the career is multiplied by 1/45th (a full career is 45 years). Some periods of unemployment, disability,

etc. are valued at the last corresponding earned wage and others at the minimum claim per working year.

This minimum claim per working year is used in an alternative pension computation in case the beneficiary can prove a career of at least 15 years in the wage earners' scheme of which she/he worked for at least one third of a full-time job in each year. For each past career year, the actual wage is replaced by the minimum claim in case this latter is higher (compared on the same price value). The beneficiary will receive this alternatively computed pension if this is more favourable to him.

Additionally, a guaranteed minimum pension can be granted on either of two criteria:

– The 'severe' career duration criterion: the wage earner must prove a career as a wage earner lasting at least two thirds of a full career, with at least 208 'fulltime day equivalents' per year. If this criterion is met, the guaranteed minimum pension is calculated as the guaranteed minimum pension of a full career multiplied by a career fraction. This career fraction is calculated as the number of career years with at least 52 'fulltime day equivalents' per year divided by the number of years of a full career.
– A more 'flexible' career duration criterion which allows years with part-time employment to be taken into account: the wage earner has to prove a career as a wage earner lasting at least two thirds of a full career with at least 156 'fulltime day equivalents' per year. If this criterion is met, the guaranteed minimum pension is calculated as the guaranteed minimum pension of a full career multiplied by a fraction equal to ((total days of employment and assimilated days/312)/number of years of a full career).

Besides these two minimum pension rights, maximum amounts are also defined.

The rules on survivors' pensions were changed in 2015. After the death of the spouse who was either a wage earner or received a replacement income (pension included) in the wage earners' scheme, the surviving spouse is entitled to a survivor's pension. However, conditions must be met for this, the most important one the minimum age. If the surviving partner has reached a certain minimum age, she/he will receive a survivor's pension. If she/he is younger than this minimum age, she/he will not receive a survivor pension but a transitional allocation benefit. The minimum age was 45 in 2015 and will be gradually raised to 55 by 2030.

A survivor's pension is calculated as 80% of the deceased person's retirement pension, computed at the tariff for a household (which means 80% of 75%, or 60% of the reference wage), or, if she/he was still working, at 80% of the retirement pension she/he would be entitled to, should she/he have worked until the age of 65.

Survivors can cumulate (up to a ceiling) a survivor's pension with their own old-age pension. Moreover, the pension is compatible with a professional activity, provided that the income from that activity does not exceed a certain limit. Up to the age of 65, the limit for someone receiving only a survivor's pension is higher.

Pension benefits are automatically adjusted to the evolution of prices by the health index (unless otherwise decided – see index jump in 2015) and partially adjusted to living standards according to the 'Generation Pact'.

2.2.3. Pension scheme for the self-employed

For this Table 29, the pension scheme for self-employed workers consists of old-age pensions and survivor's pensions.

The legal retirement age for the self-employed is currently 65, but will be raised to 67 as of 2030. Early retirement is allowed at the age of 62 for a minimum career length of 40 years. As from 2019 onwards, this will be allowed at 63 for a minimum career length of 42 years.

$$Pension = 75\%\ or\ 60\% \cdot \frac{1}{45} \sum_{j=1}^{n} Income_j^{ceil} \cdot \frac{PI_n}{PI_j} \cdot correction\ coefficient \quad (4)$$

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, just as in the wage earners' scheme.

The working years before 1984 are valued at a fixed income. For the working years (during which a self-employed professional activity was exercised) as from 1984, the pension right is calculated on the basis of the business income used to compute social security contributions and income tax, up to an income ceiling. The income is adjusted to current prices.

As in the wage earners' scheme, minimum and maximum pensions are provided for. The guaranteed minimum pension is granted in proportion to the career if the self-employed person has a career of at least two thirds of a full career as self-employed and/or wage earner. There is no minimum claim per career year.

In 2009, 70% of 'pure' self-employed pensioners[2] received the minimum pension.[3] This high number of self-employed individuals benefiting from the minimum pension is caused by the scheme's computation formula, which is less generous than that for wage earners. Other than a so-called 'correction coefficient' (reduction coefficient), the employee and self-employed pension schemes are quite similar.

The 'correction coefficient' is equal to the ratio between the old (lower) contribution rate for the self-employed for their pension scheme and the old contribution rate (employer + employee) for the pension scheme for wage earners. It reflects the discrepancy between the contributions paid by wage earners and by the self-employed. As a consequence, this gives a self-employed pension of almost in half of the pension that would have been computed under the wage earners' regime. Finally, and unlike wage earners, the self-employed were subjected to a malus system up to and including 2013. The system consisted of a progressive actuarial discount factor which reduced pension benefits in the case of early retirement between 60 and 65 years, except in the case of a career of 43 years or more.

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2 A pure self-employed pensioner is a pensioner only receiving benefits from the pension scheme for the self-employed.

3 Commission de la réforme des pensions 2020-2040 (2014)

When pensions (from the wage earners' scheme and the self-employed scheme) are cumulated, the total amount of the pension cannot exceed a given ceiling.

The rules on survivors' pensions were changed in 2015. After the death of a spouse who was self-employed, the surviving spouse is entitled to a survivor's pension if certain conditions are met. The most important condition is the minimum age. If the surviving partner has reached a certain minimum age, she/he will receive a survivor's pension. If she/he is younger than this minimum age, she/he will not receive a survivor's pension but a transitional allocation benefit. The minimum age was 45 in 2015 and will be gradually raised to 55 by 2030.

The minimum amount of the survivors' pension is the same as the amount of the minimum retirement pension.

The adjustments of pension benefits to prices by the health index and to living standards are similar to those in the wage earners' scheme: they are automatically adjusted to the development in prices (unless otherwise decided – see index jump in 2015) and partially adjusted to living standards according to the 'Generation Pact'.

3. The dynamic microsimulation model MIDAS

The computation of the entries for rows 1 and 10 of columns G and H is done by means of the MIDAS model. MIDAS is a microsimulation model that is used by the Federal Planning Bureau to assess the adequacy of pensions in Belgium. This section describes briefly the model, its datasets and the modifications that were necessary to compute accrued-to-date liabilities (ADLs) with this model.

3.1. MIDAS[4]

3.1.1. Scope

MIDAS (an acronym standing for 'Microsimulation for the Development of Adequacy and Sustainability') is a dynamic population model with dynamic cross-sectional ageing. It is used by the Federal Planning Bureau in its adequacy assessment of pensions in Belgium.

MIDAS is a microsimulation model, meaning that it models on the level of individuals grouped in households rather than on aggregate data. It is also a dynamic population model with dynamic cross-sectional ageing. This means that it starts from a cross-sectional dataset representing a population of all ages at a certain point in time. The model then simulates the life spans of the individuals in the dataset, including their interactions, over a specified number of future years. So, new individuals are born, go through school, marry or cohabit, enter the labour market, retire and, finally, die. All these events are simulated by the model. During their active years, the individuals build up pension rights, which result in a pension benefit when they retire.

From 2012 up to 2016, the simulations are aligned with observed data to represent reality as closely as possible. From 2017 onwards, the model takes into account the latest budgetary projections and assumptions of the reference scenario of the 2016 Study Committee on Ageing report.[5] Furthermore, it includes all relevant policy changes between its starting year and 2015.

The coverage of MIDAS includes employees', self-employed and civil servants' pensions and the Conventional Early Leavers' Scheme (CELS), as well as unemployment benefits, disability pensions and social assistance. Consequently, the assessment of the adequacy of pensions concerns not only earnings, as was the case in the previous version of the model[6], but also beneficiaries of other social security benefits and those receiving social assistance.

4 For a more detailed description of the MIDAS model, see Dekkers G. *et al.* (2015)

5 The baseline assumptions of MIDAS aligned on the 2016 Study Committee on Ageing report were modified to correspond with the updated MIDAS database.

6 Dekkers *et al.* (2009)

3.1.2. Modules

MIDAS consists of different modules: the demographic module, the labour market module, the pensions and social security module, the taxation module and an output module. The simulation results of each module provide the input to the subsequent module(s). Thus, for instance, the inputs for the labour market module are the current demographical characteristics of each individual, and the previous values of all other variables.

The first module of MIDAS is the demographic module. This module is composed of four main parts: the birth process, the survival process, the education process and the marriage market.

The labour market module simulates the transitions between different labour market states and non-working states (such as unemployment, disability, and retirement) and earnings and working hours for those who work. All transitions are modelled as binary choice decisions, usually through standard logit regressions combined with alignment procedures.[7] All decisions are assumed to be made on the level of the individual, taking the characteristics and choices of the other household members as given. Note that the behavioural equations describing various states are based on survey data. This means that there is no official clearly defined definition underlying notions such as 'unemployment', 'disability' and being 'chronically ill'.

The social security module simulates the main schemes of the Belgian social security system: first pillar old-age pension benefits for private sector employees, civil servants and self-employed, as well as the guaranteed minimum income for the elderly. Furthermore, it simulates the Conventional Early Leavers' Scheme (CELS) benefit, the widow(er)s' or survivors' pension benefit, the disability pension benefit, unemployment benefit and, finally, social assistance benefits and, on the level of the household, family benefits.

Finally, the taxation module simulates the gross-net trajectory, i.e. social security contributions and federal income taxes. Regional and local taxes are not simulated at this point.

3.1.3. Alignment

The Federal Planning Bureau assesses the budgetary consequences of ageing using its semi-aggregate MALTESE model. These are produced in the European context of the AWG and in Belgium for the Study Committee on Ageing[8]. To sketch an outlook on the prospective adequacy of pensions that is consistent with these budgetary scenarios, the microsimulation MIDAS model is designed to be as consistent as possible with information from MALTESE. This can be AWG projections and assumptions[9,10] but, in the Belgian context, MIDAS is often aligned with the projections of the Study Committee on Ageing through the extensive use of alignment procedures. MIDAS also makes sure it follows the same assumptions as MALTESE.

7 For an extensive discussion see: Dekkers, G. *et al.* (2012)
8 High Council of Finances (2015)
9 Dekkers, G. *et al.* (2009)
10 Dekkers, G. *et al.* (2015)

In general, alignment is a procedure whereby an aggregate simulation result of the model is made to be in line with a desired aggregate result, usually based on predictions of semi-aggregate models or social-policy scenarios. The objective of alignment is to ensure that output aggregates of the MIDAS micro-model match external macro-aggregates. The alignment procedure discussed here is, in many cases, linked in this framework to binary discrete choice models, and is a key element of the LIAM2 software package that underlies MIDAS.[11]

The projections of the MALTESE model compose the data that MIDAS uses to align the developments in state variables. The population projections assume that the fertility rate in the long run stabilises around the most recent observed average, while the life expectancy at birth continues to slowly increase. The socio-economic assumptions make it possible to break down the population by socio-economic categories such as employment, unemployment, disability, students and pensioners. The following list gives the different states that are aligned based on the baseline aggregate projections of the 2016 report of the Study Committee on Ageing:

- mortality (by age, gender and year of simulation)
- fertility (by age, gender and year of simulation)
- employment rate (by age class, gender and year of simulation)
- unemployment rate (by age class, gender and year of simulation)
- proportion of self-employed individuals (by age class, gender and year of simulation)
- proportion of public sector employees (by age class, gender and year of simulation)
- proportion of civil-servants (by age class, gender and year of simulation)
- proportion of disabled individuals (by age class, gender and year of simulation)
- proportion of CELS recipients (by age class, gender and year of simulation)

Even if the proportion of retired individuals is not in the list of aligned aggregates, the number of retirees and 'other inactive people' are indirectly aligned, since these are the residual states. For individuals, younger than 60, the 'other inactive' state is the residual state. For those aged 60 and over, the retirement state is the residual state when employment, unemployment, disability and CELS states are determined and the individual is eligible for a pension benefit.

Because some of the required aggregates are not produced by MALTESE, the alignments of the marriage and cohabitation procedures (and the divorce and cohabitation termination procedures) are based on statistics from the Directorate-General Statistics Belgium. As, by definition, we have observed statistics and not projections, we made the assumption that the proportion of divorces and terminated cohabitations do not change over time.

In addition to the calibration to the output aggregates of the 2016 report of the Study Committee on Ageing, MIDAS uses the same assumptions as the working paper. The projections of the social sustainability of the pension system are therefore based on the same assumptions as the projections of the

11 de Menten, G. *et al.* (2014)

financial sustainability. The assumptions on the macro-economic environment are, for the mid-term, based on the Federal Planning Bureau's economic forecasts for the period 2016-2021, also discussed in the 2016 report of the Study Committee on Ageing.[12]

The social policy assumptions concern the growth of wage ceilings, the adjustment to living standards of the non-lump-sum benefits and the real growth of lump-sum benefits following the measures of the 2005 Generation Pact. Pension benefits are adjusted to the evolution of the health index (unless otherwise decided – for example, the index jump in 2015) and, for retired civil servants, to the real wage increases for working civil servants (the *péréquation*).

3.1.4. Dataset

MIDAS uses individuals and households from a representative sample of administrative data on Belgian population in 2011. The sample is extracted from the *Datawarehouse marché du travail et protection sociale* of the Crossroads Bank for Social Security. It contains a little more than 600 000 representative individuals, with retrospective data that is complete for wage earners and only partial for civil servants and self-employed workers. The dataset is enriched with information from the 2011 population census and a dataset containing fiscal information.

The MIDAS population is composed of the following socio-economic categories: working people, unemployed people, disabled people, students, pensioners and early retired people, and 'other inactive people'.

The simulated 2012-2016 period is aligned with observed data to represent reality as closely as possible. From 2017 onwards, the proportions are the result of aligning the MIDAS projections with the MALTESE projections used in the 2016 report of the Study Committee on Ageing.

3.2. Modifying MIDAS to produce ADLs for Belgium

MIDAS covers employees', self-employed and civil servants' pensions and the Conventional Early Leavers' Scheme (CELS), unemployment benefits, disability pensions and social assistance. As the supplementary table is only focused on pension benefits, a large part of the MIDAS results will not be used. However, to compute the accrued-to-date liabilities of the first pillar pension schemes, the original model needs to be modified. The section on future adjustments also lists modifications that are not strictly limited to Table 29, but that can lead to improving the ADL computation.

3.2.1. Already implemented modifications

- The future accrual of pension rights is cancelled as from 2015 (the base year).
- Discounting factors have been implemented.
- The simulation horizon is prolonged to 2085 (see section 4.2).
- Assumptions on the alignments: as the simulation horizon has been extended, the data used in the alignment procedures must also be adapted.

[12] See Dekkers *et al.*, 2012, and Dekkers *et al.*, 2015, for a more extensive discussion of alignment in MIDAS.

3.2.2. Future modifications

MIDAS is adapted and refined continuously. In this section, some possible adjustments are presented. Not all of them have an impact on the Table 29 values.

- Currently, the pension scheme of civil servants is modelled on a *tantième* of 60. To represent the actual situation more accurately, other *tantièmes* should be used as well. Use of alignment procedures could be an alternative here.
- ADLs of future pensions of civil servants are computed on the wages of the ten (or five) years prior to the base year. In fact, pensions are established on the wages of the last ten (or five) years of career. A wage projection to the end of the career should be included in MIDAS to better represent these pensions.
- In the current version of the model, the pension benefits for self-employed people are basically modelled by means of the minimum pension. Although this is close to reality, a dedicated modelling might be developed. A first condition for this is, of course, the availability of historical data.
- The current version of MIDAS does not include immigration or emigration flows. The flows are currently modelled in a new development version of the model. However, the accrued-to-date liabilities approach is limited to the pension rights existing at the end of the base year. Therefore, it is assumed there are no future entitlements or new entrants to the pension schemes. Future net immigration flows are not taken into account.
- A model of the orphans' benefits might be implemented in a future version of MIDAS. They are not yet modelled and are hence not included in this supplementary table. As with the immigration and emigration flows, the impact of this would be rather small as it can only affect the current population.

4. Assumptions

4.1. Base year

The supplementary table on pension schemes in social insurance is a mandatory table for all EU member states. It must be published on a three-yearly basis, and for the first time by the end of 2017; the base year of this first Table 29 is 2015.

The table is designed to give an estimate of the accrued-to-date liabilities of pension benefits on 1 January 2015 and to explain by increases (contributions, interest effect, etc.) and decreases (benefits payments, etc.) the stock of accrued-to-date liabilities on 31 December 2015. The estimate of the pension entitlements on 1 January does not take into account the benefits received in the past nor the benefits paid during the base year 2015. The present value of pension entitlements on 1 January 2015 equals the present value of pension entitlements at the end of the previous reporting period.

Contributions, payments of benefits and transfers are those realised during the year 2015. Changes in entitlements due to negotiated changes in scheme structures are included if they result from pension reforms voted before or during 2015. The measures pertaining to years after 2015 are included.

4.2. Number of projection years

The question of the appropriate time horizon of the population and pension liabilities projections is not easy to answer. To achieve the best view on accrued-to-date liabilities of future pensions, one should project until the last pension beneficiary dies, which is perfectly possible as the Table 29 methodology requires a closed group approach.

However, several projection runs must be performed to complete Table 29: runs to estimate the impact of changes in pension legislation, the impact of model assumptions, etc. Additionally, Eurostat requires a sensitivity analysis consisting of two alternative discount rates to illustrate the interest sensitivity of the estimates.

To limit computation time and hard disk storage, only the most significant years should be projected: the years after which the ADL value stabilises have almost no importance.

To decide on the number of years, one single projection is run over 95 years. The ADL for base year 2015 is first computed with 45 years of projection. After this, the ADL is computed by including each time one more year of projection finally leading to an ADL computed with 95 years of projection.[13] This is shown in Graph 1.

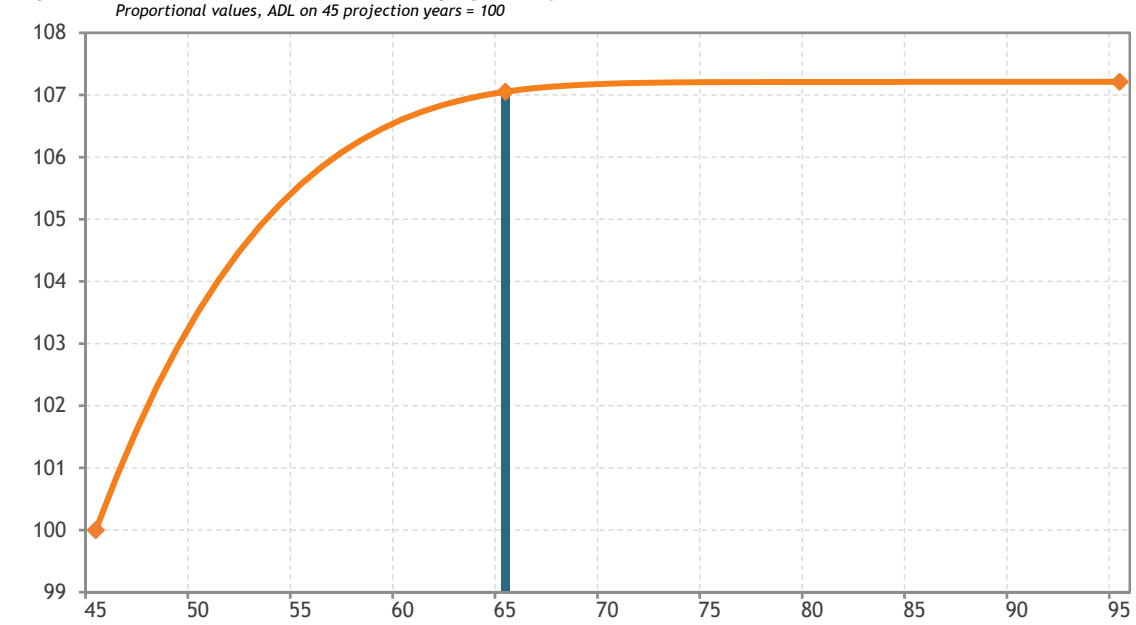
All these ADLs are plotted in following graph. The X-axis ranges from 45 to 95 representing the number of years included in the ADL computation. For simplicity of the graph and as the values of the ADLs

[13] As discussed in section 3.1.4, MIDAS has a dataset based on 2011. During the first four years of projection in MIDAS, all values are aligned with actual observations. Technically, the ADL's are calculated with projections of respectively 49 years, 50 years, etc. and finally 99 years.

are not yet of importance at this point, the series of ADLs are expressed in proportion to the ADL for 45 years of projection, which was set as equal to 100. These values are on the Y-axis.

Graph 1 **ADL 2015 - Different number of projection years**

Proportional values, ADL on 45 projection years = 100



Source: Own work, MIDAS

At a certain point, the curve starts to flatten out. At this point, the ADL stabilizes: adding more years to the computation has no more significance. This point is reached after 65 years of projection.

A small check is performed to assess the impact of limiting the projection to 65 years. If the ADL based on 45 years of projection equals 100, the ADL on 65 years equals 107.05 and the ADL with 95 years of projection 107.21.

Reducing the projection years by almost a third (from 95 years to 65 years) only reduces the ADL by 0.15% which is insignificant considering the reduction in computation time and hard disk storage.

Table 29 and the sensitivity analysis will therefore be based on 65 years of projection, simulating the accrued-to-date liabilities up to 2080.

4.3. Reporting values

The elements of Table 29 are recorded in gross amounts (i.e. without deductions for taxes, service charges associated with the pension scheme, other expected revenues of government or further social security contributions).

4.4. Retirement age

The statutory retirement age in Belgium is currently 65 years for both men and women and in all pension schemes. However, during the base year 2015, a pension reform act was voted in parliament. The Act of 10 August 2015 *"aimed at raising the legal retirement age, conditions for the early retirement pension and the minimum age for the survivor's pension"* was published in the Belgian Official Journal of 21 August 2015. The statutory retirement age will increase from 65 to 66 years by 2025 and again to 67 years by 2030. The minimum age to be granted a survivor's pension will be gradually raised from 45 to 55 by 2030.[14]

4.5. Type of benefits covered by the supplementary table

The focus of the supplementary table is on pension benefits. This means that the assistance scheme (guaranteed income for the elderly), disability benefits and unemployment benefits with company allowance non-job seeker, as well as benefits from individual insurance policies are excluded.

Eurostat allows survivors' benefits to be included in the supplementary table if these are part of the pension scheme, as is the case in Belgium. Survivors' benefits include not only widows' benefits but also orphans' benefits. The latter are not yet modelled in the MIDAS model and are hence not included in this supplementary table.

4.6. Mortality rates

Currently, for most of its population projections, MIDAS uses the mortality rates as issued yearly by the Federal Planning Bureau (FPB).[15, 16] These are established on a yearly base for men and women separately (and in unisex) by means of a prospective mortality model,[17] a negative exponential model which can be expressed as:

$$Q_{x,t} = e^{\alpha_x + \beta_x . t} \tag{5}$$

The mortality rate for an x-year old in year t is expressed as a function of two age-dependent parameters: α_x the average over time of the mortality rate for age x, and β_x the speed at which the mortality decreases over time.

To ensure comparability of results between EU countries, Eurostat recommends using the EUROPOP data.[18] Currently, the projections are made using EUROPOP2015 data issued in March 2017.

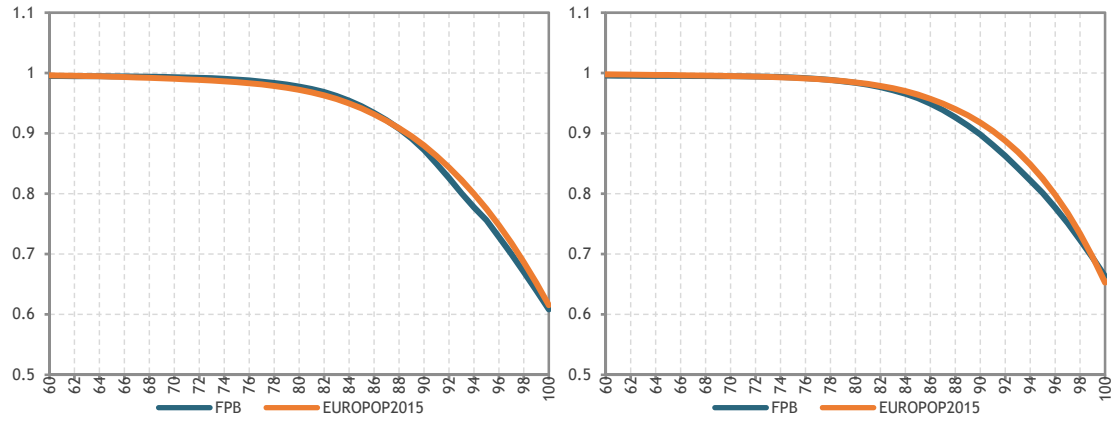
Pension liabilities must be projected up to 2080 (see section 4.2) to meet the goals of Table 29. This corresponds to the projection horizon of the EUROPOP2015 mortality rates. If mortality rates were needed for years after 2080, they would have been maintained at 2080 levels.

14 For a more comprehensive description of these reforms, see Federal Planning Bureau (2015).
15 Bureau Fédéral du Plan (2016)
16 Dekkers G. *et al.* (2015) shows simulation results that are based on the previous (2013) EUROPOP projections.
17 More details on the model can be found in: Bureau Fédéral du Plan (2009)
18 Eurostat and ECB (2011)

The following two graphs show the projected one-year survival probability for men (left) and women (right) for the year 2060. The one-year survival probability is the complement of the mortality rate, together summing to 1.

Graph 2 One-year survival probabilities for 2060: comparison of FPB_2016 and EUROPOP2015

Probabilities



Source: Federal Planning Bureau (2017), EUROPOP2015 (Eurostat, 2017)

For ages 60 up to 100, the one-year survival probability is shown. This probability can be read on the X-axis. At age 60, these probabilities are still very close to 1 whereas at 100 men have 60% chance to live to the next year and women almost 65% (EUROPOP2015 curves).

As shown by the curves, the EUROPOP2015 survival probabilities have almost a similar pattern than the FPB projections. It is only at higher ages (more than 85 years) that the EUROPOP2015 survival rates are higher than the FPB survival rates:

- The current and future population of pensioners is expected to live longer and to benefit from their pensions for a longer period, increasing the ADL estimates (in comparison with results based on FPB mortality rates).
- The current beneficiaries of survivors' pensions will also live longer, increasing the ADLs (in comparison with results based on FPB mortality rates).
- As people have a lower probability of death (in comparison with results based on FPB mortality rates), less new survivors' pensions will be created in the future. In theory, this decreases the ADLs. However, in practice, the impact will be lower due to the limited weight of the survivors' pensions in the overall amount of pension benefits.

As a total, the estimated ADLs will be higher using the EUROPOP2015 projections than using FPB projections.

4.7. Inflation

The projections are made at constant prices (2011), i.e. they are expressed in real terms. Therefore, inflation expectations are not taken into account.

4.8. Assumptions on future wages

To estimate the present value of future pension liabilities, a decision must be taken on how future wages are treated. This decision also translates as choosing between the PBO approach (projected benefit obligations) or the ABO approach (accumulated benefit obligations) to compute the pension benefits.

The PBO approach takes into account future wage increases (general wage increase and/ or promotions) while an ABO approach involves applying no wage increase and using current wages to compute the pension benefit. Future wages would equal the wages in the base year.

First pillar pension computations for wage earners and the self-employed are described in sections 2.2.2 and 2.2.3. The pension benefits are not computed on final wages, but on the wages or revenues earned through the whole career.

When applying ADL methodology to compute the accrued part of pension benefits at the base year, the pensions are computed as if the beneficiary retires in the base year. The process of building up pension rights is stopped at the end of the base year, so there is no need to project future wages as they do not intervene in the pension computation. Therefore, the applied approach can be described as a ABO approach.

Opposite to these social security pension schemes, the first pillar pension benefits of civil servants are based on the wages earned in the last ten (or five) years of career (see section 2.2.1).

To compute the ADLs for these benefits, we rely on the legislation on how to compute a pension for a civil servant who leaves his assignment and starts working as wage earner or self-employed individual. In those cases, a pension is computed with the wages earned in the past five years. This pension will then still follow the evolution of the current wages of civil servants until the legal retirement age where the pension benefit is paid. The application of the future wage increases is however not yet foreseen in the model. Consequently, the approach can also be described as ABO.

4.9. Assumptions on pension parameters

Table 1 gives an overview of other variables used in the pension computations. They are adjusted according to the parameters used for computing the budget for the adjustment to living standards as stated in the Generation Pact of 2005. As these parameters in reality only serve to compute a total budget and the actual adjustments to living standards are decided on according to this budget constraint, these variables will not necessarily evolve as presented here.

Projection according to these variables is consistent with the Federal Planning Bureau's projection method when future government measures remain unknown.

Table 1 Pension projection parameters in MIDAS
Percentages

Parameter	Annual indexation
Pension cap for the minimum right per career year computation	+ 1.25%
Minimum pension for wage earners	+ 1.00%
Maximum pension benefit for civil servants	+ 1.00%
Minimum pension benefit for civil servants	+ 1.00%
Minimum pension for the self-employed	+ 1.00%

4.10. Indexation of existing pension benefits

In accordance with Eurostat/ECB requirements, the indexation practices of the benefit payments in the different pension schemes are included in the model.[19]

Up to 2016, all pensions are adjusted to living standards according to the measures decided by the government. From 2017 on, pensions in the wage earners' and self-employed schemes are adjusted annually to living standards by a so-called 'welfare adjustment'. This equals a 0.5% annual increase, as defined by the 'Generation Pact' of 2005. The public sector pensions are adjusted to living standards proportionally to the real wage increase of working civil servants (the '*péréquation*') less 0.5%. This corresponds to the historical trend of the difference between real wage increases and the effective welfare adjustment for civil servants' pensions. This results in the long term in an annual adjustment of 1.5% - 0.5% = 1%.

4.11. Discount rate

As recommended in the Technical Compilation Guide issued by Eurostat and the European Central Bank, a discount rate of 3% in real terms is used. This discount rate is used to transform the future pension payments into present values.

4.12. Guaranteed minimum pensions and minimum claim per working year

In all pension schemes (wage earners, self-employed and civil servants), a minimum pension is guaranteed. Additionally, the wage earners' scheme has a system of minimum claims per working year.

The guaranteed minimum pensions and the minimum claim per working year are only granted when certain criteria on the career duration are met:

– A wage earner must fulfil a career of at least 2/3 of a full career (so-called severe and flexible criterion) for a guaranteed minimum pension and 15 years of which she/he worked for at least 1/3 of a full-time job in each year for the application of a minimum claim per working year (see section 2.2.2).
– The pension scheme of self-employed workers provides for a guaranteed minimum pension in case the self-employed has a career of at least two thirds of a full career (see section 2.2.3).

[19] Eurostat and ECB (2011)

– A guaranteed minimum pension is also provided for when the future beneficiary has had a career in both the wage earners' scheme and the self-employed workers' scheme. Specific criteria based on career duration apply in this case.
– Civil servants are entitled to a guaranteed minimum pension if they have been working for at least 20 years as a civil servant. If the civil servant fulfils this criterion and the earnings-related pension is lower than the guaranteed minimum, a pension supplement is added to the retirement pension to reach this minimum amount (see section 2.2.1).

A common concept of these guaranteed minimum pensions is that they can only be accessed when a certain career duration can be proved. The principles of the ADL concept will have consequences on the application of these criteria.

The careers end in the base year and no future pension rights are considered. Hence, the past career of future retirees will in most cases be insufficient to access the minimum pension. The younger an active person is in the base year, the shorter his past career and the more likely he is to fall short of the career duration criteria.

Supplementary table 29 is designed to give an indication of pension liabilities as they are accrued at the end of the base year. An insufficiently long career, for instance when cut off by the ADL principles, means that there exists no right to a guaranteed minimum pension at the end of the base year, not even a partial right.

5. Columns of the supplementary table

5.1. Columns G and H

The pension schemes recorded in column G and H are those schemes whose stock of pension entitlements are not recorded in the core national accounts, although a part of their transactions are.

Column G covers government schemes for its own employees. This means that this column will hold information on the first pillar pension benefits of civil servants.

Column H covers the social security pension schemes and will contain all the information on the first pillar pension benefits of wage earners and the self-employed.

As mentioned before, the pension benefits in the supplementary table will refer to old-age pension benefits and survivors' pension benefits.

5.2. Columns J and K

The pension entitlements acquired or held by resident households are reported in column J. The pension entitlements acquired or held by non-resident households are shown separately in column K if they are significant.[20]

Information on pension benefits paid out to non-residents is only available in the social security pension system for wage earners and the self-employed (column H). In January 2015, 9.8% of all pension benefits were paid out to non-residents (in numbers), or 3.9% of the amount of pension benefits paid out in that month.[21] There is no information on the level of contributions into these systems. Furthermore, information is lacking on the social security benefits for non-resident public service pensioners (column G) and columns A to F.

The limited information that is available does not allow to make a sound estimation of the values that must be entered in columns J and K. As such, these columns will remain empty.

[20] The Technical Compilation Guide only mentions the J column. However, the official SDMX templates by Eurostat also contain the K column.

[21] Office National des Pensions (2016)

6. Rows in the supplementary table

In this section, the different rows of the supplementary table are discussed. Columns G and H will be addressed separately.

6.1. Government schemes for own employees

The pension scheme for civil servants is represented in column G. This pension scheme provides benefits for civil servants working in the general government. However, there exist pension schemes for civil servants who were once set up by general government or regional authorities, but as today do not longer depend on general budget for their financing (public agencies with a semi-autonomous character, the police force and pension fund structures for local authorities, …). Coherent with current practices in the national accounts, these pension schemes will be reported under the social security schemes.

A description of the pension scheme of civil servants is presented in section 2.2.1.

6.1.1. Pension scheme for civil servants

MIDAS replicates the rules of the civil servants' pension benefits and survivors' benefits, including minimum and maximum pension regulations. However, the dataset used by MIDAS does not contain information on the past revenues of civil servants. These are therefore simulated by means of the observed wage evolution in the public sector.

Furthermore, each civil servant is modelled at a *tantième* of 60.

6.1.2. Rows in column G

Row 1 Pension entitlements

To compute the accrued-to-date liability of a civil servant's pension, only the rights the person is holding at the beginning of the base year (2015) must be taken into account. As row 1 gives the situation at the beginning of the year, no pension reform is taken into account (see section 4.4).

The ADL for a currently retired person i is obtained by summing up the actual value of all his future pension benefits l:

$$ADL_{i,t} = \sum_{l=1} pension_{i,l}.v^{l} \tag{6}$$

A currently active civil servant is entitled to a pension computed on the basis of an average wage at the end of his career, proportional to the years worked until the beginning of the base year (= real number of years already worked). The average wage is based on the wages earned during the last ten or five years before retirement.

As this pension is a future benefit, it must be discounted to the end of the base year by means of the discount rate to obtain the accrued-to-date liability.

For a civil servant i, the formula for the ADL computation of his future pension benefits is as follows:

$$ADL_{i,t} = \sum_{l=1} \left(\frac{n_i}{60} . \sum_{j=1}^{10\ or\ 5} \frac{Wage_{i,t-j}}{10\ or\ 5} \right) . v^{l+P_i-t} \quad (7)$$

where 't' is the base year, 'P_i' the year of retirement for a person i, 'v' the discount factor and 'n_i' the number of eligible years spent in the public service up to the end of the base year. The number of years 'j' for which the wages are taken into account depends on the date the person was born (giving 10 or 5 years). By summing over 'l', all future pension payments are taken into account.

The total accrued-to-date liabilities for civil-servants are calculated as the sum of all individual ADLs, scaled up to transform the sample-level ADL into an estimate of ADL for all Belgian civil servants.

Once the ADLs are computed, some processing is necessary to present them as required by Table 29. This process is described more in detail in annex 1.

A first step is to reevaluate the results: each MIDAS value is expressed in terms of 2011 prices. The obtained values are converted into 2015 prices by means of a revaluation coefficient based on the official health index. The price index increased by approximately 5.4% between 2011 and 2015 and the MIDAS results are thus adapted correspondingly.

Next, the MIDAS results are assigned to the correct Table 29 categories: pensions for civil servants' career years in column G, pensions for wage earners' and the self-employed' career years in column H.

After the assignment, the ADLs are adjusted so that the simulated pension benefit payments match the pension benefit payments of the standard national accounts. This step achieves consistency between the supplementary table and the standard national accounts.

As described earlier, a part of the ADLs represents the actual value of the pension entitlements of civil servants whose pension schemes were once set up by general government or regional authorities, but as today do not longer depend on general budget for their financing. Annex 1 describes more in detail the part of ADLs that is reported in column H as social security scheme.

The ADLs of the pension system for general government employees represent a total amount of 242 708.99 million euro.

Row 2 Increase in pension entitlements due to social contributions

Row 2 collects all the increases in pension entitlements, less the pension scheme service charges if these are deducted from the pension entitlements.

Row 2.1 Employer actual social contributions

This row records the employer actual social contributions. In principle, there are no actual social contributions made by the government for its own employees.

Public agencies and public enterprises that must pay a contribution to the general government to finance the pensions of their statutory personnel are reported under the social security schemes of column H.

Row 2.1 of column G is put to 0.

Row 2.2 Employer imputed social contributions

Row 2.2 records the imputed contributions made by the government as an employer for its own employees.

As column G is classified under the defined benefits pension schemes, this row will be measured as a balancing item. Row 2.2 will capture any changes in pension entitlements not included in the other rows of the table and any 'experience effects' where the observed outcome of pension modelling assumptions (real wage growth rate, discount rate, etc.) differs from the levels assumed.[22]

$$Row\ 2.2 = R\ 10 - R\ 1 - R\ 2.1 - R\ 2.3 - R\ 2.4 + R\ 2.5 - R\ 6 - R\ 7 - R\ 8 - R\ 9 + R\ 4 \quad (8)$$

Row 2.2 is estimated at 13.61 million euro. However, as this row serves as a balancing item, it is less straightforward to interpret the outcomes. This small positive value would imply that actual pension contributions are not totally sufficient to cover the increase in pension entitlements and the pension benefit payments. This row will not be commented in more detail as there are also problems in the interpretation of row 3 of column H (see section 6.2.2). It is wiser not to comment on this row yet and to interpret it only when a sufficiently long series of values has been established in future years.

Row 2.3 Household actual social contributions

This row records the household actual social contributions. In principle, there are no actual social contributions made by the households to the public sector pension scheme.

The contributions paid by households in the pension scheme, the most important being the mandatory contributions for survivors' pensions, are reported under the social security schemes (see section 6.2.2).

Row 2.3 of column G is put to 0.

Row 2.4 Household social contribution supplements

Row 2.4 captures the property income earned or imputed in the scheme. This property income is equivalent to the unwinding of the discount rate, meaning that the value is equal to the discount rate (3% in the base scenario) times the pension entitlements at the beginning of 2015.

The property income is estimated at 7 281.27 million euro

[22] Eurostat and ECB (2011)

Row 2.5 Pension scheme service charges

Row 2.5 covers the cost of running the pension scheme. These costs consist of wages and social contributions, but also of normal operating costs such as overheads, rents for buildings and investment in furniture and ICT equipment. As the institution, responsible for the pension scheme (the Public Sector Pensions Service, PSPS) is a public service, no costs are charged to the pension scheme members (public servants). They are not deducted from the social contributions, nor are they a charge on the pension entitlements. The pension scheme service charges are financed via the overall budget of the federal state. For this reason, row 2.5 will be left blank.

For information, in 2015 the service charges for running the public sector pension scheme amounted to 44.1 million euro.[23]

Row 3 Other (actuarial) increase of pension entitlements in social security pension schemes

This row is not applicable to defined benefits schemes for general government employees. Any 'experience effects', where the observed outcome of pension modelling assumptions (real wage growth rate, discount rate, etc.) differs from the levels assumed, are covered by row 2.2.

Row 4 Reduction in pension entitlements due to payment of pension benefits

Row 4 contains information on the amount of pension benefits paid out during the accounting period. The payment of pension benefits has the effect of 'settling' a part of the pension entitlements at the balance sheet opening (row 1).

This information is found in the national accounts.[24] A total amount of 9 049.6 million euro was paid out in 2015 on old-age and survivors' pensions from the public sector scheme. Also here, it is important to stress that this amount does not contain the benefit payments to the civil servants whose pension scheme does not longer rely on the budget of the general government for its financing. Those benefit payments are reported in column H.

Row 5 Changes in pension entitlements due to social contributions and pension benefits

Row 5 summarises the changes in pension entitlements due to contributions and benefits. Row 5 is obtained by adding rows 2 and 3 and subtracting row 4.

Row 6 Transfers of pension entitlements between schemes

To obtain the right to a civil servant's pension, a career of at least 5 years as a civil servant is required. Careers falling short of this condition give no right to a civil servant's pension. In that case, the career years will be recognised in the social security scheme and constitute rights for a wage earners' pension. This creation of pension rights in the social security scheme will be accompanied by the transfer of social contributions from the Public Sector Pension Service to the National Pensions Office to finance these pension rights.

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23 Personal communication, Modart C., National Bank of Belgium, 31 January 2017.

24 See annex 4 for more details on these benefit payments.

A second case in which a civil servant's career does not give right to a civil servants' pension is when the person is dismissed as a disciplinary sanction. This dismissal results in the loss of the right to a civil servant's pension. The career years will be recognised as career years in the social security pension scheme. In this case too, the creation of pension rights in the social security scheme is accompanied by the transfer of social contributions between the pension institutions.[25]

In 2015, 4.89 million euro was transferred for these reasons.[26]

Another situation in which pension rights can be transferred from the civil servants' pension scheme is when the person starts working for the European Community and his pension rights are recognised. In 2015, 906 000 euro was transferred for this reason.[27]

See section 6.2.2 (row 6) for further information on the pension contributions from the social security scheme for wage earners.

For the year 2015, the contributions transferred from and into the civil servants' pension scheme can be summarised as follows:

Table 2 Pension contributions transferred from and into the civil servants' pension scheme
Euro

Transfers from the civil servants' scheme towards	Transferred amount
The social security schemes	-4 892 000
European pension schemes	-906 000
Transfers from the social security scheme for wage earners towards	
The civil servants' pension scheme	360 304 000
Total	354 506 000

Row 6 of column G will show the result of these contribution flows: +354.51 million euro in 2015.

Row 7 Change in entitlements due to negotiated[28] changes in scheme structure

Row 7 shows the impact of negotiated reforms of pension scheme structures on entitlements related to past service (= benefits accrued in past years). To be reported in this row, the reform should lead to a change in pension entitlements in the supplementary table. The reform should be formally enacted during the base year (2015) and must be voted by parliament.

If a formally enacted reform has no impact on current pension entitlements, no measurement should be recorded. Only reforms affecting existing pension scheme members for their accrued-to-date rights are to be reported.[29]

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25 Janvier, R., Janssens, J. (2014)

26 "Vragen in verband met het ambtenarenpensioen en de vroegere PDOS", (Personal communication, Janssens J. (Federal Pensions Service), 7 September 2016).

27 Ibid.

28 Changes in pension entitlements under social security schemes approved by Parliament are recorded as if the changes had been negotiated (Eurostat and ECB (2011)). The pension scheme for civil servants is in fact not a social security scheme. Even so, the impact of the pension reform is represented in row 7, as will be the case for the social security schemes in column H.

29 The way study periods are recognised in the pension calculation is discussed at the moment of writing this working paper. Even if there would be a reform enacted on this topic, the impact would not be included in the Table 29 with base year 29 as the enactment would not have taken place in 2015.

During the base year 2015, a pension reform act was voted in parliament. The Act of 10 August 2015 *"aimed at raising the legal retirement age, conditions for the early retirement pension and the minimum age for the survivor's pension"* was published in the Belgian Official Journal of 21 August 2015. See section 4.4 for further details on this reform.

To assess the impact of pension reforms, two scenarios will be run. The present value will first be computed under the old pension rules, i.e. the set of rules by which the present value of entitlements at the beginning of the base year was computed (row 1). The present value will then be computed a second time, but now following the new pension rules introduced by the reform. The difference between these two values at the end of the base year is the impact of the pension reforms.

Here, it is important that the computation according the new pension rules must be executed on a *ceteris paribus* basis by implementing only the pension reform. The impact of changes to other assumptions must be estimated separately (see other rows).

$$Row\ 7 = ADL_{new}^{end} - ADL_{old}^{end} \tag{9}$$

The following table illustrates this formula.[30] The pension reform is estimated to have an impact on the accrued-to-date liabilities of the civil servants' pension scheme of -9 966.52 euro. This impact of -4.13% is in line with preliminary estimates of the impact of the pension reforms on the accrued-to-date liabilities.[31]

Table 3 Impact of negotiated changes in scheme structure, column G
Euro

Present value of pension entitlements	End of base year 2015
Under new rules	231 342 256 486
- Under old rules	- 241 308 775 504
= Row 7: Change in present value	- 9 966 519 017

Row 8 Changes in entitlements due to revaluations

Revaluations take place due to changes in key model assumptions in the actuarial computations. These assumptions are the discount rate, the wage rate and the inflation rate. The impact of those revaluations is computed as the difference in the present value of the pension entitlements at the end of the base year. The present value of the pension entitlements at the end of the base year is computed a first time under the original assumptions, i.e. the assumptions by which the present value of entitlements at the beginning of the base year was computed (row 1). The present value at the end of the base year is computed a second time, but now under the new assumptions.

The supplementary table on pension schemes in social insurance, base year 2015, is the first table to be composed for Belgium. Therefore, changes in key model assumptions are not possible as it is the first time these assumptions will be defined.

30 See discussion of rows 1 and 10 for the mentioned present values.
31 Brys Y. (2016) estimated this impact at -3.02% for Belgian first pillar pension schemes.

If key model assumptions change, Eurostat[32] requires a detailed split of the amount recorded in row 8 based on the model computations carried out for the scheme. The change in pension entitlements should be split following the three key model assumptions listed by Eurostat. This means the difference in present value of the pension entitlements must be computed for each key model assumption change at the end of the base year while only changing that key model assumption.

$$Row\ 8 = \sum_i ADL^{end}_{new\ key_i} - ADL^{end}_{old\ key_i} \quad (10)$$

Table 4 Impact of key model assumption changes, Column G
Euro

Revaluation	Impact
Changes in assumed discount rate	0.00
Changes in assumed wage developments	0.00
Changes in assumed price developments	0.00
Row 8 = Total impact	0.00

Row 9 Changes in entitlements due to other changes in volume

Other changes in volume due to changes of non-key assumptions in the actuarial computations, such as changes in the demographic assumptions, are reported here. The impact of those changes is computed as the difference in present value of pension entitlements at the end of the base year. The present value of the pension entitlements at the end of the base year is computed a first time under the original assumptions, i.e. the assumptions by which the present value of entitlements at the beginning of the base year was computed (row 1). The present value at the end of the base year is computed a second time, but now under the new assumptions.

The supplementary table on pension schemes in social insurance, base year 2015, is the first table to be composed for Belgium. Therefore, other changes in volume are not possible as it is the first time these assumptions will be defined.

If there are changes, a detailed split of the amount recorded in this row is also required here. This means the difference in present value of the pension entitlements should be computed at the end of the base year while only changing one assumption each time.

$$Row\ 9 = \sum_i ADL^{end}_{new\ assumption_i} - ADL^{end}_{old\ assumption_i} \quad (11)$$

[32] Eurostat and ECB (2011)

Table 5 Impact of other changes in volume, Column G
Euro

Other changes in volume	Impact
Changes in demographic assumptions	0.00
Changes in other assumptions	0.00
Changes in entitlements imposed without negotiation	0.00
Row 9 = Total impact	0.00

Row 10 Pension entitlements

Row 10 captures the accrued-to-date liabilities at the end of the reporting period. The row is computed in the same way as row 1, but one year later, on 31 December 2015. This also means that the ADLs are computed after implementation of the measures of the pension reform.

This row should be interpreted as the result of the rows of the column: the present value of pension entitlements at the beginning of the reporting period, increased by social contributions and financial return on the assets, decreased by pension settlements and eventually corrected for model corrections or changes in assumptions.

$$Row\ 10 = Row\ 1 + Row\ 5 + Row\ 5 + Row\ 7 + Row\ 8 + Row\ 9 \quad (12)$$

As described earlier, the part of the ADLs representing the actual value of the pension entitlements of civil servants whose pension schemes were once set up by general government or regional authorities, but as today do not longer depend on general budget for the financing, is reported in column H as social security scheme.

The ADLs for the public sector pension system in row 10 are estimated at 231 342.26 million euro.

6.2. Social security pension schemes

The social security pension schemes consist of the social security pension schemes. These consist of the scheme for wage earners, the pension scheme for the self-employed and the pension scheme for civil servants for which the financing is no longer depending on the budget of the federal government.

The pension scheme for the civil servants was described under section 6.1; in sections 6.2.1 and 6.2.2 follow the description of the pension schemes of the wage earners and the self-employed.

6.2.1. General remarks on the pension schemes for wage earners and the self-employed

The modelling in MIDAS follows closely the current regulations, including the minimum provision and ceilings.

MIDAS does not replicate yet the exact rules of the self-employed pension benefits and surviving benefits due to a lack of data concerning the past revenues. The model therefore assigns to retirees the

minimum pension for the self-employed (proportional to their actual career) in the year of retirement. The minimum pension is projected as described in section 4.8.

As stated in section 2.2.3, the consequences of this simplification might be limited because 70% of 'pure' self-employed pensioners received the minimum pension in 2009.[33] Nevertheless, it is a point for attention in the future development of MIDAS.

6.2.2. Rows in column H

Row 1 Pension entitlements

Wage earners

To compute the accrued-to-date liability of the pension of a wage earner, only the rights the person is entitled to at the beginning of the base year (2015) must be taken into account. As row 1 gives the situation at the beginning of the year, no pension reform is considered (see section 4.4).

The ADL for a currently retired person i is obtained by summing up the actual value of all his future pension benefits l:

$$ADL_{i,t} = \sum_{l=1} pension_{i,l}.v^{l} \tag{13}$$

Where the pension benefit for a full career is computed based on wages from the whole career, the ADL will compute the pension benefit for a currently active person only on the fraction of the career up to the base year.

A future pension benefit is obtained which will be discounted to the end of the base year by means of the discount rate. This results in the accrued-to-date liability.

For one wage earner i, the formula for the ADL computation of his future pension benefits is as follows:

$$ADL_{i,t} = \sum_{l=1} \left((75\% \; or \; 60\%).\frac{1}{45}\sum_{j=1}^{n_i} max\left(min\left(wage_{i,j},\; ceil_j\right), minright_{P_i}\right) \right).v^{l+P_i-t} \tag{14}$$

Where 't' is the base year, 'n_i' the number of years of career up to the base year, '$wage_{i,j}$' is the person's annual wage in year 'j' re-evaluated at year 't', '$ceil_j$' the wage ceiling applicable in year 'j', '$minright_{P_i}$' the minimum right per career year a person is entitled to if the wage was too low, 'P_i' the year of retirement of person i and 'v' the discount factor. If the resulting pension benefit falls below a certain amount and the beneficiary fulfills certain career duration conditions, a guaranteed minimum pension will be applied. See section 4.12 for these conditions. By summing over 'l', all future pension payments are taken into account.

[33] Commission de la réforme des pensions 2020-2040 (2014)

The total accrued-to-date liabilities for wage earners are calculated as the sum of all individual ADLs, scaled up to transform the sample-level ADL into an estimate of ADL for all Belgian wage earners.

Self-employed individuals

To compute the accrued-to-date liability of the pension of a self-employed person, only the rights the person holds at the beginning of the base year (2015) must be taken into account. As row 1 gives the situation at the beginning of the year, no pension reform is considered (see section 4.4).

The ADL for a currently retired person i is obtained by summing up the actual value of all his future pension benefits l:

$$ADL_{i,t} = \sum_{l=1} pension_{i,l}.v^{l} \tag{15}$$

For an active self-employed person, this means, in the MIDAS model, the minimum pension of a self-employed person in the year of retirement, proportional to the fraction of career worked until the end of the base year.

This pension is a future benefit; hence, it will be discounted to the beginning of the base year by means of the discount rate to obtain the accrued-to-date liability.

For one self-employed person i, the formula for the ADL computation of his future pension benefits is as follows:

$$ADL_{i,t} = \sum_{l=1} \left(\frac{n_i}{45}.Minimum\ pension_{P_i}\right).v^{l+P_i-t} \tag{16}$$

Where 't' is the base year, 'n_i' the number of years of career up to the base year, 'Minimum pension$_{P_i}$' is the minimum pension in the year of retirement of person i, 'P_i' is the year of retirement of person i and 'v' the discount factor. If the resulting pension benefit falls below a certain amount and the beneficiary fulfills certain career duration conditions, a guaranteed minimum pension will be applied. See section 4.12 for these conditions. By summing over 'l', all future pension payments are taken into account.

The total accrued-to-date liabilities for self-employed individuals are calculated as the sum of all individual ADLs, scaled up to transform the sample-level ADL into an estimate of ADL for all Belgian self-employed individuals.

Wage earners and self-employed individuals

Once the ADLs are computed, some processing is necessary to present them as required by Table 29. This process is described more in detail in annex 1.

A first step is to reevaluate the results: each MIDAS value is expressed in terms of 2011 prices. The obtained values are converted into 2015 prices by means of a reevaluation coefficient based on the official health index. The price index increased between 2011 and 2015 with approximately 5.4% and the

MIDAS results are adapted correspondingly.

Next, the MIDAS results are assigned to the correct Table 29 categories: pensions for civil servants' career years in column G, pensions for wage earners' and self-employed individuals' career years in column H.

After the assignment, the ADLs are adjusted so that the simulated pension benefit payments match the pension benefit payments of the standard national accounts. By this step, a coherence between the supplementary table and the standard national accounts is achieved. The adjustment coefficients are identified for wage earners and the self-employed separately.

Civil servants

As described earlier in section 6.1, column H will also contain the values for civil servants whose pension schemes were once set up by general government or regional authorities, but as today do not longer depend on general budget for their financing. Annex 1 describes more in detail the part of ADLs that is reported in column H as social security scheme.

The final step is done by summing the ADLs of the pension schemes that are reported under the social security systems: wage earners, the self-employed and a part of the civil servants, leading to a total amount of 1 374 754.66 million euro.

Row 2 Increase in pension entitlements due to social contributions

Row 2 collects all the increases in pension entitlements, less the pension scheme service charges if these are deducted from the pension entitlements.

Row 2.1 Employer actual social contributions

Employer actual social contributions are recorded in row 2.1. As stated in Eurostat's Technical Compilation Guide, the actual social contributions paid by the employers can be found in the national accounts. What is found there is the total amount of social contributions: 44 255.20 million euro[34]. Only part of this is destined to finance first pillar pensions. The other part of the contributions serves to finance coverage for sickness and invalidity, unemployment, occupational illnesses, workplace accidents, etc.

To estimate the pension contributions paid on behalf of wage earners in the social security system, we must pay attention to the contributions intended for civil servants, define which part of the contributions was paid into the social security system and, finally, which part of the social contributions finances first pillar pensions. The full description of this estimation process can be found in annex 2.

In 2015, 14 375.97 million euro were paid by employers to finance the social security pension schemes.

[34] Institut des Comptes Nationaux (2016a)

Row 2.2 Employer imputed social contributions

For social security pension schemes, the 'experience effects', where the observed outcome of pension modelling assumptions (real wage growth rate, discount rate, etc.) differs from the levels assumed, are not recorded in row 2.2 but in row 3. Therefore, this row does not have to be completed.

Row 2.3 Household actual social contributions

In row 2.3, household actual social contributions are recorded. As stated in Eurostat's Technical Compilation Guide, these contributions are published in the national accounts. Since the introduction of the overall financial management in the Belgian social security system in 1994, separate contributions no longer exist for each of the social risks. Therefore, what is found in the national accounts is the total amount of social contributions.

The 'households sector' in the national accounts is, regarding social contributions, subdivided into three socio-economic categories: 'wage earners, 'self-employed' and 'no professional activity'.

An important remark to make here is that the category 'wage earners' in fact covers wage earners in terms of the social security pension system and civil servants. This concerns the civil servants whose pension schemes were once set up by general government or regional authorities, but as today do not longer depend on general budget for the financing.

Other contributions that are reported in this column for the civil servants, are the mandatory contributions for survivors' pension benefits. Appointed civil servants pay a mandatory contribution which finances their survivors' pensions. The part of the contributions that is not used to finance survivors' pensions, will finance the civil servants' old age pensions.

Other contributions, which are of smaller importance when expressed in monetary terms, are the special contributions for those managers of public agencies who receive a complementary pension benefit, the solidarity contribution paid on the pension benefits of current retirees, and others.

To estimate the wage earners' social contributions which are paid in the social security system, the social contributions financing civil servants' pensions must first be subtracted. See annex 3 for more details on this procedure.

The category 'no professional activity' is composed of retired people, unemployed people and a variety of other small categories. Again, no subdivision is publicly available. For each of the three socio-economic categories in the national accounts, the pension contributions must be estimated. The estimates and the assumptions made are explained in annex 3.

The aggregate amount of the pension contributions for the three socio-economic categories for households in the national accounts ('wage earners', 'self-employed' and 'no professional activity') adds up to a total pension contribution of 12 991.75 million euro.

Row 2.4 Household social contribution supplements

Row 2.4 captures property income either earned or imputed in the scheme. This property income is equivalent to the unwinding of the discount rate, meaning that the value is equal to the discount rate (3% in the base scenario) times the pension entitlements at the beginning of 2015.

The property income is estimated at 41 242.64 million euro

Row 2.5 Pension scheme service charges

Row 2.5 covers the cost of running the pension schemes. As the institutions managing the pension schemes (the National Pensions Office and the National Institution for the Social Security of the Self-Employed[35]) are federal organisms, no costs are charged to the pension scheme members (wage earners and the self-employed). The costs are mainly financed via the global budget of the federal state. For this reason, row 2.5 will be left blank.

For information, the service charges for running the social security pension schemes amounted in 2015 to 148.5 million euro.[36]

Row 3 Other (actuarial) increase of pension entitlements in social security pension schemes

This row is used when actual contributions to the social security pension scheme are not actuarially based, and, therefore, there is an imputed contribution which is not the responsibility of any employer.[37] A positive value arises for example when the social contributions do not cover the financing needs of the social security pension scheme. Row 3 also collects the 'experience effects' observed for social security pension schemes, where the observed outcome of pension modelling assumptions (wage growth rate, inflation rate and discount rate) in any one year differs from the levels assumed.[38] As such, this row can be seen as the equivalent of row 2.2 for the public sector pension scheme.

$$Row\ 3 = R\ 10 - R\ 1 - R\ 2.1 - R\ 2.3 - R\ 2.4 + R\ 2.5 - R\ 6 - R\ 7 - R\ 8 - R\ 9 + R\ 4 \quad (17)$$

The row is defined as a balancing item and is estimated for 2015 at -27 301.09 million euro. Caution must be used when interpreting this result. This negative value would imply that the actual contributions are sufficient to cover the increase in pension entitlements and pension benefit payments. Considering an ageing population, a growing part of the government budget earmarked for pension benefits and already implemented pension reforms, this would be a dangerous message to give. It is therefore wiser not to comment on this row yet and to interpret it only when a sufficiently long series of values has been established in future years.

35 Since the 1 April 2016, the Public Sector Pensions Service and the National Pensions Office have been merged into the Federal Pensions Service (FPS).

36 Personal communication, Modart C., National Bank of Belgium, 31 January 2017

37 Eurostat and ECB (2011)

38 Ibid.

Row 4 Reduction in pension entitlements due to payment of pension benefits

Row 4 contains information on the amount of pension benefits paid out during the accounting period. The payment of pension benefits has the effect of 'settling' a part of the pension entitlements at the balance sheet opening (row 1).

It is important to remember that this row also contains the benefit payments to the civil servants whose pension scheme does not longer rely on the budget of the general government for its financing. Those benefit payments were excluded from column G.

This information is found in the national accounts.[39] A total amount of 32 869.70 million euro was paid out in 2015 on old-age and survivor's pensions from the social security schemes. Annex 4 presents more information on the benefit payments of the different schemes.

Row 5 Changes in pension entitlements due to social contributions and pension benefits

Row 5 summarises the changes in pension entitlements due to contributions and benefits. Row 5 is obtained by summing rows 2 and 3 and subtracting row 4.

Row 6 Transfers of pension entitlements between schemes

It is possible for a non-statutorily appointed (= contractual) employee or a temporarily appointed civil servant to become a statutorily appointed civil servant. Under certain conditions, their past career can be taken into account for the computation of the civil servants' pension.[40]

In this case, the pension rights are transferred from the social security scheme towards the pension scheme of the civil servants. In accordance to this transfer of rights, the National Pensions Office will transfer the corresponding amount of contributions to the Public Sector Pensions Service. A similar transferring mechanism does not exist for the self-employed.

Another situation in which pension rights can be transferred from the social security schemes (both wage earners and self-employed) is when a person starts working for the European Community and their pension rights are recognised.

As referred in section 6.1.2 (row 6), a similar flow of contributions exists in the opposite direction, from the Public Sector Pensions Service towards the National Pensions Office.

For the year 2015, the contributions transferred from and into the social security pension schemes can be summarised as follows:[41]

[39] See annex 4 for more details on these benefit payments.

[40] Janvier, R., Janssens, J. (2014)

[41] INASTI (2016a) and « RE: Vragen in verband met het ambtenarenpensioen en de vroegere PDOS », (Personal communication, Weerts J. (Federal Pensions Service), 25 October 2016).

Table 6 **Pension contributions transferred from and into the social security schemes**
Euro

Transfers from the social security scheme of	
Wage earners towards	
The civil servants' pension scheme	-360 304 000
European pension schemes	-24 841 000
Self-employed individuals towards	
European pension schemes	-566 000
Transfers from the civil servants' scheme towards	
The social security schemes	4 892 000
Total	-380 819 000

Row 6 of column H will show -380.82 million euro (out-flow).

Row 7 Change in entitlements due to negotiated[42] changes in scheme structure

As described in section 6.1, this row shows the impact of negotiated reforms of pension scheme structures on entitlements related to past service. Only reforms affecting existing pension scheme members for their accrued-to-date rights are to be reported if the reform was formally enacted during the base year (2015) and agreed upon by parliament.[43]

In Belgium, this is the case with the pension reform act of 10 August 2015 as discussed in section 4.4.

The present value of the pension entitlements at the end of the base year is first computed under the old pension rules. Then, the present value is computed a second time, but now following the new pension rules introduced by the reform. The impact of pension reforms is the difference in the present value of the pension entitlements at the end of the base year. Here, it is important that the computation with the new pension rules must be executed by implementing only the pension reform.

The following table illustrates this procedure. The decrease in ADLs of 57 189.54 million euro corresponds to an impact of -4.14% and is in line with preliminary estimates of this impact.[44]

Table 7 **Impact of negotiated changes in scheme structure, column H**
Euro

Present value of pension entitlements	End of base year 2015
Under new rules	1 325 623 875 927
- Under old rules	- 1 382 813 417 462
= Row 7: Change in present value	- 57 189 541 535

42 Changes agreed in parliament to pension entitlements under social security schemes are recorded as if the changes had been negotiated. (Eurostat and ECB (2011)).

43 The way study periods are recognised in the pension calculation is discussed at the moment of writing this working paper. Even if there would be a reform enacted on this topic, the impact would not be included in the Table 29 with base year 2015 as the enactment would not have taken place in 2015.

44 Brys Y. (2016) estimated this impact at -3.02% for Belgian first pillar pension schemes.

Row 8 Changes in entitlements due to revaluations

As discussed in section 6.1, row 8 captures the revaluations that are caused by changes of key model assumptions in the actuarial computations. These assumptions are the discount rate, the wage rate and the inflation rate. The impact of those revaluations is computed as the difference in present value of the pension entitlements at the end of the base year.

The supplementary table on pension schemes in social insurance, base year 2015, is the first table to be composed for Belgium. Therefore, changes in key model assumptions are not possible as it is the first time these assumptions will have been defined.

Table 8 Impact of key model assumption changes, Column H
Euro

Revaluation	Impact
Changes in assumed discount rate	0.00
Changes in assumed wage developments	0.00
Changes in assumed price developments	0.00
Row 8 = Total impact	0.00

Row 9 Changes in entitlements due to other changes in volume

For a description of this row, see section 6.1 where the government scheme for its own employees is discussed.

The supplementary table on pension schemes in social insurance, base year 2015, is the first table to be composed for Belgium. Therefore, other changes in volume are not possible as it is the first time these assumptions will have been defined.

Table 9 Impact of other changes in volume, Column H
Euro

Other changes in volume	Impact
Changes in demographic assumptions	0.00
Changes in other assumptions	0.00
Changes in entitlements imposed without negotiation	0.00
Row 9 = Total impact	0.00

Row 10 Pension entitlements

Row 10 captures the accrued-to-date liabilities at the end of the reporting period. The row is computed in the same way as row 1, but one year later, on 31 December 2015. This also means that the ADLs are computed after implementation of the measures of the pension reform.

This row should be interpreted as the result of the rows of the column: the present value of pension entitlements at the beginning of the reporting period, increased by social contributions and the financial return on the assets, decreased by pension settlements and, if necessary, corrected for model corrections or changes in assumptions.

(18)

Row 10=Row 1 + Row 5 + Row 5 + Row 7 + Row 8 + Row 9

As described earlier, this column also contains the part of the ADLs representing the actual value of the pension entitlements of civil servants whose pension schemes were once set up by general government or regional authorities, but as today do not longer depend on general budget for their financing.

The ADLs for the social security pension schemes in row 10 are estimated at 1 325 623.88 million euro.

6.3. Order of computation

When filling in columns G and H of the supplementary table a distinction can be made between the ways the rows are addressed. The first category concerns the variables for which the information must be/can be collected independently from the model. The second category concerns the variables for which the values are obtained by means of the model; a certain order to obtain these variables must be followed.

6.3.1. Information from external sources

The information in rows 2.1, 2.3 and 4 can be found in the national accounts. Some computations are, however, necessary before the values from the national accounts can be used in Table 29.

The transfers between pension schemes (row 6) can be found in the annual reports of the organisations responsible for the schemes or must be obtained via personal contact with these organisations.

The service charges for the pension schemes (row 11) can be found in the annual reports of the organisations responsible for the schemes.

6.3.2. Model-based information

The starting point is rows 1 and 10. Attention must be given to years in which a pension reform has been voted, model changes implemented or (key) model parameters been altered. A computation with and without these modifications must be performed (reference is made to the discussions on each row).

Row 2.4, which is the unwinding of the discount rate on row 1, follows almost immediately out of the first step.

Rows 7, 8 and 9 are obtained by finding the difference between the various model runs (with and without reforms, changes, etc.).

Finally, rows 2.2 and 3, which are the balancing rows for respectively the public sector pension scheme and the social security pension schemes, are derived as final values. These rows conclude the completion of Table 29.

7. Sensitivity analysis

European countries are asked by the ESA 2010 transmission programme to accompany Table 29 with a sensitivity analysis consisting of two alternative scenarios. The sensitivity analysis is required for the discount rate used in the computation of the present value of the pension entitlements from the unfunded defined benefit schemes of government and social security schemes (columns G and H).

In the original set-up of Table 29, the present values of the pension entitlements of columns G and H are computed by means of a real discount rate of 3% (5% nominal). In the alternative scenarios, the real discount rate will be 2% and 4% respectively. Table 29 for the base scenario (3%) is represented in annex 5; the complete tables of the alternative scenarios can be found in annexes 6 and 7.

Table 10 Sensitivity analysis for defined benefit schemes of government employees (column G)
Million euro

	Sensitivity 1: -1%	Basic scenario	Sensitivity 2: +1%
Row 1	306 661	242 709	197 777
Row 2.2	150	14	-80
Row 2.4	6 133	7 281	7 911
Row 10	290 066	231 342	189 764

Table 11 Sensitivity analysis for social security schemes (column H)
Million euro

	Sensitivity 1: -1%	Basic scenario	Sensitivity 2: +1%
Row 1	1 826 482	1 374 755	1 069 306
Row 2.4	36 530	41 243	42 772
Row 3	-27 414	-27 301	-27 222
Row 10	1 750 781	1 325 624	1 036 550

A change in rows 1 and 10 should be logical as they represent the discount future pension benefit payments. The ADLs for 2015 (row 10) change by -18% for government employees and by -22% for the social security schemes due to an increase in the discount rate by 100bp. A decrease in the discount rate of 100bp results in, respectively, an increase of 25% and 32%. Section 9.2 provides a benchmark for these values.

Row 2.4 represents the unwinding of the interest rate on the present value of pension entitlements at the beginning of the base year (row 1). These rows move in the same direction as the discount rate.

Row 2.2 (for the unfunded defined benefit schemes of government employees) represents the employer imputed contributions. The role of this row is fulfilled by row 3 for the social security pension schemes. These rows are the last to change as they serve as balancing items. Consequently, they contain the changes in ADLs during the base year that were not explained by other rows.

Sections 6.1.2 and 6.2.2 already cautioned against a quick interpretation of these rows. A positive value would imply that actual pension contributions are not sufficient to cover the increase in pension entitlements and the pension benefit payments.

In contrast, a negative value would then imply that the actual contributions are sufficient to cover the increase in pension entitlements and the pension benefit payments. Considering an ageing population, where a growing part of the government budget is earmarked for pension benefits and already implemented pension reforms, this would be a dangerous message to give. It is therefore wiser to not comment yet on these rows and their sensitivities but to interpret them when a sufficiently long series of values has been established in future years.

8. ADL in terms of GDP

Expressing the ADLs of the unfunded defined benefit schemes of government employees and social security schemes in terms of GDP gives an indication of the number of years a country would have to use its GDP to meet its pension commitments if it was to dedicate the entire GDP to it.

ADLs measure the amount of money required by the pension system to meet its commitments in the theoretical case of closing down the system. Such a scenario is in theory ruled out for public or government-sponsored unfunded pension schemes.

Table 12 ADL in terms of GDP
Million euro and percentages

	Sensitivity 1: -1%	Basic scenario	Sensitivity 2: +1%
ADL	2 040 847.57	1 556 966.13	1 226 313.53
GDP 2015[45]	410 350.80	410 350.80	410 350.80
ADP/GDP	497%	379%	299%

With a discount rate of 3%, the MIDAS model and its dataset, the assumptions made and the estimation procedures described in this working paper, the ADL/GDP ratio for 2015 is determined at 379%. The present value of the accrued-to-date liabilities of all first pillar pension schemes in Belgium equals roughly 3 years and 10 months of the total Belgian production capacity.

To illustrate the sensitivity of this ratio to the discount rate, two alternative ratios are computed, at a rate of 2% and 4%, respectively leading to a ratio of 497% and 299%. The complete tables of the alternative scenarios can be found in annexes 6 and 7.

Some considerations must be made by these ratios. Table 29 shows the pensions entitlements on an accrued-to-date basis. These are present values of the pension entitlements of the retired population and the part of pension entitlements that is already accrued by the future beneficiaries. As such, accrued-to-date liabilities do not represent public debt and are not an indicator of the fiscal or financial sustainability of the pension systems and are only appropriate for national accounts purposes.

Accrued-to-date liabilities should only be interpreted as an asset from the households in national accounts' terminology. An assessment of the sustainability of the pension systems can be found in the reports of the Ageing Working Group or the Belgian Study Commission for Ageing.

[45] Institut des Comptes Nationaux (2016b)

9. Benchmarking

The present value of the pension entitlements for the unfunded defined benefit schemes of government and social security schemes have been computed by means of an actuarial model. The model is an adaptation of the microsimulation model MIDAS that has been used for several years by the Federal Planning Bureau to assess the adequacy of the Belgian pension system.[46]

The MIDAS model itself has been tested and the outcomes of the adequacy studies on the Belgian pension system have been benchmarked and consolidated. Hence, the benchmarking concerns only the ADLs of the Belgian pension system.

To this end, two easy-to-implement formulae have been presented in Blanchet and Le Minez (2012).[47] The first formula gives an approximation of the accrued-to-date liabilities in terms of GDP. The second formula estimates the change in ADL/GDP due to a change in the discount rate used to compute the ADL. The formulae will be applied in the sections 9.1 and 9.2 of this chapter.

Besides these formulae, an overview is given of other studies that have been written in this domain. These studies might not always cover the same scope and might apply another methodology. They are presented in section 9.3 and their usefulness for this working paper is commented.

9.1. Steady state approximation of the ADL/GDP indicator

To consolidate the accrued-to-date liabilities proportional to the GDP, Blanchet and Le Minez (2012) describe a steady state analytical approximation of the ADL/GDP indicator.[48]

The following assumptions must be made to obtain a steady state environment and to permit the deduction of the formula: a stable age structure of the population, wages increasing at a constant rate, fully stabilised pension rules and a discount rate equal to the growth rate of the economy. These assumptions do not correspond on every point with the assumptions that must be made for Table 29 purposes. Therefore, comparing our results to this approximation is not straightforward.

In this steady state environment, the ADL/GDP indicator can be simplified to the pensions/GDP ratio times the gap between the average age of the retired population (A_p) and the average age of the active population (A_w).

$$\frac{ADL}{GDP} \approx \frac{Pensions}{GDP}\left(A_p - A_w\right) \tag{19}$$

As mentioned in the updated version of the 2015 Belgium country fiche for the Ageing Working Group[49], the gross public pension expenditures for 2013 accounted for 10.5% of GDP. The expenditures

46 Dekkers G. et al. (2010)
47 Blanchet, D., Le Minez, S. (2012)
48 Ibid.
49 Federal Planning Bureau (2015)

comprise benefits for old-age pensions, early retirement benefits (including unemployment with company allowance scheme for non-job seeker) and survivors' pensions and were intended for wage earners, the self-employed and civil servants. In this publication, no information was available to exclude early retirement benefits.

The average age of the retired population (A_p) and the average age of the active population (A_w) are results from the simulations performed with MIDAS.

Table 13 Steady state approximation of the ADL/GDP indicator
Percentages

	2014	2015
Pensions/GDP	10.4%	10.5%
A_p	75.65	74.70
A_w	41.83	42.02
$\widehat{ADL/GDP}$	**341%**	**343%**

As already stated before, the ADL/GDP from Table 29 is not calculated under steady state assumptions. The ADL/GDP ratio obtained with a discount rate of 3% is 379% (see section 8). The approximation at 343% is good given the steady state assumptions that were not totally fulfilled.

9.2. Approximation of the impact of the discount factor on the ADL indicator

According to the ESA 2010 data transmission requirements for Table 29, two sensitivity analyses for the schemes outside the core national accounts are to be delivered. The base scenario described in ESA 2010 has to be computed with a real discount rate of 3% (5% nominal). The required sensitivity analyses consist of one scenario with a real discount rate of 2% and one with a rate of 4%.

Under the same steady state conditions as mentioned before, an order of magnitude of the impact of the discount factor on the ADL indicator can be calculated. The same remark as on the differences between these assumptions and the Table 29 assumptions applies here too.

The following formula gives the change of the accrued-to-date pension liabilities (in percentage) due to a one percentage point increase in the discount factor.[50]

$$\frac{\partial ln(ADL)}{\partial r} = -\frac{1}{2}\left(\frac{V_p + V_w}{A_p - A_w} + (A_p - A_w)\right) \quad (20)$$

Besides the average ages of the retired population (A_p) and the active population(A_w), this formula requires the variances in ages at the time of paying contributions (V_w) and in ages at the time of receiving pension benefits (V_p).

The variance in ages at the time of paying contributions (V_w) is defined by the length of active life:

$$V_w = \frac{\left(length(Active\ life)\right)^2}{12} \quad (21)$$

[50] Blanchet, D., Le Minez, S. (2012)

For the length of active life, the average contributory period (or average years of service) as mentioned in the most recent Ageing Report is used. For 2014, this period equalled 37.1 years.[51]

The variance of the ages at the time of receiving pension benefits (V_P) is defined on the average length of the retirement periods:

$$V_p = \frac{\big(length(Retirement\ period)\big)^2}{12} \tag{22}$$

For the length of the retirement period, the duration of retirement as mentioned in the most recent Ageing Report is used. This is the remaining years of life at average effective age of exit from the labour market, from life expectancy data calculated in the EUROPOP2013.

The latest available data is for 2014. The length of retirement period equalled 20 years for men and 23.7 years for women.[52] There is no unisex average retirement period published. The impact of the discount factor on the ADL indicator is therefore calculated for both sexes. The impact on the whole population will lie between these values.

Table 14 Approximation of the impact of the discount factor on the ADL indicator
Variance of ages, ages and units

	Men	Women
V_p	(20.0)^2/12	(23.7)^2/12
V_w	(37.1)^2/12	(37.1)^2/12
A_p	74.65	74.65
A_w	41.83	41.83
$\frac{\partial ln(ADL)}{\partial r}$	**-18.67**	**-18.88**

A one percentage point change in the discount rate will lead to a change in the opposite direction of the ADLs of approximately 18.8%.

The following table compares the approximations with the obtained values (see Table 12). The starting point of the approximations is the obtained ADL/GDP ratio at a discount rate of 3%, from which the other ratios are estimated.

Table 15 Comparison between obtained and approximated ADL/GDP ratios
Percentages

	Discount rate 2%	Discount rate 3%	Discount rate 4%
Obtained values through model	497%	379%	299%
Approximated values	450%	379%	308%

One can conclude here that the approximations are not too far of the real values, making them a rather good predictor.

51 European Commission (2015)
52 Ibid.

9.3. Studies on the Belgian pension system

Several studies have been conducted in the past to estimate the present value of pension entitlements in Belgium (social security and public pension scheme). A selection is provided under this paragraph. For various reasons, which we will discuss here, caution must be used when regarding the ADL/GDP ratios. However, all point to a high value for this ratio.

The first remark is on the age of these studies. The most recent study, in 2013, uses a representative dataset of the Belgian population on 1 January 2002. However, it also bases its ADL computation back in 2002, disregarding pension evolutions over more than a decade. Other studies are older and are based on data from before 2002.

When consulting the studies, it is not always clear which benefits are within the scope of the study. In the studies where this is clear, the scope may differ from the scope of Table 29.

A last important remark must be made on the applied computations principle. Not all studies follow the ADL approach. Even when the ADL/GDP ratio might seem comparable, a study following the open-group approach is not comparable to the Table 29 values. The ADL approach considers only insured people that are alive at the valuation moment and does not take into account the acquisition of future pension rights. In contrast, the open-group approach not only considers the acquisition of pension rights in the future, but also future new entrants to the pension scheme.

Table 16 Studies on the Belgian pension system

Reference	Base year	Benefits in scope (with certainty)	Discount rate	% GDP	Population	Computation principle	Other assumptions
Flawinne et al. (2013)	2002	Old-age Survivors' Means-tested	2% (real) 3% (real) 4% (real)	228.6% 179.7% 143.4%	Active + Pensioners	ADL (micro-Simulation)	Pension age: men 65, women 62
Jousten et al. (2012)	2001	Old-age Survivors' Means-tested	3% (real)	+-168%	Active + Pensioners	ADL (micro-Simulation)	
Mink (2008)	2005	Old-age Survivors' Means-tested Early retirement Disability	3% 5%	208% 165%			Based on a European Commission[53] study: Present value of projected ratios of future pension expenditure in terms of GDP
ABN Amro (2003)	2000	Old-age	5.25% (nominal)	296%	Active + Pensioners	Open group	Net present value Projections up to 2050
Kune (1996)	1990	Old-age	4%	75% (ABO) 101% (PBO)			Not comparable due to differences in scope and methods Uses current value of average real pensions. Population >25 years
Bouillot and Perelman (1995)	1985 2015 (proj)	Old-age Survivors' Means tested	3% (real)	218.4% (GNP!) 246.2% (GNP!)	Active + Pensioners	ADL[54]	Not comparable due to differences in methods - Compares the ADL to GNP - Average pension benefits per age group - Outdated: pension landscape has changed (e.g. pension age: men 65, women 60)
Perelman (1981)	1967 - 1977	Old-age Survivors'	5-9% (nominal)	/	Active + Pensioners		Not comparable due to differences in methods - Compares the ADL to total wealth of households. Not to GDP - Average pension benefits per age group - Outdated: pension landscape has changed (e.g. pension age: men 65, women 60)

[53] European Commission (2006)

[54] Bouillot and Perelman (1995) use the concept of "Équivalent Patrimonial des Droits à la Pension", which is equivalent to ADL.

10. Future developments

Section 3.2.2 describes future modifications that can be made to MIDAS. Some of them will improve the computation of the ADLs. The following list gives the future areas of development in the Table 29 project that do not concern MIDAS.

– The social security contributions (by both employers and households) financing the pension systems in the social security schemes are estimated in proportion to the old contribution rates. Recent information on those contributions does not exist, so we can only try to refine the estimation procedure.

– The same remark can be made for the information for columns J and K. Here too, we can only try to refine the estimation procedure.

11. Frequency and timing of publication of Table 29

11.1. Frequency

The ESA 2010 Transmission Programme requires that the supplementary table on pension schemes in social insurance is transmitted by the Member States every third year, instead of the initially-planned annual transmission.[55,56] However, various reasons make it interesting to publish this table every year, at least columns G and H:

– Table 29 can hold interesting information for other studies, which gives added value in uninterrupted, yearly publication.

– The information in rows 7, 8 and 9 is more interesting when provided in the year in which the decision on the reform, model change, parameter change, etc. has been taken.

– Yearly publication allows more straightforward interpretation of the variation of variables between two publications.

Hence, for these reasons, a limited Table 29 (columns G and H only) can be established on a yearly basis. The Table 29 destined for Eurostat will then be published on a three-yearly basis in cooperation with the National Bank of Belgium.

11.2. Timing

The timeline of the construction of Table 29 and the delivery to Eurostat consists of several layers.

The initial Eurostat requirements to deliver Table 29 are straightforward. After the closure of each three-year period, the National Bank of Belgium and the Federal Planning Bureau have 24 months to complete the table and deliver it to Eurostat. The first period ends on 31 December 2015. This means the first report and data should be handed over by 31 December 2017. The Federal Planning Bureau received a grant from Eurostat to develop a model to compute several values of columns G and H. A consequence of this grant is that the initial deadline is advanced: the final report and data transmission should be completed prior to the end of October 2017.

The first transmission, however, will be in mid-2017, when a mandatory test transmission will be organised by Eurostat. The National Bank of Belgium and the Federal Planning Bureau should hand over a draft version of the final report and provisional data. Although this is a provisional data transmission, the data should be based on the Belgian situation. No fictional data is allowed.

As presented in section 11.1, a yearly Table 29, or at least columns G and H, could be interesting. In this case, a new layer of deadlines is added to the timeline. Each year, an annual Table 29 is set up, although no transmission is made to Eurostat within the three-year period. Hence, this annual Table 29 will be used for reference purposes.

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55 Barcellan, R. *et al.* (s.d.)

56 Presidency of the Council of the European Union (2012)

Table 17 Timeline

	31/12/2015	31/12/2016	30/06/2017	31/10/2017	31/12/2017	31/12/2018	31/12/2019	31/12/2020
Eurostat require-ments	End of the first 3y period				End of first 3y period + 24m			
						End of second 3y period		End of second 3y period + 24m = deadline final report Transmission Table 29
			Mid-2017: Test transmission					
Eurostat grant for Belgium				Conventional dead-line final report + transmission Table 29				
FPB Proposal					Annual table	Annual table	Annual table	Annual table

12. Data sources

Computation of pension entitlements

Database

"Datawarehouse marché du travail et protection sociale" of the Crossroads Bank for Social Security.

Population projection: life expectancy

Eurostat, EUROPOP2015 - European population projections, base year 2015.

Social security contributions

Institut des Comptes Nationaux (2016b), Comptes nationaux: Comptes détaillés et tableaux 2015, octobre 2016, 183p. (Additional computations are necessary)

Payment of pension benefits

Institut des Comptes Nationaux (2016a), Comptes nationaux: Comptes des administrations publiques 2015, octobre 2016, 119p.

Service charges of the respective pension schemes:

National Bank of Belgium.

GDP numbers

Institut des Comptes Nationaux (2016b), Comptes nationaux: Comptes détaillés et tableaux 2015, octobre 2016, 183p.

13. References

ABN AMRO (2003), Desire to retire: The European pension problem, 38p.

Barcellan, R., Stapel-Weber, S. and Wouters, J. (s.d.), ESA 2010 data transmission programme: What's new as of the second half 2014?

Blanchet, D., Le Minez, S. (2012), Joint macro/micro evaluations of accrued-to-date pension liabilities: an application to French reforms, INSEE, 29p.

Bouillot L. and Perelman, S. (1995), Évaluation patrimoniale des droits à la pension en Belgique, *Revue Belge de la Sécurité Sociale*, n° 3-4, pp. 801-831.

Brys, Y. (2016), Supplementary table 29 - Impact van een pensioenhervorming, Federal Planning Bureau, 11p. (Internal document)

Bureau Fédéral du Plan (2009), Quotients de mortalité prospectifs par sexe et unisexes, *Working paper 18-09*, 35p.

Bureau Fédéral du Plan (2017), Perspectives démographiques 2016-2060, 43p.

Cantillion, B., Crop, M., Paeme L., Perl, G., (2002), Voorstellen tot hervormingen in het pensioenregime van de zelfstandigen. Tweede verslag van de werkgroep 'Cantillon', Brussels, February 2002.

Chambre des représentants de Belgique (2016), Ajustement des budgets des recettes et des dépenses pour l'année budgétaire 2016 : Exposé général, *Doc 54 1803/001*, 25 May 2016.

Commission de la réforme des pensions 2020-2040 (2014), Un contrat social performant et fiable – Propositions de la Commission de la réforme des pensions 2020-2040 pour une réforme structurelle des régimes des pensions – Annexe 2.2 : Les dispositions de retraite pour travailleurs indépendants, Brussels, 43p.

de Menten, G., Dekkers, G., Bryon, G., Liégeois, P., O'Donoghue, C., (2014), LIAM2: a new open source development tool for discrete-time dynamic microsimulation models, *Journal of Artificial Societies and Simulation*, 17(3)9.

Dekkers, G., Inagaki, S. Desmet R., (2012), Dynamic Microsimulation Modeling for Policy Support: An Application to Belgium and Possibilities for Japan. *Review of Socionetwork Strategies*, 6(2), pp 31-47.

Dekkers, G., Desmet, R., Fasquelle, N., Weemaes, S., (2015), The social and budgetary impacts of recent social security reform in Belgium. In Salagean, I., Lomos C., Hartung A., *"The young and the elderly at risk: Individual outcomes and contemporary policy challenges in European societies"*, Intersentia, ISBN 978-1-78068-343-0. Chapter 6.

European Commission (2006), The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050), Special Report n° 1/2006, 207p.

European Commission (2015), The 2015 Ageing report, Economic and budgetary projections for the 28 EU Member States (2013-2060), 397p.

Eurostat, EUROPOP2015 - European population projections, base year 2015.

Eurostat and ECB (2011), Technical Compilation Guide for Pension Data in National Accounts, 134p.

Federal Planning Bureau (2015), Economic Policy Committee's Ageing Working Group, Belgium Country fiche 2016: Updated version including the Belgian 2015 pension reform.

Flawinne, X. Marechal, C., Perelman, S., Tarantchenko, E. (2013), Social Security, Implicit Debt and Inequality: Learning from the Belgian Experience, *Belgisch tijdschrift voor sociale zekerheid*, p 299-327.

FPS Economy, SMEs, Self-employed and Energy, Consumer price index (CPI), Internet. Consulted 25 October 2016. (http://statbel.fgov.be/en/statistics/figures/economy/consumer_price_index)

High Council of Finances (2016), Rapport of the Study Committee on Ageing, Brussels, Federal Planning Bureau, 60p.

Institut National d'Assurances Sociales pour Travailleurs Indépendant (2016a), Rapport annuel 2015, 53p.

Institut National d'Assurances Sociales pour Travailleurs Indépendant (2016b), Cotisations sociales, Internet. Consulted 9 May 2016. (http://www.inasti.be/sites/rsvz.be/files/publication/folder_cotisations_sociales_01_2016.pdf)

Institut National d'Assurances Sociales pour Travailleurs Indépendant (2016c), Statistiques, Internet. Consulted 12 July 2016. (https://rproxy.rsvz-inasti.fgov.be/WebSta/index_nl.htm)

Institut des Comptes Nationaux (2016a), Comptes nationaux : Comptes des administrations publiques 2015, 119p.

Institut des Comptes Nationaux (2016b), Comptes nationaux : Comptes détaillés et tableaux 2015, 183p.

Janssens, J. (Federal Pensions Service), "Vragen in verband met het ambtenarenpensioen en de vroegere PDOS", (Personal communication), 7 September 2016.

Janvier, R., Janssens, J. (2014), De toekomst van de pensioenen in de overheidssector, Die Keure, Brugge, ISBN 978-90-486-0383-1, 339p.

Jousten, A., Perelman, S., Sigismondi, F. and Tarantchenko, E. (2012), Accrued Pension Rights in Belgium: Micro-Simulation of Reforms, *International Journal of Microsimulation*, 5, 2, 22-39.

Mink, R. (2008), General government pension obligations in Europe, *IFC Bulletin*, n 28.

Modart, C. (National Bank of Belgium), (Personal communication), 31 January 2017.

Office National des Pensions (2015a), Rapport annuel 2014, 88p.

Office National des Pensions (2016), Statistique annuelle des bénéficiaires de prestations 2015.

Office National de Sécurité Sociale (2016), Instructions administratives ONSS - 2016/1 Les cotisations de sécurité sociale, Internet. Consulted on 28 April 2016. (https://www.socialsecurity.be/employer/instructions/dmfa/fr/latest/instructions/socialsecuritycontributions/contributions.html)

Perelman, S. (1981), Évaluation patrimoniale des droits à la pension en Belgique, *Brussels Economic Review - Cahiers Économiques de Bruxelles*, 89, 25-52.

Presidency of the Council of the European Union (2012), Note to the Permanent Representatives Committee, "*Proposal for a Regulation of the European Parliament and of the Council on the European system of national and regional accounts in the European Union (ESA 2010)*", Interinstitutional File: 2010/0374 (COD), Brussels, 17 December, 2012.

Saeys, K. (Federal Pensions Service), "RE: Vragen in verband met het ambtenarenpensioen en de vroegere PDOS", (Personal communication), 21 October 2016.

Service des Pensions du Secteur Public (2015), Rapport annuel 2014, 92p.

Service fédéral des Pensions (2016), Consulter les statistiques des pensions des fonctionnaires, Internet. Consulted on 25 October 2016.
(http://pdos-sdpsp.fgov.be/sdpsp/statistics/statistics_1988.htm#page_bottom)

Weerts, J., "RE: Vragen in verband met het ambtenarenpensioen en de vroegere PDOS", (Personal communication), 25 October 2016.

Annexes

Annex 1: Rows 1 and 10 (columns G and H)

This annex provides details on the computation method for rows 1 and 10. The method will be illustrated on row 10, the only difference between these two rows consisting of the base year. Row 1 gives the situation at the end of 2014 whereas row 10 gives the situation one year later. The ADLs have been discounted with a discount rate of 3%.

If applicable, the simulations and computations must be computed more than once. If there are changes in entitlements due to negotiated changes in scheme structures (row 7), changes in entitlements due to revaluations (row 8) or other changes in entitlements due to changes in volume (row 9), the ADLs must be computed before and after the changes. In 2015, there was a pension reform act that increased, among other things, the retirement age. To express the impact of this measure, two simulations were run with the base year 2015 (one with and one without the pension reforming measures). The difference in ADLs is expressed in row 7.

The values for the ADLs are obtained through the MIDAS microsimulation model. For a description of the MIDAS model, see section 3.

The following table shows the ADLs as they are produced by MIDAS. An important remark here is that each MIDAS value is expressed in terms of 2011 prices. The values obtained are converted into 2015 prices by means of a revaluation coefficient based on the official health index. The price index increased between 2011 and 2015 by approximately 5.4% and the MIDAS results are adapted correspondingly.[57]

Table 18 MIDAS results in terms of prices of 2002 and 2015
Million euro

Accrued-to-date pension liabilities (MIDAS)	2011 prices	2015 prices
Future pensions (current wage earners)	682 886	720 023
Future pensions (current self-employed)	87 449	92 205
Future pensions (current civil servants)	177 360	187 005
Pensions of current pensioners	247 020	260 454
Survivors' pensions (beneficiaries with own pensions)	58 133	61 294
Survivors' pensions (beneficiaries without own pensions)	52 305	55 149
Survivors' pensions of pensioners	49 003	51 668
Total pension benefits	1 354 154	1 427 797

The categories in which MIDAS delivers the results do not correspond with the Table 29 structure. A first important step will be the transformation of the MIDAS results into this structure.

The first three results are assigned as follows to the columns of Table 29: for civil servants to column G and for wage earners and the self-employed to column H. As stated in sections 6.1 and 6.2, there exist

[57] FPS Economy, SMEs, Self-employed and Energy (2016). The index for 2011 (base year 1996) was 132.21 and evolved to 139.40 in 2015 (base year 1996).

categories of civil servants who do not longer depend on general budget for the financing of their pension scheme (public agencies with a semi-autonomous character, the police force and pension fund structures for local authorities, …). The correction for these categories of civil servants will be made at a later point.

The results corresponding to current old-age and survivors' pension benefits, however, are not subdivided in civil servants and wage earners. A pro rata distribution is applied. The distribution is based on information from i) the national accounts for the total pension benefit payments[58] and ii) the institutions managing the pension systems for the split in old-age pensions and survivors' pensions.[59]

Table 19 Pension benefits by socio-economic category and by type of pension benefit (step 1)
Million euro and percentages

Category	Pension benefit payments	Proportion old-age/ Survivors' pension benefits	Old-age pension	Survivors' pension
Civil servants	15 168,0	89%/11%	13 500,8	1 667,2
Wage earners	23 408,2	79%/21%	18 511,9	4 896,3
Self-employed	3 343,1	74%/26%	2 485,8	857,3

For each of the two types of pension benefit payments, the weight of each socio-economic category can be deduced. These weights are represented in following table.

Table 20 Pension benefits by socio-economic category and by type of pension benefit (step 2)
Percentages

Category	Old-age pension	Survivors' pension
Civil servants	39.1%	22.5%
Wage earners	53.7%	66.0%
Self-employed	7.2%	11.6%
Total	100.0%	100.0%

Table 21 represents the final step in the distribution of the MIDAS results following the Table 29 structure. The pension benefits of current pensioners are allocated to the Table 29 columns applying the weights of the old-age pensions. The three result variables on survivors' pensions are allocated applying the weights of the survivors' pensions.

Table 21 Transformation of MIDAS results into Table 29 categories
Million euro

	MIDAS	Column G (Public sector)	Column H (Wage earners)	Column H (Self-employed)
Future pensions (current wage earners)	444 813	-	444 813	-
Future pensions (current self-employed)	38 789	-	-	38 789
Future pensions (current civil servants)	72 673	72 673	-	-
Pension benefits of current pensioners	168 244	65 841	90 280	12 123
Survivors' pensions (with own pensions)	162 597	36 530	107 281	18 785
Survivors' pensions (without own pensions)	39 693	8 918	26 189	4 586
Survivors' pensions of pensioners	27 346	6 144	18 043	3 159
Total pension benefits	954 155	190 106	686 607	77 442

[58] Institut des Comptes Nationaux (2016a)
[59] Officie National des Pensions (2016) and Service des Pensions du Secteur Public (2015)

An important point to remember is that Table 29 is a combination of simulated data (pension entitlements) and data that is published in the standard notional accounts (pension benefit payments and social security contributions[60]).

Table 29 is a supplementary table in the transmission programme of national accounts. Hence, it is important to achieve consistency between this supplementary table and the standard national accounts. For this purpose, the simulated pension benefit payments of 2015 will be adjusted to match the pension benefit payments of the standard national accounts.[61] The same adjustment coefficient is then applied to the ADLs.

Thus, the simulated pension benefit payments equal the pension benefit payments of the standard national accounts, and the ADLs which are tied to pension benefit payments are now consistent with the values that are reported in the standard national accounts. The adjustment coefficients are identified for each of the three socio-economic categories: civil servants, wage earners and self-employed.

As final step, the ADLs of the socio-economic categories that belong to the social security system are grouped. This means the pension scheme for wage earners and self-employed people, but also, as discussed earlier on, the categories of civil servants who do not longer depend on the general budget for the financing of their pension schemes.

The part of ADLs that belong to this category of civil servants is estimated pro rata by means of the benefit payments that are discussed in annex 4.

Table 22 Reporting of certain categories of civil servants under social security schemes
Million euro and percentages

	Benefit payments	Percentage
Civil servants to be reported under the social security scheme	6 118.4	40.34%
Civil servants to be reported under the scheme for general government employees	9 049.6	59.66%
Total	15 168.0	100.00%

Based on this information, 40.34% of the computed ADLs for civil servants will be reported under column H as social security schemes.

Table 23 shows the final values for row 10 in Table 29.

Table 23 Final values for row 10
Million euro

	Column G + H	Column G (Public sector)	Column H (Social security)
Pension entitlements	1 556 966	231 342	1 325 624

[60] See annex 2 and 3 on how the pension contributions are deduced from the total social security contributions in the national accounts.

[61] The adjustment is based on the pension benefit payments of 2015.

Annex 2: Row 2.1 (column H)

This annex provides further details on the computation method applied for row 2.1 (Employer actual social contributions) of column H in the supplementary table 29 'Accrued-to-date pension entitlements in social insurance'.

As stated Eurostat's Technical Compilation Guide, the actual social contributions paid by employers can be found in the national accounts. What is found there is the total amount of social contributions. Only part of this is intended to finance first pillar pensions. The other part of the contributions covers sickness and invalidity, unemployment, occupational illnesses, workplace accidents, etc.

Table 24 Employers' social contributions, 2015
Million euro

Generation of income account	S1 (uses)
D121 Employers' actual social contributions	44 255.20
Paid to government	36 081.40
Paid to other sectors	8 173.80

As Table 24 shows, 44 255.2 million euro were paid during 2015 as social contributions of which 36 081.4 million euro went to general government.[62] The social contributions paid to other sectors than general government are, for example, contributions to insurance companies and pension funds. Those sectors are not part of social security and these social contributions are not recorded here.

Not all of 36 081.4 million euro was paid to the general government was paid on behalf of wage earners into the social security pension system. 2 401.5 of the 7 436.9 million euro to the account of general government was paid on behalf of civil servants whose pension system does not longer depend on the budget of the federal authorities (see section 6.2.1).[63] This means that 5 035.4 million euro was paid by general government was on behalf of wage earners.

Table 25 Social contributions as paid by employers and as received by government subsectors, 2015
Million euro

Secondary distribution of income account	S13 (resources)	S1311 (resources)	S1312 (resources)	S1313 (resources)	S1314 (resources)
D611 Employers' actual soc. contrib.	36 081.4	713.4	8.1	5.9	35 354.0
To the account of gen. government	7 436.9	458.6	8.1	5.9	6 964.3
To the account of other sectors	28 644.5	254.8	-	-	28 389.7

Together with the 28 389.7 million euro paid by the other sectors, this gives a total of 33 679.9 million euro social contributions paid on behalf of wage earners. In the remainder of this annex, the part of the pension contributions will be estimated based on these 33 679.9 million euro.

The 33 679.9 million euro include not only pension contributions, but also contributions for a series of other social risks such as sickness and invalidity, unemployment, occupational illnesses and workplace accidents. A final part of the estimation process is to estimate the proportion of pension contributions in the total social contributions.

62 Institut des Comptes Nationaux (2016a)
63 Personal communication, Modart C., National Bank of Belgium, 31 January 2017.

Since the overall financial management of the social security system was introduced in 1994, separate contribution rates for each social risk no longer exist. An exception is made for wage earners, who are only partially subject to social security contributions. Those contribution rates are based on the rates applied before 1 January 1995. Therefore, we will use this information to estimate the part of wage earners' social contributions that finances the first pillar pensions.[64] These contribution rates will allow us to estimate the pension contributions.

A remark here is that the description 'wage earners' in the national accounts is used for white-collar workers in the private sector, white-collar workers in the public sector and blue-collar workers. There are differences in the social security regulations for these socio-economic categories and hence in their contributions. As there is no information on the proportion of each category, all wage earners are assumed to be white-collar workers in the private sector. Neither the slightly different social security contributions of white-collar workers in the public sector nor the 108% rate applied to the gross salary of blue-collar workers have been considered. This might have a minor impact on the estimate.

The total social security contributions paid by a private sector employer for a white-collar worker are 24.92% of gross salary. Before 1 January 1995, 8.86% of this 24.92% financed the first pillar pensions, which corresponds to 35.55% of total social security contributions. Applying this percentage to the total 33 679.9 million euro (social security contributions paid on behalf of wage earners) results in employers' actual pension contributions of 11 974.5 million euro.

In column H, row 2.1 (Employer actual social contributions for pensions) is estimated at 14 376.0 million euro: 11 974.5 million euro on behalf of wage earners and 2 401.5 million euros on behalf of civil servants whose pension system does not longer depend on the budget of the federal authority (see section 6.2.1).

64 Office National de Sécurité Sociale (2016)

Annex 3: Row 2.3 (column H)

This annex provides further details on the computation method applied for row 2.3 (Household actual social contributions) of column H in the supplementary table 29 'Accrued-to-date pension entitlements in social insurance'.

As stated by Eurostat's Technical Compilation Guide, the actual social contributions paid by households are published in the national accounts. Since the introduction of overall financial management in the Belgian social security system in 1994, separate contributions no longer exist for each of the social risks. Therefore, what is found in the national accounts is the total amount of social contributions.

Households paid in 24 516.1 million euro of social contributions in 2015; 22 455.6 million euro of this amount was intended for the general government.[65] Only part of the total social contributions is aimed at financing first pillar pensions. The other part covers sickness and invalidity, professional illnesses, profession-linked accidents, etc.

Table 26 Social contributions as paid by households and as received by the general government, 2015
Million euro

Secondary distribution of income account	S 14 (uses)	S 13 (resources)
D613 Households' actual social contributions	24 516.1	22 455.6
D613E Actual social contributions due by wage earners		
D613EC Mandatory social contributions	18 984.6	16 924.1
D613EV Voluntarily social contributions	1.0	1.0
D613S Actual social contributions due by the self-employed		
D613SC Mandatory social contributions	3 974.9	3 974.9
D613SV Voluntarily social contributions	0.0	0.0
D613N Actual social contributions due by individuals with no professional activity		
D613NC Mandatory social contributions	1 485.1	1 485.1
D613NV Voluntarily social contributions	70.5	70.5

The 'households sector' of the national accounts is subdivided in three socio-economic categories: 'wage earners, 'self-employed' and 'no professional activity'. An important remark to make here is that the category 'wage earners' covers in fact real wage earners and the civil servants whose pension system does not longer depend on federal or regional budgets (see section 6.2.1). There is no publicly available split between these two categories.[66]

The category of 'no professional activity' is composed of retired people, unemployed people and a variety of other small categories. Again, no subdivision is publicly available.

For each of the three socio-economic categories in the national accounts, the pension contributions must be estimated based on the reported total social contributions. The estimates and assumptions made are explained below. The estimates will be done separately as the contribution rates in Belgium depend on the worker's socio-economic category.

[65] Institut des Comptes Nationaux (2016a)
[66] Personal communication, Modart C., National Bank of Belgium, 31 January 2017.

To estimate the wage earners' social contributions (wage earners in terms of the social security pension system) financing first pillar pensions, the social contributions from the civil servants must be subtracted first.

From the 16 925.1 million euro paid by 'wage earners' (national accounts definition) the 1 672.6 million euro that finance the civil servants pension scheme (see section 6.2.1) are subtracted. This leaves 15 252.5 million euro of social contributions of 'real' wage earners (i.e. without civil servants). Note here that this assumes implicitly that there were no other social contributions by civil servants than pension contributions.

The last part of this estimation process is to define the pension contributions. Since the overall financial management of the social security system was introduced in 1994, separate contributions rates for each social risk no longer exist and, hence, the national accounts no longer provide this information. To estimate the pension contributions, the old contribution rates applied prior to 1 January 1995 will be used.[67] Today, these contribution rates are still used for employees who are only partially subject to social security contributions. As there is no information on the split between white-collar and blue-collar workers, all wage earners are assumed to be white-collar workers. This might have a minor impact on the estimate.

White-collar workers were subject to a social security contribution rate of 13.07% of which 7.50% was used to finance the first pillar pensions (this corresponds to 57.38% of total contributions). By applying the proportion of 57.38% to the remaining amount, the part of the social security contributions that finances the social security scheme can be estimated at 8 752.4 million euro.

Table 27 Estimate of pension contributions by wage earners
Million euro

	2015
Actual social security contributions due from wage earners (nat. accounts' definition)	16 925.1
- Pension contributions from civil servants	- 1 672.6
= Actual social security contributions due from wage earners (social security definition)	= 15 252.5
Proportion of old contribution rates	x 7.5%/13.07%
= Estimated pension contributions due from wage earners	= 8 752.4

Estimating the pension contribution part in the social security contributions of self-employed people is slightly more complicated as the system applies different rates to different bands on the self-employed person's annual income. In 2015, the following bands and rates were used:[68]

Table 28 Social security contribution rates for the self-employed
Amounts and percentages

Income bands (euro)		2015
0.00	12 870.00	729.00 euro
12 870.00	55 576.00	22.00%
55 576.00	81 902.00	14.16%
81 902.00		0.00%

[67] Office National de Sécurité Sociale (2016)
[68] INASTI (2016b)

As with wage earners, there used to be a contribution rate for each social risk in the social security system. Since the overall financial management in the Belgian social security system was introduced in 1994, these separate contributions no longer exist. The estimate of the pension contributions will be based on the old rules. Before 1 January 1995, 8.23% of the social security contributions was intended to finance the social security pension scheme[69], independent of the total level of social contributions.

To estimate the pension contributions based on the total social contributions reported in the national accounts, we first set a lower and an upper limit.

The lower limit attributes to every self-employed person an annual income below 55 576.00 euro. In this case 8.23%/22.00% = 37.4% of total social security contributions were pension contributions, which gives 37.4% x 3 974.9 = 1 487.0 million euro.

Establishing an upper limit is less straightforward since we work with a graduated contribution system. When the annual income exceeds the limit of 55 576.00 euro, the social security contributions are a function of two contribution rates (22.00% and 14.16%), depending on the income in each income band. A higher upper limit can be calculated as 8.23%/14.16% = 58.1% of total social security contributions. This would be 58.1% x 3 974.9 = 2 310.3 million euro.

On the basis of the information in the national accounts, it is not possible to attain a more reliable estimate of self-employed pension contributions. However, a possible way to remedy this would be to use the statistics of the National Institute for the Social Security of the Self-Employed (NISSE). These statistics allow us to estimate a pension contribution based on the average annual income of the self-employed.[70]

In the past, the social security contributions from self-employed individuals were calculated on the basis of their income for the year three years earlier. As from 1 January 2015, these contributions will be calculated on the basis of the income for the year itself (2015). At the moment, however, no information is available on 2015 income since 2012 is the last available year.

The following table shows a selection of entries taken from the total table indicating how the pension contributions are estimated. Only the pension contributions are calculated (not the total social security contributions). These are calculated as 8.23% of the average income of income classes, except for the classes where the average income is lower than 12 870.00 euro. In these classes, the fixed amount is used. For the 126 401 self-employed people whose income was not communicated, the average annual income of 21 556.25 euro is used.

69 Cantillon, B. *et al.* (2002)
70 INASTI (2016c)

Table 29 Pension contributions of the self-employed - estimate
Euro

Income classes	Average income 2012	Number of self-employed per income class (end of 2015)	Pension contribution
0.00	0.00	182 401	0.00
0.01 - 2 500.00	978.33	95 357	69 515 253.00
2 500.00 - 5 000.00	3 705.11	47 416	34 566 264.00
5 000.00 - 7 500.00	6 249.70	45 766	33 363 414.00
...	...	...	...
32 500.00 - 35 000.00	33 745.57	20 677	57 425 413.52
35 000.00 - 37 500.00	36 215.87	20 318	60 559 142.04
37 500.00 - 40 000.00	38 708.81	15 279	48 674 846.03
...	...	...	...
No income communicated	-	126 401	224 245 407.08
All classes	21 556.25	1 035 469	1 653 023 803.14

The estimated pension contribution of 1 653.0 million euro falls between the lower and upper limit, defined by means of the data from the national accounts.

The 'no professional activity' category covers several inactive states: pensioners, unemployed people, etc. Part of the 1 555.6 million euro of contributions were made by retired civil servants that belong to the pension systems that are no longer depending on the budget of the federal authority. In 2015, 49.5 million euros of contributions were made by these persons.[71]

As there is no further information on the weight of each of the different inactive states, the pension contributions are estimated very roughly by using the proportion of pension contributions to the total social security contributions from wage earners. This proportion (57.38%) is applied on the social security contributions (1 555.6 - 49.5 = 1 506.1 million euro), resulting in an estimated amount of 864.3 million euro paid to finance the social security pension scheme.

The aggregate amount of the pension contributions of the different socioeconomic categories of the national accounts' households (wage earners, self-employed and 'no professional activity') adds up to a total pension contribution of 12 991.7 million euro. This amount is reported in column H, row 2.3 (Household actual social contributions for pensions).

Table 30 Estimated pension contributions to social security schemes
Euro

Socio-economic category	Pension contribution
Wage earners	8 752 415 689.56
Civil servants	1 672 556 925.00
Self-employed	1 653 023 803.14
No professional activity	864 250 191.28
Retired civil servants	49 500 000.00
Total	12 991 746 608.98

[71] Personal communication, Modart C., National Bank of Belgium, 31 January 2017.

Annex 4: Row 4 (columns G and H)

This annex provides details on the computation method applied to row 4 (Reduction in pension entitlements due to payment of pension benefits) of columns G (Government schemes for own employees) and H (Social security pension schemes) of the supplementary table 29 'Accrued-to-date pension entitlements in social insurance'.

Eurostat's Technical Compilation Guide states that the payments of pension benefits can be found in the general government accounts (national accounts).[72] Table 31 also includes the pension benefits from two pension fund structures of local public authorities[73] and pension benefits for civil servants who worked in the former colonies[74].

The following table indicates which pension benefits are retained and which are not and whether these are public service pension benefits (column G) or social security pension benefits (column H).

Column H also contains a few social security schemes that were once created by federal or regional authorities, but are no longer financed through public budget.

Table 31 Pension benefits 2015
Million euro

	2015	Column G	Column H	Remark
Employees	23 071.7	-	OK	
Self-employed	3 343.1	-	OK	
Service for Overseas Social Security	336.5	-	OK	
Widow's and orphan's fund	1 156.9	-	OK	Civil servants pension payments that must be reported under the social security schemes. See sections 6.1 and 6.2.
Pensions of public agencies	440.4	-	OK	
Municipal pensions (municipal pensions and pensions from provincial and local government - Pool I and II)	2 254.5	-	OK	
Statutory staff of the Post Office	648.0	-	OK	
Pension fund of the integrated police	145.3	-	OK	
Statutory staff of Belgacom	383.7	-	OK	
Statutory staff of the SNCB group	1 029.6	-	OK	
Statutory staff of other public enterprises	60.0	-	OK	
Retirement pension and survival pension	8 942.6	OK	-	
Early retirements (*mise en disponibilité*: military and teaching profession)	220.8	-	-	Not a pension benefit for Table 29
Other social insurance benefits of pension funds D622 (S1312 - Communities and regions)	56.8	OK	-	
Other social insurance benefits of pension funds D622 (S1313 - Local government	6.7	OK	-	
Old expats in Africa	43.5	OK		
	42 140.1	9 049.6	32 869.7	Excluded: 220.8

72 Institut des Comptes Nationaux (2016a)
73 Institut des Comptes Nationaux (2016b)
74 Service fédéral des Pensions (2016)

Concerning 2015, 9 049.6 million euro have been paid to the beneficiaries of the government pension scheme for its own employees (column G), whereas 32 869.7 million euro have been paid to the affiliates of the social security pension schemes (column H).

Annex 5: Columns G and H of supplementary table 29

Table 32 Columns G and H of supplementary table 29
Euro

Code	Row n°		DB scheme for general government employees - Classified in general government G	Social security pension scheme H
		Opening balance sheet		
XAF63LS	1	Pension entitlements	242 708 988 793	1 374 754 662 980
		Changes in pension entitlements due to transactions		
XD61p	2	Increase in pension entitlements due to social contributions	7 294 880 711	68 610 361 378
XD6111	2.1	Employer actual social contributions	0	14 375 974 880
XD6121	2.2	Employer imputed social contributions	13 611 047	
XD6131	2.3	Household actual social contributions	0	12 991 746 609
XD6141	2.4	Household social contribution supplements	7 281 269 664	41 242 639 889
XD6151	2.5	Pension scheme service charges	0	0
XD619	3	Other (actuarial) change of pension entitlements in social security pension schemes		-27 301 087 896
XD62p	4	Reduction in pension entitlements due to payment of pension benefits	9 049 600 000	32 869 700 000
XD8	5	Changes in pension entitlements due to social contributions and pension benefits	-1 754 719 289	8 439 573 482
XD81	6	Transfers of pension entitlements between schemes	354 506 000	-380 819 000
XD82	7	Change in entitlements due to negotiated changes in scheme structure	-9 966 519 017	-57 189 541 535
		Changes in pension entitlements due to other flows		
XK7	8	Changes in entitlements due to revaluations	0	0
XK5	9	Changes in entitlements due to other changes in volume	0	0
		Closing balance sheet		
XAF63LE	10	Pension entitlements	231 342 256 486	1 325 623 875 927

Annex 6: Sensitivity analysis (discount rate -1%)

Table 33 Sensitivity analysis (discount rate -1%)
Euro

Code	Row n°		DB scheme for general government employees - Classified in general government G	Social security pension scheme H
		Opening balance sheet		
XAF63LS	1	Pension entitlements	306 660 540 367	1 826 482 464 595
		Changes in pension entitlements due to transactions		
XD61p	2	Increase in pension entitlements due to social contributions	6 282 840 086	63 897 370 781
XD6111	2.1	Employer actual social contributions	0	14 375 974 880
XD6121	2.2	Employer imputed social contributions	149 629 279	
XD6131	2.3	Household actual social contributions	0	12 991 746 609
XD6141	2.4	Household social contribution supplements	6 133 210 807	36 529 649 292
XD6151	2.5	Pension scheme service charges	0	0
XD619	3	Other (actuarial) change of pension entitlements in social security pension schemes		-27 414 484 624
XD62p	4	Reduction in pension entitlements due to payment of pension benefits	9 049 600 000	32 869 700 000
XD8	5	Changes in pension entitlements due to social contributions and pension benefits	-2 766 759 914	3 613 186 156
XD81	6	Transfers of pension entitlements between schemes	354 506 000	-380 819 000
XD82	7	Change in entitlements due to negotiated changes in scheme structure	-14 182 045 274	-78 933 504 461
		Changes in pension entitlements due to other flows		
XK7	8	Changes in entitlements due to revaluations	0	0
XK5	9	Changes in entitlements due to other changes in volume	0	0
		Closing balance sheet		
XAF63LE	10	Pension entitlements	290 066 241 179	1 750 781 327 291

Annex 7: Sensitivity analysis (discount rate +1%)

Table 34 Sensitivity analysis (discount rate +1%)
Euro

Code	Row n°		DB scheme for general government employees - Classified in general government G	Social security pension scheme H
		Opening balance sheet		
XAF63LS	1	Pension entitlements	197 776 860 734	1 069 305 865 716
		Changes in pension entitlements due to transactions		
XD61p	2	Increase in pension entitlements due to social contributions	7 830 981 554	70 139 956 117
XD6111	2.1	Employer actual social contributions		14 375 974 880
XD6121	2.2	Employer imputed social contributions	-80 092 875	
XD6131	2.3	Household actual social contributions	0	12 991 746 609
XD6141	2.4	Household social contribution supplements	7 911 074 429	42 772 234 629
XD6151	2.5	Pension scheme service charges	0	0
XD619	3	Other (actuarial) change of pension entitlements in social security pension schemes		-27 222 831 818
XD62p	4	Reduction in pension entitlements due to payment of pension benefits	9 049 600 000	32 869 700 000
XD8	5	Changes in pension entitlements due to social contributions and pension benefits	-1 218 618 446	10 047 424 299
XD81	6	Transfers of pension entitlements between schemes	354 506 000	-380 819 000
XD82	7	Change in entitlements due to negotiated changes in scheme structure	-7 148 916 727	-42 422 768 164
		Changes in pension entitlements due to other flows		
XK7	8	Changes in entitlements due to revaluations	0	0
XK5	9	Changes in entitlements due to other changes in volume	0	0
		Closing balance sheet		
XAF63LE	10	Pension entitlements	189 763 831 562	1 036 549 702 851

Annex 8: Pension fact sheet: public sector pensions

1. General description of the scheme and the computation model

a. Coverage of the scheme and classification in Table 29 of the transmission programme

Column G covers the public sector pension scheme. This scheme consists of the old-age pension, the survivor's pension, and the disability pension. However, the disability pension is not included here. The pension expenditures for civil servants counts as 37% of total first pillar pension expenditures.

Column G does not include the ADLs of the civil servants whose pension scheme does not longer depend on the budget of the federal government. These values are reported under the social security schemes.

b. Institutional set up

Data is used from the Datawarehouse marché du travail et protection sociale of the Crossroads Bank for Social Security. It contains a little more than 600 000 representative individuals, with retrospective data that is complete for wage earners and only partial for civil servants and self-employed workers. The dataset is enriched with information from the 2011 population census and a dataset containing fiscal information.

The institution responsible for Table 29 is the National Accounts Institute of Belgium. It has entrusted the National Bank of Belgium and the Federal Planning Bureau, with the completion of the supplementary table. Column H a responsibility of the latter.

c. Major formulas: benefit formula; indexation of benefits

The retirement pension is calculated on the average wage of the last ten years of work (five years for people born before 1962) and is proportional to the career, with the considered service years in the numerator and a *tantième* of 60 in the denominator. Some civil servants have a preferential denominator (55 in teaching and 48 years for magistrates and in academic services).

Civil servants can be granted a minimum pension, which is a fixed amount, provided they have 20 years of service. The Federal Planning Bureau opt for a strict application of this minimum criterium and does not allow for a pro rata recognition.

The pension benefit is also subject to a relative maximum of 75% of the reference wage and pensions are capped to an absolute maximum pension, which is a fixed amount.

Civil servants' pensions are automatically adjusted to the health index and to the real wage increases of the active civil servants (the *péréquation*).

d. Type and structure of the computation model

MIDAS is a microsimulation model, meaning that it models on the level of individuals grouped in households rather than on aggregate data. It is also a dynamic population model with dynamic cross-

sectional ageing. This means that it is based on a cross-sectional dataset representing a population of all ages at a certain point in time.

2. Assumptions and methodologies applied

a. Discount rate

A discount rate of 3% in real terms is used.

b. Wage growth

Future wage growth is not taken into account for Table 29 purposes. Wage evolution is halted at the end of the base year. An ABO approach is followed.

c. Valuation method: ABO/PBO

ABO

3. Data used to run the model

a. Mortality tables

MIDAS uses EUROPOP2015 data in the projections used for table 29.

b. Entitlement statistics; other relevant statistics

The entitlement statistics are taken from the 2015 national accounts (government accounts).

4. Reforms incorporated in the model

The Act of 10 August 2015 *"aimed at raising the legal retirement age, conditions for the early retirement pension and the minimum age for the survivor's pension"*. The reforms that have an impact on the benefits covered by Table 29 are considered: i) the statutory retirement age will increase from 65 to 66 by 2025 and further to 67 by 2030 and ii) the minimum age to be granted a survivor's pension will be gradually raised from 45 to 55 by 2030.

5. Specific assumptions

a. How are careers modelled?

Future career evolution is projected by MIDAS. However, halting the constitution of pension rights at the end of the base year annuls any effect of career evolution on the ADLs.

b. How are survivors' pensions calculated?

Deaths are simulated through MIDAS' demographic module. If an (ex-)civil servant dies, the surviving partner becomes eligible for a survivor's pension. If the surviving partner has reached a minimum age, she/he will receive the survivors' pension. If she/he is younger than this minimum age, she/he will not

receive a survivor's pension but a transitional benefit. The age condition was 45 for the 2015 and will gradually increase to 55 by 2030.

A divorced spouse can also be entitled to a survivor's pension under certain conditions. These conditions will not be discussed here. The minimum age condition plays a similar role in these situations. This age condition was also 45 for the 2015 and will gradually increase to 55 in 2030.

c. How is the retirement age modelled over time?

The statutory retirement age in Belgium is currently 65 (both men and women and all pension schemes). In 2015, a pension reform act was passed in parliament. The statutory retirement age will increase from 65 to 66 by 2025 and to 67 by 2030. The minimum age to be granted a survivor's pension will be gradually raised from 45 to 55 by 2030.

d. Other specific features of the model

6. Links to (national) publications providing further information on the pension schemes

For old-age pensions for public sector workers (French):
http://pdos-sdpsp.fgov.be/sdpsp/pdf/publications/retirement_pension_201609.pdf

For survivor's pensions (French):
http://pdos-sdpsp.fgov.be/sdpsp/pdf/publications/survival_pension_201609.pdf?version=20161108

Annex 9: Pension fact sheet: social security pension schemes

1. General description of the scheme and the calculation model

a. Coverage of the scheme and classification in Table 29 of the transmission programme

Column H covers the social security pension schemes for both wage earners and the self-employed. Both pension schemes consist of an old-age pension and a survivors' pension. The column also includes the ADLs of the civil servants whose pension scheme does not longer depend on the budget of the federal government.

Of the total pension expenditure on first pillar pensions, 55% is on wage earners and 8% on self-employed individuals.

b. Institutional set up

Data is used from the Datawarehouse marché du travail et protection sociale of the Crossroads Bank for Social Security. It contains a little more than 600 000 representative individuals, with retrospective data that is complete for wage earners and only partial for civil servants and self-employed workers. The dataset is enriched with information from the 2011 population census and a dataset containing fiscal information.

The institution responsible for Table 29 is the National Accounts Institute of Belgium. It has entrusted the National Bank of Belgium and the Federal Planning Bureau, with the completion of the supplementary table. Column H a responsibility of the latter.

c. Major formulas: benefit formula; indexation of benefits

Wage earners

The pension of wage earners is computed at 75% of the reference wage for the head of household with a dependent spouse and 60% in all other cases. The reference wage is calculated on the wages actually earned during the career up to a wage ceiling. These wages are adjusted to current prices. The sum of those adjusted wages over the career is multiplied by 1/45 (a full career is 45 years).

A guaranteed minimum pension exists for the pensions accrued over a career which equals at least two thirds of a full career in the wage earners' scheme. A minimum right per working year also exists if some conditions are met. The Federal Planning Bureau opt for a strict application of these minimum criteria and does not allow for a pro rata recognition of these minimum provisions. Besides these two minimum pension rights, retirement pensions are also subject to a maximum pension.

Pension benefits are automatically adjusted to the health index and partially adjusted to living standards according to the 'Generation Pact'.

Self-employed individuals

The pension of self-employed individuals is computed at 75% of the reference wage for the head of household with a dependent spouse and 60% in all other cases. The working years before 1984 are valued at a fixed income, while for the working years as from 1984 the pension right is based on the business income used to compute social security contributions and income tax, up to an income ceiling. The income is adjusted to current prices.

The pension is capped to a maximum pension and a minimum pension can be granted when the person can prove at least two thirds of a full career as a self-employed individual and/or wage earner. The Federal Planning Bureau opt for a strict application of this minimum criterium and does not allow for a pro rata recognition.

Pension benefits are automatically adjusted to the health index and partially adjusted to living standards according to the 'Generation Pact'.

d. Type and structure of the calculation model

MIDAS is a microsimulation model, meaning that it models on the level of individuals grouped in households rather than on aggregate data. It is also a dynamic population model with dynamic cross-sectional ageing. This means that it is based on a cross-sectional dataset representing a population of all ages at a certain point in time.

2. Assumptions and methodologies applied

a. Discount rate

A discount rate of 3% in real terms is used.

b. Wage growth

Future wage growth is not taken into account for Table 29 purposes. Wage evolution is halted at the end of the base year. An ABO approach is followed.

c. Valuation method: ABO/PBO

ABO

3. Data used to run the model

a. Mortality tables

MIDAS uses EUROPOP2015 data in the projections used for table 29.

b. Entitlements statistics; other relevant statistics

The entitlements statistics are taken from the 2015 national accounts (government accounts).

4. Reforms incorporated in the model

The Act of 10 August 2015 "*aimed at raising the legal retirement age, conditions for the early retirement pension and the minimum age for the survivor's pension*". The reforms that have an impact on the benefits covered by Table 29 are considered: i) the statutory retirement age will increase from 65 to 66 by 2025 and further to 67 by 2030 and ii) the minimum age to be granted a survivor's pension will be gradually raised from 45 to 55 by 2030.

5. Specific assumptions

a. How are careers modelled?

Future career evolution is projected by MIDAS. However, halting the constitution of pension rights at the end of the base year annuls any effect of career evolution on the ADLs.

b. How are survivors' pensions calculated?

Wage-earners

The rules on survivors' pensions were changed in 2015. After the death of the spouse who either earned a wage or received a replacement income (pension included) in the wage earners' scheme, the surviving spouse is entitled to a survivor's pension if some conditions are met. The most important is the minimum age. If the surviving partner has reached a minimum age, she/he will receive the survivor's pension. If she/he is younger than this minimum age, she/ he will not receive a survivor's pension but a transitional benefit. The age condition was 45 for the year 2015 and will be gradually increased to 55 by 2030.

A survivor's pension is calculated as 80% of the deceased person's retirement pension, computed at the family rate (which means 80% of 75%, or 60% of the reference wage), or, if he was still working, at 80% of the retirement pension she/he would have had, should she/he have worked until the age of 65.

Self-employed individuals

In this system, the rules on survivors' pensions were also changed in 2015. After the death of the spouse who was self-employed, the surviving spouse is entitled to a survivor's pension if some conditions are met. The most important is the minimum age. If the surviving partner has reached a minimum age, she/he will receive a survivor's pension. If she/he is younger than this minimum age, she/he will not receive a survivor's pension but a transitional benefit. The age condition was 45 for the year 2015 and will be gradually increased to 55 by 2030.

The calculation takes into account the career of the deceased person and his/her business income.

c. How is the retirement age modelled over time?

The statutory retirement age in Belgium is currently 65 (both men and women and all pension schemes). In 2015, a pension reform act was passed in parliament. The statutory retirement age will increase from

65 to 66 by 2025 and further to 67 by 2030. The minimum age to be granted a survivor's pension will be gradually increased from 45 to 55 by 2030.

d. Other specific features of the model

6. Links to (national) publications providing further information on pension schemes

Institution managing the pension schemes for wage-earners: (French):
http://www.onprvp.fgov.be/FR/profes/calculation/Pages/default.aspx

Institution managing the pension schemes for the self-employed: (English):
http://www.nisse.be/en?_ga=1.53618988.562573872.1479120952