REGERINGSKANSLIET

Swedish pension fiche prepared for the AWG projections for age-related public expenditure 2015

The pension system and pension projections until 2060

1 An overview of the pension system

> The Swedish public old-age pension system consists of an earnings-related component based on notional accounts, a private mandatory defined contribution system and a pension-income-tested minimum top-up, the guarantee pension. Most employees are covered by occupational pension plans. The possibility to make tax-deductions for private pension savings will be reduced in 2015 and abolished in 2016.

1.1 The Swedish public pension system

The reformed Swedish public old-age pension system was fully implemented in 2003. The reformed earnings-related old-age pension system consists of a notionally defined contribution (NDC) PAYG component and a fully funded, defined contribution (DC) pension system[1]. Both are based on lifetime earnings and individual accounts. In addition, there is a pension-income-tested top up, the guarantee pension, which is financed with general taxes from the central government budget. The same rules apply to all persons regardless of occupational sector and for employees and self-employed alike.

The old Swedish pension system consisted of a flat-rate pension provided in full to everyone with at least 40 years of residence in Sweden

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[1] The latter part is classified as a private pension in National Accounts terms.

between the ages of 16 and 65. Further, it included an earnings-related pay-as-you-go (PAYG) component providing a benefit based on 60 per cent of an average of the contributors best 15 years of earnings, with 30 years required to receive a full benefit.

The reformed system covers individuals born 1938 and later, with transition rules for persons born 1938-1953. Given the actual pension pattern, the last cohorts with pension rights in the old system will retire around 2020. As a result, it will take a couple of decades until all beneficiaries have all of their benefits calculated according to the reformed rules.

Table 1 – Statutory retirement age, earliest retirement age and penalties for early retirement

Men and women		2013	2020	2030	2040	2050	2060
- with 20 contribution years	Statutory retirement age	Does not exist					
	Earliest retirement age (Guarantee pension)	61 (65)	61 (65)	61 (65)	61 (65)	61 (65)	61 (65)
	Penalty in case of earliest retirement age	Benefit actuarially calculated					
- with 40 contribution years	Statutory retirement age	Does not exist					
	Earliest retirement age (Guarantee pension)	61 (65)	61 (65)	61 (65)	61 (65)	61 (65)	61 (65)
	Penalty in case of earliest retirement age	Benefit actuarially calculated					
Note: Transitional rules apply for individuals born before 1953.							

Source: Ministry of Finance

Pension rights are credited to the individual accounts for 18.5 percent of the annual pensionable income up to the pension ceiling amounting to 8.07 income base amounts.[2] 16 percentage points are paid to the NDC PAYG system and 2.5 percentage points to the funded DC system. The insured person pays a pension contribution amounting to 7 percent of the gross pensionable income, and the employer 10.21 per cent.[3] Contributions over the pension ceiling is transferred to the central government budget as general tax and have no connection to the income-based pension system. Contributions are also paid by the central government to cover pension entitlements credited for income

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[2] The income base amount 2014 was SEK 56 900 and is indexed yearly with change of average earnings. The public pension ceiling in 2014 was SEK 459 200 or approx. EUR 49 100.

[3] The explanation to that 7% plus 10,21% sum up to 18.5% is that the contribution is calculated on earnings net the employee contribution, i.e. $(0.07+0.1021)/(1-0.07) = 0.185$

replacement social insurances, e.g. for unemployment, sickness, disability or parental leave.

The retirement age is flexible and individuals can claim benefits from the age of 61 without any upper limit. Under the Employment Protection Act, an employee is entitled to stay in employment until his/her 67th birthday.

The DC PAYG system

The NDC PAYG pension system works on an actuarial basis. At the time of retirement an annuity is calculated by dividing the individual's account value by a divisor reflecting unisex life expectancy at the specific date of retirement.[4] The individual can counteract the negative effect on the annuity caused by increasing life expectancy by postponing the date of retirement. Hence, incentives are strong to prolong the working career. If for example an individual born in 1946 delays the retirement from 65 to 67 the annuity divisor decreases from 16.31 to 15.16 and the NDC pension consequently increases with 7.6 %.

The PAYG-pensions in payment are on average indexed by wages, but are front-loaded in the sense that pensioners receive a share of the real economic growth in advance. The NDC savings is as a primary rule indexed by the average rate of growth of earnings per contributor. In case of financial sustainability problems though, the automatic balancing mechanism is activated and the indexation will be reduced until stability is restored. This guarantees that the system will be able to finance its obligations with a fixed contribution rate and fixed rules regardless of the demographic or economic development.[5] The balancing indexation was activated for the first time in 2010 because of the financial crisis in 2008. The balancing is expected to stay in effect until 2017 according to recent budget forecast from the Swedish Pension agency.[6]

Non-earnings-related minimum pensions and basic security

The pension-income-tested top-up, the *Guarantee pension*, is financed by general tax revenues. The benefit is proportionally reduced if the number of residence years in Sweden falls short of 40. The guarantee pension, together with the means-tested housing supplement for pensioners (BTP), is higher than the minimum income standard in the system for social assistance. All forms of basic security benefits for the elderly can

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[4] The gender-neutral annuity divisors in the NDC system result in about 8% higher pension for women (at age 65) compared to a system based on sex specific life expectancy.

[5] The activation of the balancing mechanism is based on the pension system annual reports that are published by the Swedish Pensions Agency. See annex 2 for more details. In the model calculations the balancing mechanism is activated until 2019, and then it is switched off.

[6] More details about the automatic balancing can be found in annex 2.

only be received from the age of 65. The guarantee pension is price indexed and fully taxed.[7]

The guarantee pension is means-tested against public pension income and survivor benefits, but not against work income etc. For low incomes, the benefit is reduced krona by krona, and for higher incomes, the benefit is reduced by 48 per cent. The annual benefit amounts to a maximum of 2.13 price base amounts (PBA) (EUR 10 100 year 2014) for single households, and 1.90 PBA:s per person (EUR 9 000 year 2014) for cohabitants.[8] The guarantee pension is fully phased out when the income pension reaches 3.07 PBA:s for single households and 2.72 PBA:s for cohabitants.

Formally outside the old-age pension system, but de facto closely interlinked[9], there is the tax-free means tested *Housing supplement for pensioners* (BTP).[10] There is also a *Special housing supplement* (SBTP) for pensioners with low income and high housing costs. Finally, there is a tax-free means-tested program, *Maintenance support for the elderly (ÄFS)*, which ensure that pensioners with very low income, usually immigrants with few years of residence in Sweden, do not become dependent on social assistance. The size depends on household income and housing costs, but is by design always higher than the social assistance benefit.

Early retirement, disability and survivor's pension

It is possible to retire at the age of 61 in the reformed pension system, but the loss is twofold for the individual. First, the benefit is based on lifetime contributions, which implies that all years with earnings will increase the benefit. Second, the level of the benefit is calculated using the cohort-specific life expectancy at the date of retirement. Hence, leaving early implies both a lower (notional) pension capital and a longer period of payment, and therefore the annual benefit will be lower compared with a later retirement age. Regardless of the flexibility in the reformed pension system there is a strong tendency to claim public pension at age 65, which was the norm in the old system. However, to claim pension is not the same as leaving the labour market. In 2013 the average age for withdrawal from the labour market was estimated to 63.6 years, which is the highest age since the beginning of the 1980:ies.[11]

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[7] In the AWG projections income indexation is assumed from the end of the medium-term projection period 2019 for all transfers and taxes regardless if legislation states otherwise.

[8] The price base amount 2014 is SEK 44 400, and is indexed by the change of the consumer price index (EURO amounts calculated on an exchange rate of 9.35 SEK per EURO).

[9] Common thresholds, common administration etc.

[10] BTP amounts to maximum 93% of housing costs up to SEK 5 000 a month (EUR 580) for single persons and SEK 2500 (EUR 290) for couples.

[11] Average age for persons leaving the work force, working at age 50, including disability pensioners. The average age for withdrawal of public pension was 64.5 years in 2013 (cf. 64.7 years in 2010). Source: The Swedish Pensions Agency.

The reformed pension system is individual-based. The previous widow's pension (women only) has been replaced by a new, temporary and gender-neutral, so-called adjustment allowance. However, due to the long phase out period, widow's pensions will continue to be paid out for several decades. In the reformed system, a survivor will receive an adjustment allowance for 12 months as a standard, but the payments continue as long as the survivor has children younger than 12 years. The size of the adjustment allowance, as well as the widow's pension, is based on the deceased's earnings.

Disability benefits, which are equivalent to disability pensions in most European countries, are formally a part of the sickness insurance scheme. Individuals with disability benefits continue to accumulate pension entitlements in the public pension system. The contributions are paid by the central government budget. Public old-age pension benefits for disabled persons are based on lifetime earnings, just as for everyone else.[12]

Occupational pensions

The absolute majority of all employees, both in the public and the private sector, are covered by semi-mandatory occupational pension plans based on collective agreements between the unions and the employers' confederations. These occupational pension schemes, financed through employers' contributions, provide a supplement to the public system, and a top-up for incomes above the public pension system ceiling. Thus, these schemes are most important for high-income earners. There are four major occupational plans: blue-collar workers in the private sector, white-collar workers in the private sector, central government employees and local government employees.[13]

Private individual pensions

Mandatory private premium pension
The public system also consists of a private mandatory fully funded defined-contribution part, the *Premium pension*.[14] The system is administered by the state and financed by a contribution rate of 2.5% of pensionable earnings, following the same transition rules as the PAYG system. Individuals can choose from a large number of mutual funds when investing their capital. A government run default fund caters for people who do not make an active choice. The individual mutual funds

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[12] Survivors as well as disability pensions are income indexed in the AWG calculations.

[13] The occupational systems have been renegotiated in order to harmonize with the reformed public pension system, towards more defined contribution and less defined benefit. As in the public system, there are long transitional periods. The AWG calculations only cover negotiated pensions paid out as a supplement to public pensions, and not other types of negotiated cessation compensation, etc. paid out before the age of 65.

[14] In 2007 the premium pension was reclassified from general government to the private sector, which reduced general government net lending by approximately 1 percent of GDP.

earn a market rate of return. At retirement, at any age from 61 years, individuals can choose a fixed or variable annuity, in part or in full.

Voluntary private pensions
It is also possible to make tax-deductions for private pension saving, something that is especially important for self-employed who are not covered by an occupational pension plan. The maximum yearly deduction allowed is SEK 12 000 (EUR 1 280), which will be reduced to SEK 1 800 (EUR 260) in 2015 and abolished altogether in 2016. For self-employed not eligible to occupational saving plans, deductions will be allowed even after 2016.[15] In 2011 approximately 38 per cent of the population 20-64 years old made tax-deductions for private pension savings, on average SEK 5 600 (EUR 600) and in total SEK 11 400 billion (EUR 1 120 billion).

Tax status

Old-age (including guarantee pension), disability and survivors pension, is subject to income tax (but not payroll taxes). The means-tested basic security allowances (BTP, SBTP and ÄFS) are tax-free. Private tax-deductible pension savings, as well as funded occupational pensions are taxed ETT (contributions Exempt, returns Taxed, benefits Taxed). The mandatory premium pension is taxed EET.

1.2   Recent reforms of the public pension system included in the projections

Old-age pensions

There have been no major reforms of the old age pension system since 2003, except for minor modifications in the formula for the calculation of the balancing index. Triggered by the 2008 financial crisis it was decided to smooth the value of the buffer funds in the formula, in order to make the balancing index fluctuate less. This change only affects the system in the short run, and not at all when the automatic balancing is not activated.[16]

A number of aspects of the Swedish pension system are currently being considered, but no concrete reforms have been proposed to Parliament so far. A recent government inquiry, The Pension Age Committee, had several proposals on pension-related age limits and ways to promote a longer working life.[17] Other aspects of the pension system that are being

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[15] 12 000 SEK plus 35 percent of business income not exceeding 10 PBA:s.
[16] For more information about the automatic balancing mechanism, see annex 2.
[17] SOU 2013:25, see http://www.regeringen.se/sb/d/16827/a/214148. The report is in Swedish but contains a summary in English (page 39-56).

considered are the administration of the pension funds and improvements in the DC Premium pension system.

Disability pension

The disability pension system has recently been reviewed in order to control costs. The changes primarily entail stricter eligibility conditions that require permanent reduction of the ability to work, thus reducing the inflow of retirees. Already granted benefits remain the same, with the exception of the temporary disability pension that has been abolished. For the individuals that still get disability pension the same rules as previously apply, and the level the benefit remains the same.

Private tax-deductible pension savings

The tax-deductibility of private voluntary pension savings will be abolished from 2016, taking away the incentives for this type of savings in the future. In the calculations, new contributions will be stopped from 2016, but pension payments will be substantial for several decades.

Other reforms affecting pensioners

In order to support in particular low-income pensioners, a new special basic tax deduction for individuals 65+ was introduced in 2009, and then increased in several steps.[18] In addition, the Earned Income Tax Credit (EITC) that was introduced in 2007 makes work pay better for everyone, especially pensioners. For individuals 65+ the EITC is approximately doubled, giving a strong incentive for the elderly to prolong their working lives. Social contributions (31.42% of earnings in 2013) have been reduced for individuals 65+, so that they only pay the old age pension contribution (10.21% of their earnings).

1.3 Description of the actual "constant policy" assumptions used in the projection

All types of pensions, benefits and thresholds in the pension and tax systems are income indexed from 2019 in the calculations, regardless if legislation states otherwise (e.g. guarantee pension, BTP, SBPT and ÄFS are price indexed by law).[19]

There is a broad majority in the parliament in the so-called pension group, which is responsible for the maintenance of the pension reform. Any change in the reform, the pension agreement, requires consensus within the pension group. This means that it is easier for the government to help low-

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[18] The SESIM model has been updated with the tax reforms until 2014, thus net pensions will be somewhat underestimated.
[19] By law some thresholds in these systems are not indexed at all.

income pensioners outside the pension system. Hence, the price indexation of the guarantee pension has not been changed since the system was implemented in 2003. Instead, the enhanced basic tax deduction and the BTP, which are outside the pension agreement, have been made more generous. The income indexation of the minimum pension in the AWG calculations might therefore be too cautious, while a price indexation probably would be too restrictive.

2 An overview of the Demographic and labour forces projections

Demographic development

The Swedish population is expected to increase rapidly from 9.6 million in 2013 to a bit more than 13 million in 2060 in the Europop 2013, or by some 36.3 percent, see table 2. The population increase is mainly driven by a strong positive net migration. Of a total population increase of a bit more than 3.4 million people between 2013 and 2060, some 2.2 million or 64 percent is explained by a positive migration, and the remaining 1.2 million or 36 percent by a birth surplus.

Table 2 – Main demographic variables evolution

	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	9600	10182	11037	11774	12479	13082	2060
Population growth rate	0,9	0,9	0,7	0,6	0,5	0,4	2021
Old-age dependency ratio (pop65/pop15-64)	30,2	33,1	35,7	37,4	37,6	41,5	2060
Ageing of the aged (pop80+/pop65+)	26,9	25,8	33,5	34,0	37,8	36,8	2054
Men - Life expectancy at birth	80,1	81,0	82,2	83,4	84,5	85,6	2060
Men - Life expectancy at 65	18,6	19,2	20,1	21,0	21,9	22,7	2060
Women - Life expectancy at birth	83,6	84,5	85,8	87,0	88,1	89,2	2060
Women - Life expectancy at 65	21,1	21,8	22,8	23,8	24,7	25,6	2060
Men - Survivor rate at 65+	89,4	90,4	91,6	92,7	93,6	94,4	2060
Men - Survivor rate at 80+	62,0	65,1	69,2	72,9	76,2	79,1	2060
Women - Survivor rate at 65+	92,9	93,6	94,5	95,2	95,9	96,4	2060
Women - Survivor rate at 80+	73,0	75,7	79,2	82,1	84,7	87,0	2060
Net migration	65,8	55,3	56,0	49,1	34,7	31,2	2013
Net migration over population change	0,8	0,6	0,7	0,7	0,5	0,6	2013

Source: EUROSTAT and Commission Services

Note: The * column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2013 to 2060.

Life expectancy at birth is expected to increase by 5.5 years for both sexes from 2013 to 2060, from 80.1 years for men and 83.6 years for women, to 85.6 and 89.2 years respectively. The bulk of the increase in

life expectancy occurs above the age of 65. Life expectancy for 65-year-olds, which determines the pension benefit in the reformed pension system, increases by 4.1 years for men and 4.5 years for women.

Strong immigration and rapid population growth make the old-age dependency ratio increase at a slower rate than in previous AWG projections. Nevertheless, the number of people 65 years and older per persons in the ages 15 to 64 years old increases from 30.2% in 2013 to 41.5% in 2060. In table 2 2060 is the peak year for the old age dependency ratio, but in the demographic projection this ratio will continue to rise, indicating continued cost increases in the years after 2060.

The Age pyramid in graph 1 illustrates the increase of the population 65 years and older. While some 4.9 percent of the population was 80 years or older in 2013, and some 19.4 percent 65 years and older, the same numbers are 8.2 percent and 24.2 percent in 2060. The share of the population in ages 20–64 years falls from 57.9 percent to 52.6 percent in the same period of time.

Graph 1: Age pyramid comparison: 2013 vs 2060
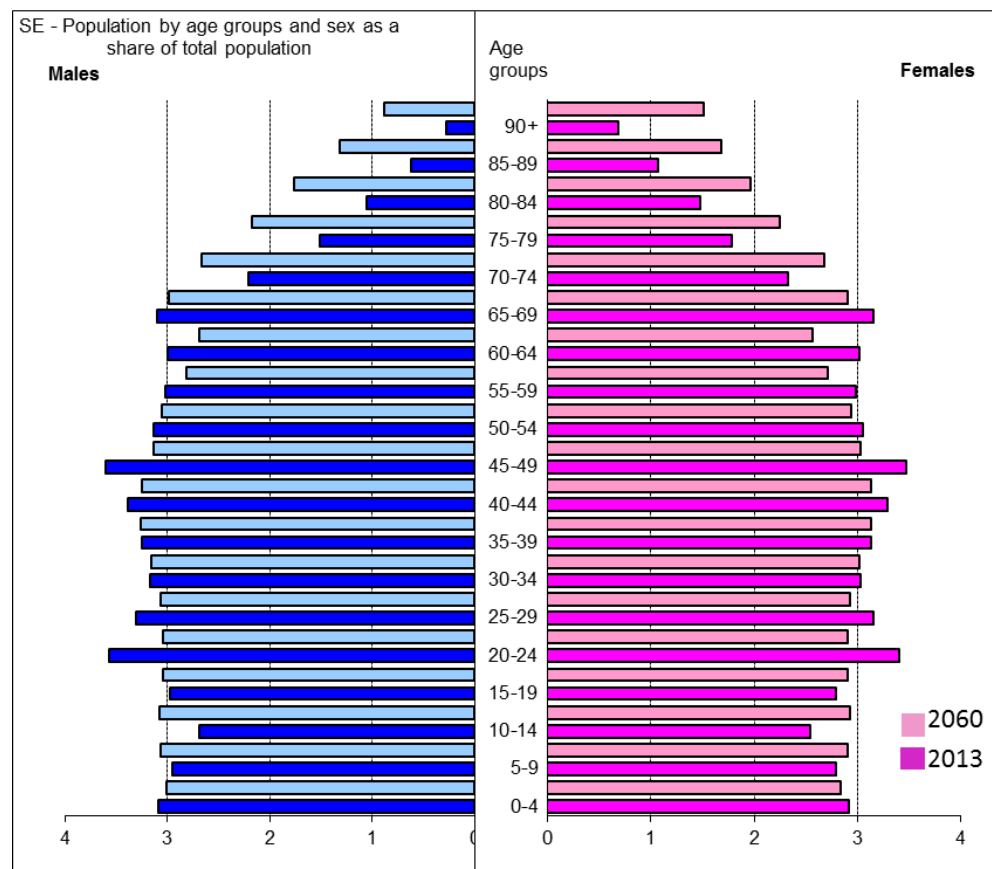
Labour force

Table 3 shows the change in participation and employment rates in the age groups, 55 to 74 years, that are most influenced by financial incentives to stay on in the labour force. Labour force participation and employment rates are projected to increase somewhat for older workers. The increase will continue until 2047, when a small decrease is expected. The moderate development is mainly the effect of the age structure of the labour force. The pension age is not regulated in the Swedish pension system, and existing financial incentives, the fact that the benefit is reduced as life expectancy at the time of retirement increases, is not assumed to have any effect on the labour supply in these calculations.

The entry age is expected to increase for both sexes, see table 4a and 4b. The growth is concentrated to the period 2013-2020, thereafter the entry age is constant for both sexes. As the average effective exit ages even decreases slightly between 2013 and 2020, the projected working career for both men and women will be somewhat shorter. For men the projected contributory period is also shortened, while it increases by some 3.5 years for women, see table 4b. The latter is explained by the historic increase in the participation rate for women, i.e. that females that entered the labour market before approx. 1995 have a shorter contributory period on average. In addition, the phasing in of the reformed NDC pension system, where non-contributory periods, e.g. parental-leave, generates pension rights, contributes to the increase.

Table 3 – Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74							
	2013	2020	2030	2040	2050	2060	Peak year*
Labour force participation rate 55-64	77,7	77,1	77,3	78,7	79,2	78,9	2047
Employment rate for workers aged 55-64	73,7	74,0	74,5	75,8	76,3	76,0	2047
Share of workers aged 55-64 on the labour force 55-64	94,9	95,9	96,3	96,4	96,3	96,3	2040
Labour force participation rate 65-74	15,2	15,8	17,2	16,7	17,3	17,4	2056
Employment rate for workers aged 65-74	14,9	15,5	16,9	16,5	17,0	17,1	2056
Share of workers aged 65-74 on the labour force 65-74	98,0	98,3	98,5	98,5	98,5	98,5	2039
Median age of the labour force	41,0	40,0	40,0	41,0	40,0	40,0	2013

Source: Commission Services

Note: The * column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2013 to 2060.

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

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	20,6	21,1	21,1	21,1	21,1	21,1	2024
Average effective exit age (CSM) (II)	65,9	65,6	65,6	65,6	65,6	65,6	2013
Average effective working career (CSM) (II)- (I)	45,3	44,5	44,5	44,5	44,5	44,5	2013
Contributory period	41,6	41,7	41,2	39,1	41,5	41,5	2053
Contributory period/Average working career	91,9	93,6	92,5	87,9	93,3	93,2	2053
Duration of retirement **	17,8	18,4	19,3	20,2	21,0	21,8	2060
Duration of retirement/average working career	39,3	41,3	43,4	45,4	47,2	49,0	2060
Percentage of adult life spent at retirement***	27,1	27,9	28,8	29,8	30,6	31,4	2060
Early/late exit****	3,0	1,9	2,0	1,7	2,0	1,6	2013

Source: Commission Services

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

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	21,1	21,9	21,9	21,9	21,9	21,9	2023
Average effective exit age (CSM) (II)	64,5	64,4	64,4	64,4	64,4	64,4	2013
Average effective working career (CSM) (II)- (I)	43,4	42,5	42,5	42,5	42,5	42,5	2013
Contributory period	37,9	40,0	40,2	38,7	41,4	41,6	2060
Contributory period/Average working career	0,9	0,9	0,9	0,9	1,0	1,0	2060
Duration of retirement **	21,1	22,7	23,7	24,7	25,6	26,5	2060
Duration of retirement/average working career	48,6	53,4	55,8	58,1	60,3	62,4	2060
Percentage of adult life spent at retirement***	31,2	32,8	33,8	34,7	35,5	36,3	2060
Early/late exit****	4,8	2,9	3,0	2,6	3,0	2,4	2014

Source: Commission Services

Note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2013 to 2060. ** Duration of retirement is calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself. *** The percentage of adult life spent at retirement is calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years. **** Early/late exit, in the specific year, is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.

The assumption of a more or less unchanged retirement age in combination with the expected increase in the longevity will make the duration of the retirement increase with approx. 4 years for men and 5 years for women. This means that the annuity divisor in the NDC and other actuarial parts of

the pension system will increase, and that the yearly pension payments will be correspondingly lower. As pension payments from the NDC system does not keep up with growth, an increasing share of the retired population will receive guarantee pension.

3 Pension projection results

A note on ESA 2010

The European System of National Accounts (ESA) 2010 was introduced from September 2014. As decided by the AWG, Member States do not have to update their pension country fiches to reflect the new national accounts. Thus, the numbers presented in this report are based on the old definition. Publications made by the Commission services will incorporate the ESA2010 revision by updating the GDP series for the base year (2013), and by applying the previous growth rates of both GDP and the pension projections from 2013 onwards throughout the projection horizon, and might therefore deviate from the numbers presented here.

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

The projections include the public income pension and the means tested guarantee pension, as well as disability and survivor's pensions. The calculations also include occupational and private pension schemes. Also *Housing supplement for pensioners* and other means tested transfers for pensioners are included.[20] Apart from the population living in Sweden, the calculations cover individuals with Swedish pension rights living abroad.

There are small differences between the ESSPROS data presented by Eurostat and the data used by AWG, see table 5. First, there is a small difference between the public ESSPROS data presented by Eurostat and the ESSPROS numbers presented by Statistics Sweden. Second, there are definition differences between the ESSPROS numbers from Statistics Sweden and the data used in the AWG calculations, see table 5. The AWG numbers exclude the work injury benefit and some minor benefits for handicapped, but include the housing supplement for the elderly and disabled. The excluded and included items are of the same magnitude, so the GDP-ratio for the public expenditures remains approximately the same.

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[20] In ESSPROS the housing subsidy is counted as a benefit in kind (function 7 housing), but practically this is a cash benefit that is a closely integrated part of the pension system. The benefit is not counted in any other item in the AWG calculations.

Table 5 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
1 Eurostat total pension expenditure	12,2	11,8	11,6	11,8	12,9	12,1	11,6	11,9
2 Eurostat public pension expenditure	9,8	9,4	9,2	9,3	10,1	9,3	8,7	8,9
3 Public pension expenditure (AWG)	9,9	9,5	9,2	9,4	10,2	9,4	8,9	9,1
4 Difference (2) - (3)	-0,1	-0,1	-0,1	-0,1	-0,1	-0,1	-0,1	-0,1
5 Expenditure categories not considered in the AWG definition:								
5.1 Work injury benefit	-0,2	-0,2	-0,2	-0,1	-0,1	-0,1	-0,2	-0,2
5.2 Economic integration of the handicapped and Care allowance	-0,2	-0,2	-0,2	-0,1	-0,1	-0,1	-0,2	-0,2
6 Expenditure categories considered in the AWG definition, but not in ESSPROS as cash benefits								
6.1 Housing supplement for elderly and disabled	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2

Source: Eurostat, Statistics Sweden and Ministry of Finance

3.2 Overview of the projection results

Projected gross public pension spending as a percentage of GDP will end up at 7.8 % in 2060 in the baseline scenario, a decrease of 1,5 percentage points compared to the starting year 2013. The decrease of the public pensions is mainly explained by a more favourable demographic forecast and better macro development. To some extent, the growing importance of the premium pension (which is private sector) strengthens this development. The system will mature and grow in importance through-out the whole period until 2060, and thus the public part of total pension expenditure will decrease. Other factors that hold back public sector expenditure is the phasing out of the widows pension and the reform of the disability pension.

The importance of occupational pensions will grow. The reason is that higher coverage results in a higher expenditure to GDP ratio until approximately 2030, mainly as a result of higher female participation rate until 1995, and that re-negotiations of occupational pension plans widens the eligibility. After 2040 the share will stabilize and the effect of the ageing population will dominate.

Table 6 - Projected gross and net pension spending and contributions (% of GDP)							
Expenditure	**2013**	**2020**	**2030**	**2040**	**2050**	**2060**	**Peak year***
Gross public pension expenditure	9,3	8,6	8,2	7,8	7,5	7,8	2013
Private occupational pensions	1,9	2,3	2,7	2,8	2,6	2,7	2035
Private individual pensions	0,7	0,8	1,0	1,2	1,2	1,4	2060
Mandatory private	0,1	0,3	0,6	1,0	1,2	1,3	2060
Non-mandatory private	0,6	0,5	0,4	0,2	0,1	0,0	2015
Gross total pension expenditure	11,8	11,7	11,9	11,8	11,3	11,9	2033
Net public pension expenditure	7,0	6,5	6,2	6,0	5,8	6,0	2013
Net total pension expenditure	8,9	8,8	9,1	9,0	8,7	9,2	2060
Contributions	**2013**	**2020**	**2030**	**2040**	**2050**	**2060**	**Peak year***
Public pension contributions	6,3	6,1	6,2	6,2	6,3	6,3	2052
Total pension contributions	8,8	8,4	8,4	8,4	8,5	8,5	2013

Source: Commission Services

Note: The peak year is the year in which the particular variable reaches its maximum over the projection period 2010 to 2060.

The importance of the occupational and private individual schemes will be amplified by the fact that they are to a large extent DC, and that the interest rate assumption exceed the income growth, leading to a faster growth compared to PAYG systems, given the same contribution rate.

The development of the private individual pensions depends on two offsetting factors. The GDP ratio for mandatory private premium pension will increase from zero in 2003 to 1.3 p.p. of GDP in 2040, as the system is maturing. On the other hand, non-mandatory private pensions will gradually fade out as a result of the abolition of tax deductibility in 2016. Consequently, most people are expected to stop saving in the system. However, a small fraction will remain due to contributions from self-employed.

Pensions are taxed in the same way as other income in Sweden. Thus, it is not possible to link the taxes to different pension schemes. The downward trend of tax revenues from public pensions (2.3% of GDP in 2013 versus 1.8% of GDP in 2060), is mainly explained by the fall in gross pensions. The average implicit tax rate for pensioners will decrease somewhat until 2060, as lower replacement rates will result in lower marginal taxes. The fast decrease in the tax rate for pensioners during the first years of the projection period is due to the introduction of the special basic tax-deduction for people 65 years or older.

The earnings–related pensions will remain stable until 2020 despite the ageing effect, see table 7. Thereafter the ageing effect will dominate, and the NDC pensions will successively become lower. The reason that e-r pension ratio does not start to decrease immediately, is the gradual transition from the old DB system to the new NDC system. In the old DB system the effect of the growing female labour participation had a faster impact on pensions, as the benefits in the old system depend on the 15 best out of 30 years, and not on the whole career as in reformed NDC system.

The minimum top-up guarantee pension (including the housing supplement) will grow from 0.7 %/GDP to 1.4%/GDP, as a result of decreasing replacement rates from earnings-related pensions, which in turn is the result of longevity growing faster than the retirement age. Note that the guarantee pension is indexed with average earnings from 2019, but price indexed in the legislation. Since 2003 the indexation rules of the guarantee pension system has not been changed. The assumption about income indexation from 2019 might therefore be too cautious.[21]

Table 7 - Projected gross public pension spending by scheme (% of GDP)							
Pension scheme	2013	2020	2030	2040	2050	2060	Peak year *
Total public pensions	9,3	8,6	8,2	7,8	7,5	7,8	2013
of which earnings related:	8,6	8,1	7,5	6,9	6,4	6,5	
Old age and early pensions	6,9	6,8	6,4	6,0	5,5	5,7	2013
Disability pensions	1,2	0,9	0,9	0,8	0,8	0,7	2013
Survivors' pensions	0,4	0,3	0,2	0,1	0,1	0,0	2013
of which non-earnings related (including minimum pension and minimum income guarantee):							
Old age and early pensions	0,70	0,59	0,73	0,92	1,11	1,34	2060

Source: Commission Services

Note: The peak year is the year in which the particular variable reaches its maximum over the projection period 2010 to 2060.

Disability pension are projected to decrease as a result of the reforms implemented since 2007. The reforms have primarily led to a stricter application of the eligibility regulations. The number of individual's with disability pension started to increase sharply in 2003. After a peak of nearly 556 000 individuals in the spring of 2007, the yearly average went

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[21] Compared to AWG12 the model have been improved and the period with price indexation been prolonged, resulting in a lower ratio in 2060.

down to 368 000 in 2013 because of both higher outflow and lower inflow, i.e. a reduction of 1/3 from the peak. According to recent forecasts from the Swedish Social Insurance Agency, the number is projected to continue to decline.[22]

In the calculations, a prudent approach has been chosen, as the low inflow might not be sustainable. Therefore, the inflow to disability pension is aligned to outcome and a budget forecasts for 2014. For the years 2015-2024 the probability of inflow (as a share of the population at risk) is assumed to revert gradually to the average for the period 2006-2014. The incidence of being disabled is then kept constant for the rest of the projection period, resulting in a decrease in the number of disability pensioners with 8.7% between 2013 and 2060.[23]

The widow's pension is being phased out and is replaced by a new, temporary and gender-neutral so-called adjustment allowance. Even if the old widow's pension only affects couples married or having common children before 1989, it will continue to be paid out for several decades. In the end of the projection period, only the small temporary adjustment allowance remains. The benefit is paid out during a 12 month period to surviving spouses younger than 65, mainly to families with children.

3.3 Description of the main driving forces

To explain the development of the ratio of pensions to GDP, the growth has been decomposed into its main driving factors.[24]

The demographic change in the dependency ratio contributes to an increase of the public pension expenditures. The increase is higher at the beginning of the projection, but remains positive the whole period until 2060, although considerably lower than in the 2012 projection. The continued rise of the *dependency ratio* is due to increased longevity. In addition, net migration and fertility rates are positive, and the working age population continues to grow until approximately 2050.

The *coverage ratio effects* are different in tables 8a and 8b, as the number of pensions (tab 8a) is much higher than the number of pensioners (8b). The increase in the coverage ratio old-age is due to high migration, which will result in more cross-border pensioners. The decreasing coverage ratio in early age is the result of fewer disability pensioners in the ages 50-64.

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[22] Also note that the age limit 64 years remains unchanged throughout the projection period.

[23] The results are sensitive to the choice of reference period. A change from the years 2006-2014 to 2008-2018 results in a further decrease with 0.2 p.p. of GDP.

[24] See Annex 3 for technical details about the decomposition.

Table 8a - Factors behind the change in public pension expenditures between 2013 and 2060 (in percentage points of GDP) - pensions

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	-0,7	-0,4	-0,4	-0,3	0,3	-1,5	-0,026
Dependency ratio effect	0,8	0,7	0,4	0,0	0,8	2,8	0,060
Coverage ratio effect	-0,2	0,6	0,3	0,4	0,2	1,3	0,022
*Coverage ratio old-age**	0,1	0,8	0,5	0,4	0,3	2,0	0,038
*Coverage ratio early-age**	-1,8	-0,2	-0,5	0,0	-0,1	-2,6	-0,067
*Cohort effect**	-0,5	-0,8	-0,5	0,3	-1,0	-2,6	-0,061
Benefit ratio effect	-1,0	-1,5	-1,1	-0,8	-0,6	-4,9	-0,097
Labour Market/Labour intensity effect	-0,3	-0,1	0,0	0,0	-0,1	-0,4	-0,009
Employment ratio effect	-0,2	-0,1	0,0	0,0	0,0	-0,4	-0,009
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0	0,000
Career shift effect	0,0	0,0	0,0	0,0	0,0	-0,1	-0,001
Residual	0,0	-0,1	0,0	0,0	0,0	-0,2	-0,001

Source: Commission Services

* Sub components of the coverage ratio effect do not add up necessarily.

Table 8b - Factors behind the change in public pension expenditures between 2013 and 2060 (in percentage points of GDP) - pensioners

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	-0,7	-0,4	-0,4	-0,3	0,3	-1,5	-0,026
Dependency ratio effect	0,8	0,7	0,4	0,0	0,8	2,8	0,060
Coverage ratio effect	-0,1	0,1	0,0	0,2	0,0	0,2	0,002
*Coverage ratio old-age**	0,4	0,3	0,1	0,1	0,1	1,0	0,022
*Coverage ratio early-age**	-1,8	-0,2	-0,5	0,0	-0,1	-2,6	-0,065
*Cohort effect**	-0,5	-0,8	-0,5	0,3	-1,0	-2,6	-0,061
Benefit ratio effect	-1,1	-1,1	-0,7	-0,5	-0,4	-3,8	-0,078
Labour Market/Labour intensity effect	-0,3	-0,1	0,0	0,0	-0,1	-0,4	-0,009
Employment ratio effect	-0,2	-0,1	0,0	0,0	0,0	-0,4	-0,009
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0	0,000
Career shift effect	0,0	0,0	0,0	0,0	0,0	-0,1	-0,001
Residual	0,0	0,0	0,0	0,0	0,0	-0,1	-0,001

Source: Commission Services

Note: 'Average pension' = public pension expenditure divided by the number of pensioners

The *employment effect* and the *benefit ratio* act as offsetting factors, counterbalancing the effect of the demography. The most striking feature is the decreasing *benefit ratio*. Several factors contribute to this. The reformed NDC income pension system works on an actuarial basis. At the time of retirement an annuity is calculated by dividing the individual's account value by a divisor reflecting unisex life expectancy at the specific date of retirement, thus offsetting the effect of the increased longevity. Another important factor is the reclassification of the premium pension from the government to the private sector, which leads to a lower public but a higher private benefit ratio. In addition, other factors contribute, e.g. the phasing out of the widows pension. The employment effect is the result of both a higher participation rate and a lower unemployment rate.

Evolution of the benefit and the replacement and ratios

The evolution of the benefit ratio (BR) and the replacement rate (RR), i.e. the first pension of those who retire a given year over an economy wide average wage, is reported in Table 9.[25] The RR and BR from the public pensions will decrease. The assumption of a more or less unchanged retirement age in combination with the expected increase in the longevity will make the duration of the retirement increase with approx. 4 years for men and 5 years for women. This means that the annuity divisors used in the NDC, but also in other actuarial parts of the pension system, will increase and the yearly pension payments will be correspondingly lower. If the conservative assumption of a fixed pension age is dropped, and people are allowed to work longer when life expectancy increases, the fall in BR and RR will be mitigated.

As the old DB system is being phased out, and only the NDC part of the reformed system is defined as a public system, the public RR will decrease significantly. This is counter-acted by an increase in the other part of the reformed system, the privately classified premium pension. Still the BR and the RR will decrease significantly over the projection period. The fast decrease until 2020 is also explained by the fact that the old ATP-system was more generous. During the work with the pension reform the reformed NDC and the old DB pensions where designed to give about the same RR. However, the increase in the longevity was underestimated, resulting in a somewhat lower RR than expected. Individuals that are born after 1953 are entirely in the reformed system, and thus, the last people in the old system will retire around 2020. The

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[25] The replacement rate (RR) is defined as the first pension of retirees a given year compared to the economy-wide average wage for individual's aged 60 64 years the same year. Only domestic pensioners are counted in the RR, but all in the BR.

development will then flatten out and mainly be driven by demography and labour market assumptions.

There is a discrepancy between the development of the BR and the RR. The public BR is higher than the RR in 2013 but this relation will be reversed around 2030, due to the quicker fall in the BR. There are several explanations for this development. One is that the benefit ratio is more affected by the increasing time in retirement due to the frontloading mechanism. That means that the BR that is calculated on the average of all pensions, will grow slower than the RR that is calculated on the first pension.

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

	2013	2020	2030	2040	2050	2060
Public scheme (BR)	42,1	36,9	32,5	29,7	27,6	26,3
Public scheme (RR)	35,6	33,7	33,5	31,2	30,8	29,0
Coverage	100,0	100,0	100,0	100,0	100,0	100,0
Public scheme old-age earnings related (BR)	37,8	33,4	28,1	24,8	22,3	20,9
Public scheme old-age earnings related (RR)	35,0	32,4	29,1	25,5	24,8	23,7
Coverage	82,8	87,9	90,2	91,0	90,9	92,2
Private occupational scheme (BR)	11,9	12,8	13,5	12,8	11,2	10,3
Private occupational scheme (RR)	14,2	17,5	16,9	16,2	15,2	14,7
Coverage	72,1	76,3	79,4	82,6	85,4	88,2
Private individual scheme (BR)	5,7	4,8	4,6	5,0	5,1	5,0
Private individual scheme (RR)	6,1	6,9	6,4	5,9	5,4	4,9
Coverage	52,9	73,2	85,7	89,3	90,4	92,0
Total (BR)	53,8	50,1	47,1	44,7	41,8	39,9
Total (RR)	40,9	40,5	40,9	37,9	37,2	35,2

Source: Commission Services

Note: The coverage is calculated as the ratio of the total number of pensioners within the scheme, and the total number of pensioners (including disability and survivors) in the country.

On average pensions in payment are indexed with average earnings. However, for the individual the replacement rate from the public income pension will decrease when the individual grows older, as payments from the NDC system are frontloaded, i.e. the pensioners receive a share of the real economic growth in advance. Technically this is achieved by calculating the annuity factor with a 1.6 per cent discount factor, resulting in a higher initial benefit than a straightforward application of the actuarial principles would give. The indexation is then reduced

during the pay-out time by subtracting 1.6 per cent from the yearly income indexation, see annex 2 for details.

The calculations include pensions to individuals with Swedish pension rights living abroad. Many emigrants have only spent a small part of their careers in Sweden, and their benefits are thus relatively low. Migrants often move in and out of Sweden several times. Therefore, the number of pensioners with e-r pension (but not the expenditure) is over-estimated. Hence, only domestic pensioners are counted when calculating the RR from public earnings-related pensions. If pensioners with Swedish pension living abroad were counted, the RR would be lower than the numbers presented in table 9. It is not possible to quantify this effect exactly but it is estimated at the interval of 2-4 p.p. In addition, the replacement rate from occupational pensions is expected to decrease in the future, due to higher longevity and the growing importance of funded defined contribution components. In the calculations, only occupational pensions to individuals who receive public pension are considered. Thus, different types of early retirement option programs in collective agreements, i.e. supplements to the disability pensions, etc. are not included.

Sometimes a part of the occupational and the private voluntary DC-pensions is paid out only during the first five years of retirement, resulting in a higher average RR at the time of retirement and a shift down in the BR after 5 years. However, as this frontloading is growing over time, the effect of increasing longevity on the occupational pensions will be less evident at the time of retirement.

The development of the BR and the RR for private pensions depends on two offsetting factors. The mandatory private premium pension will increase rapidly from zero in 2003 to about 6-7 percentage points 2040 as the system is maturing. As the premium pension is funded and earns a market rate of return, that is assumed to be higher than the income growth, the replacement rate is expected to resist the effect of increasing longevity. On the other hand, the replacement rate for private voluntary pensions will decrease close to zero due to the abolished right to make tax-deductions for private pension savings. The effect of the latter will be higher on the RR than the BR as most recipients choose to get their saving paid out during a limited time-period, normally 5-years. After this period, the RR will be substantially lower but the BR essentially unchanged. These two offsetting factors also explain the increase in the coverage ratio for private individual pensions, from 53% to 92%. At the same time as fewer pensioners will get voluntary private pension, more

retired will get a premium pension, as the latter system is mandatory and covers all residents in Sweden.

System dependency ratio

The number of pensioners is expected to increase the whole projection period. In addition, employment is projected to increase until 2060, but in a slower pace, resulting in an increase in the pension system dependency ratio (SDR) with 16.2 percentage points, see table 10. The old-age dependency ratio is expected to increase with 11.3 percentage points, resulting in an approximately unchanged system efficiency quota.

Table 10 – System Dependency Ratio and Old-age Dependency Ratio						
	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	2376,2	2653,7	3076,2	3410,8	3699,3	4164,8
Employment (thousand) (II)	4720,5	4995,1	5325,2	5674,3	5992,5	6158,6
Pension System Dependency Ratio (SDR) (I)/(II)	50,3	53,1	57,8	60,1	61,7	67,6
Number of people aged 65+ (thousand) (III)	1850,2	2077,0	2378,0	2646,8	2813,1	3165,9
Working age population 15 - 64 (thousand) (IV)	6121,2	6273,1	6666,7	7082,8	7472,3	7636,7
Old-age Dependency Ratio (ODR) (III)/(IV)	30,2	33,1	35,7	37,4	37,6	41,5
System efficiency (SDR/ODR)	1,7	1,6	1,6	1,6	1,6	1,6

Source: Commission Services

Inactivity

The total number of pensioners by age group has been divided by the inactive population in the same age group, i.e. the population minus labour supply in the actual age group, in order to analyse the coverage ratio and the consistency between the labour force, demographics and the pension projections. For the age groups below 65 the ratio falls due to decreasing disability and a better labour market. For groups 65+ there will be a small increase due to the growing participation among retired.

The total number of pensioners as a share of the inactive population is above 100 % for all age groups 65+, see Table 11a and 11b. One explanation for this is that the numbers include pensioners living abroad.[26] Another reason is that pensioners are working, and part of the

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[26] If overseas pensioners are excluded the ratio in the age group 65-69 years will decrease. Earlier calculation indicates a decrease of about 9% in 2010.

labour force, even if they are receiving pension benefits at the same time.[27]

Compared to AWG12 the inactivity rate below 65 is lower. This is due to the combined effect of less disability pensioners and a better labour market compared to the previous projection. The higher inactivity rate for old pensioners this time is the result of the higher migration assumptions that in the long-run lead to more pensioners with Swedish pension living abroad. [28]

Table 11a – Pensioners (public schemes) to inactive population ratio by age group (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	6,3	5,0	4,5	4,5	4,2	4,2
Age group 55-59	89,6	71,2	68,5	72,2	77,6	77,3
Age group 60-64	98,1	82,2	78,5	80,3	77,8	76,9
Age group 65-69	135,7	154,2	150,4	152,3	158,0	155,1
Age group 70-74	121,6	120,3	125,9	121,6	128,4	132,5
Age group 75+	102,4	107,8	114,9	118,4	118,4	121,6

Source: Commission Services

Note: Inactive population is defined as the population minus labour supply in the actual age group.

Table 11b – Pensioners (public schemes) to population ratio by age group (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	2,4	1,9	1,8	1,7	1,7	1,6
Age group 55-59	12,6	10,1	8,7	8,8	9,1	8,9
Age group 60-64	30,0	26,8	25,7	24,9	23,8	23,9
Age group 65-69	109,2	114,3	111,5	112,7	116,5	114,5
Age group 70-74	110,3	113,2	116,8	113,0	118,9	122,4
Age group 75+	102,4	107,8	114,9	118,4	118,4	121,6

Source: Commission Services

The inactivity ratio for women is similar to the inactivity ratio in the population as a whole, see 12a and 12b. However, the development in the

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[27] The very high and rising numbers in the age group 65-69 years is also explained by the fact that many pensioners in this age group has earned income and that work in this age group is expected to become more common in the future.

[28] The number of pensioners outside Sweden is probably over-estimated as many migrants are moving in and out of the country several times, but we are not able to keep track of that in the modelling. However, the corresponding benefits will be correct.

age group 55-64 is different - the inactivity ratio is decreasing more for women than for men. One explanation for this is that the disability rates are higher for women, and that thus the decrease in the number of female disability pensioners is projected to be more significant than for men. Another is that the number of women with widows' pension will decrease.

A more technical explanation for the high ratio is that the calculated numbers in tables 11a to 12 b are a mix of numbers originating from the exogenous AWG assumptions and endogenous numbers that are generated in the model. Due to the fact that all demographic events occur at year-end in the model, and due to stochastic variation in the modelling there are some inconsistencies in the table. If the cross-border pensioners are excluded the ratio will exceed 100% in the age group 75+, even if no one by definition is working in this age group.

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

	2013	2020	2030	2040	2050	2060
Age group -54	7,0	5,5	4,9	4,8	4,7	4,6
Age group 55-59	85,6	67,0	58,4	60,9	64,1	67,0
Age group 60-64	91,9	72,7	68,9	68,6	66,8	65,5
Age group 65-69	132,2	154,0	144,4	142,6	145,4	141,2
Age group 70-74	120,3	122,5	128,1	118,8	124,5	128,5
Age group 75+	102,2	108,7	118,5	121,9	118,8	119,8

Source: Commission Services

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

	2013	2020	2030	2040	2050	2060
Age group -54	2,7	2,2	2,0	1,9	1,9	1,9
Age group 55-59	15,1	11,6	9,5	9,7	9,6	10,0
Age group 60-64	32,3	28,3	27,0	25,7	24,8	24,7
Age group 65-69	112,3	121,2	114,3	112,8	114,8	111,5
Age group 70-74	112,6	117,3	121,6	112,8	118,0	121,5
Age group 75+	102,2	108,7	118,5	121,9	118,8	119,8

Source: Commission Services

New public expenditure

In Table 13a-13c new earnings related pension expenditure in the public NDC system is reported. New pensioners born 1938 to 1953, will get pension from the old transitional DB system, too, during the phasing in

period until about 2020 (depending on at what age the individual retires), see table 13d.[29] Also, note that the numbers in the tables excludes pensioners with Swedish pension rights living abroad.

Compared to the average job tenure generated by the cohort simulation model (CSM), the national calculations indicate a shorter contributory period, 41.4 years vs. 41.6 in 2060. The difference is explained by the fact that individuals also get non-contributory pension rights for e.g. studies and parental leave. (If the overseas pensioners are included the average contributory period decreases nearly 3 years in 2060 according to earlier calculations). In addition, stochastic variation in the modelling adds to the difference.

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

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	1257,5	1893,8	2824,1	3358,2	5085,4	6986,6
II Number of new pensions (in 1000)	124,2	110,6	128,5	119,1	134,0	134,8
Average new pension	10,1	17,1	22,0	28,2	38,0	51,8
III Average contributory period (in years)	39,8	40,8	40,7	38,9	41,5	41,5
IV Average accrual rate (=c/A)	1,0%	1,0%	0,9%	0,9%	0,9%	0,8%
Notional-accounts contribution rate (c)	16,0%	16,0%	16,0%	16,0%	16,0%	16,0%
Annuity factor (A)	16,7	16,7	17,4	18,0	18,7	19,3
V Monthly average pensionable earning	2,2	3,7	4,9	6,8	8,9	12,5
VI Sustainability/adjustment factors	1,0	1,0	1,0	1,0	1,0	1,0
VII Average number of months of pension paid the first year	12	12	12	12	12	12
Monthly average pensionable earnings / Monthly economy-wide average wage	0,57	0,78	0,74	0,73	0,67	0,66

Source: Commission Services

Note: I-VI equals zero by definition. The used sustainability factor is set to 1, as the effect of the balance ratio is not possible to report separately

The contributory period for women is shorter than for men in 2013, but evens out successively until 2060. This is the result of the historically lower participation rate for women and the transition from the old DB-

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[29] Individuals born before 1938 only get DB pension from the old system. All individuals in these cohorts are already retired.

system.[30] The annuity factor is the same for men and women by definition. In addition, the accrual rate is the same.

Technically the base for the calculation is the accumulated pension wealth, which is the sum of "implicit pensionable earnings", which consist of earlier credited pensionable income, pension entitlements credited for income replacement social insurances, inheritance gains and possibly reduction in case of an automatic balancing. The pensionable earnings are then adjusted for the phasing in, depending on when the individual was born. There is therefore no straightforward relation between the growth of the "implicit pensionable earnings" and the average income growth. In the tables 13a-13d the sustainability factor is set to 1, because the effect of the balancing is already counted for implicitly in pension payments and pension wealth.[31] In the computations the average number of months paid out during the first year is 12, but in real life the number is close to 6. Finally note that the method of deriving the numbers in the table makes the identities hold by definition.

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

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	695,6	1003,5	1502,8	1771,1	2705,1	3625,8
II Number of new pensions (in 1000)	61,6	54,1	63,6	59,7	67,5	66,8
Average new pension	11,3	18,5	23,6	29,7	40,1	54,3
III Average contributory period (in years)	41,6	41,7	41,2	39,1	41,5	41,5
IV Average accrual rate (=c/A)	1,0%	1,0%	0,9%	0,9%	0,9%	0,8%
Notional-accounts contribution rate (c)	16,0%	16,0%	16,0%	16,0%	16,0%	16,0%
Annuity factor (A)	16,8	16,8	17,4	18,0	18,7	19,3
V Monthly average pensionable earning	2,4	3,9	5,2	7,1	9,4	13,1
VI Sustainability/adjustment factors	1,0	1,0	1,0	1,0	1,0	1,0
VII Average number of months of pension paid the first year	12	12	12	12	12	12
Monthly average pensionable earnings / Monthly economy-wide average wage	0,61	0,83	0,79	0,76	0,71	0,70

Source: Commission Services

[30] Pension rights were only credited for years with a pensionable income exceeding one price base amount.
[31] The balance indexation is switched off in the calculations after 2019, but with the AWG assumptions it is unlikely that the balancing would be triggered. In the reality it of course different and automatic balancing cannot be ruled out.

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

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	561,9	890,4	1321,4	1587,1	2380,3	3360,8
II Number of new pensions (in 1000)	62,6	56,5	64,9	59,4	66,5	68,0
Average new pension	9,0	15,8	20,4	26,7	35,8	49,4
III Average contributory period (in years)	37,9	40,0	40,2	38,7	41,4	41,6
IV Average accrual rate (=c/A)	1,0%	1,0%	0,9%	0,9%	0,9%	0,8%
Notional-accounts contribution rate (c)	16,0%	16,0%	16,0%	16,0%	16,0%	16,0%
Annuity factor (A)	16,7	16,7	17,4	18,0	18,7	19,3
V Monthly average pensionable earning	2,1	3,4	4,6	6,5	8,4	11,9
VI Sustainability/adjustment factors	1,0	1,0	1,0	1,0	1,0	1,0
VII Average number of months of pension paid the first year	12	12	12	12	12	12
Monthly average pensionable earnings / Monthly economy-wide average wage	0,53	0,73	0,70	0,69	0,63	0,63

Source: Commission Services

Transitional DB-pensions

The cohorts born until 1953 will get some of their pension from the old DB system. The last cohort eligible for DB pension will only get a small part of their public e-r pension from the old DB pension. The transition period ends in about 2020 for new retirees, depending on when they choose to retire. However, payments of the old DB pension will be substantial for several decades. If you retire at 65 in 2020, you might still get some DB pension in 2060.

Table 13d - Projected and disaggregated new public pension expenditure (old-age and early earnings-related DB pensions) - Total

New DB pension	2013	2020
I Projected new pension expenditure (millions EUR)	668,9	4,6
II Number of new pensions (in 1000)	123,0	2,0
Average new pension	5,4	2,3
III Average contributory period (in years)	40,1	40,9
IV Average accrual rate (implicit)	1,5%	1,5%
V Monthly average pensionable earning	0,755	0,326
VI Sustainability/adjustment factors	1,0	1,0
VII Average number of months of pension paid the first year	12	12
Monthly average pensionable earnings / Monthly economy-wide average wage	0,233	0,084

New e-r public pensions are thus the sum of new NDC pension and new DB pension. The average new DB pension will decreases fast, but at the same time the NDC pension will increase. The same applies for the pensionable earnings that gradually shift from DB to NDC.

3.4   *Financing of the pension system*

From 2013 to 2060 the number of pensioners will increase by 72 %. During the same period the number of contributors will grow by 23 % and employment by 30 %. The combined effect of this is that the support ratio, i.e. the number of contributors per pensioner, will remain basically unchanged, and contributions as a share of GDP will remain stable.[32]

Table 14 – Revenue from contribution (million), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)						
	2013	**2020**	**2030**	**2040**	**2050**	**2060**
Public contribution	26 321	32 722	49 426	75 304	114 451	166 517
Employer contribution	*12 262*	*16 013*	*24 946*	*38 714*	*59 529*	*87 488*
Employee contribution	*11 729*	*14 285*	*20 779*	*30 887*	*46 145*	*66 582*
State contribution	*2 331*	*2 424*	*3 700*	*5 703*	*8 777*	*12 447*
Number of contributors (I)	5 679	5 775	6 083	6 489	6 862	7 006
Employment (II)	4 721	4 995	5 325	5 674	5 993	6 159
Support ratio of (I)/(II)	1,2	1,2	1,1	1,1	1,1	1,1

Source: Commission Services

Note: The *support ratio* is defined as a number of contributors relative to the number of pensioners in public pension schemes.

The number of pensioners substantially exceeds the number of individuals older than 65. This is explained by the fact that the calculations also cover individuals with Swedish pensions living abroad as well as disability pensioners and survivors younger than 65. The number of contributors also exceeds the number of employed, as contributions are paid by the central government to cover pension entitlements for unemployment, sickness, disability and parental leave. Self-employed individuals also participate in the system. The reason for the number of contributors growing slower than the number of employees is that the number of disability pensioners is projected to decrease.

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[32] A slight increase in the contributions to GDP ratio is expected to occur due to less contributions for disability pensions financed by central government

3.5 Sensitivity analysis

The sensitivity scenarios are divided into three groups:

1. Productivity (higher / lower/ risk)
2. Demographics (higher life expectancy, lower migration)
3. Labour market (higher employment, older workers, policy)

In the first group of scenarios the effects are limited as pensions and GDP will grow in the same pace, and all systems (tax brackets, ceilings etc.) are income indexed in the calculations. The outcome in the TFP risk scenario and the the lower productivity are identical. The remaining small difference in the lower and higher productivity scenarios is explained by a change in the dependency on minimum pensions.

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

	2013	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	9,3	8,6	8,2	7,8	7,5	7,8
Higher life expectancy (2 extra years)	0,0	0,0	0,1	0,1	0,2	0,2
Higher lab. productivity (+0.25 pp.)	0,0	0,0	0,0	0,0	0,0	0,0
Lower lab. productivity (-0.25 pp.)	0,0	0,0	0,1	0,1	0,0	0,0
Higher emp. rate (+2 pp.)	0,0	-0,1	-0,2	-0,2	-0,2	-0,1
Higher emp. of older workers (+10 pp.)	0,0	-0,5	-0,6	-0,3	-0,3	-0,3
Lower migration (-20%)	0,0	0,0	0,2	0,2	0,3	0,2
Risk scenario	0,0	0,0	0,0	0,1	0,1	0,1
Policy scenario: linking retirement age to increases in life expectancy	0,0	-0,8	-0,6	-0,4	-0,4	-0,8
Total Pension Expenditure						
Baseline	11,8	11,7	11,9	11,8	11,3	11,9
Higher life expectancy (2 extra years)	0,0	0,0	0,1	0,1	0,3	0,4
Higher lab. productivity (+0.25 pp.)	0,0	0,0	-0,1	-0,2	-0,3	-0,3
Lower lab. productivity (-0.25 pp.)	0,0	0,0	0,1	0,2	0,3	0,3
Higher emp. rate (+2 pp.)	0,0	-0,1	-0,3	-0,3	-0,2	-0,2
Higher emp. of older workers (+10 pp.)	0,0	-0,8	-0,9	-0,5	-0,4	-0,5
Lower migration (-20%)	0,0	0,1	0,2	0,3	0,4	0,4
Risk scenario	0,0	0,0	0,1	0,2	0,3	0,4
Policy scenario: linking retirement age to increases in life expectancy	0,0	-1,4	-1,4	-1,1	-1,0	-1,7

Source: Commission Services

In the demographic scenarios differences are more evident. The increase compared to the base scenario is similar in the higher life expectancy and the lower migration scenarios. In the higher life expectancy scenario the effects are explained by the fact that public earnings-related pensions, as

well as occupational and private funded pensions, are adjusted on an actuarial basis, thus compensating for the increase in the longevity. When the actuarially calculated pensions are decreasing, the minimum top-up guarantee pension and the housing supplement will increase, thus explaining the increase in the pensions to GDP ratio. In the lower migration scenario, the explanation is that GDP is decreasing more than the pension expenditures.

The scenarios with higher employment give the biggest effects. Higher employment result in higher production, but also in higher e-r pensions after some years. This lowers the dependency of minimum pension.

In the older workers scenario the difference compared to the baseline is growing fast during the first decades. After this, the effect will gradually become smaller, as the extra working years will lead to higher e-r pensions for the individuals who are prolonging their working lives.

The story is similar in the policy scenario, where the GDP ratio is expected to decrease even more. In this scenario, the retirement age is linked to the increase in life expectancy. At the same time as all age limits in the pension system and related social insurances are indexed with 2/3ds of the increase in longevity.[33] This will cause higher GDP and e-r pensions and lower dependency of non-contributory pensions. The effect is strongest at the beginning when some people are working at the same time as no one retires. After some decades, the prolonged working life will lead to higher pensions, and the difference compared to the baseline becomes smaller. However, as long as life expectancy is growing the pensions to GDP ratio will remain lower.[34]

3.6   Description of the changes in comparison with earlier projections

Compared to the 2012 projections the public pensions to GDP ratio will be lower. The change is largely explained by lower dependency and benefit ratios. The former is a result of a more positive population forecast, and the latter of lower minimum and disability pensions.

The coverage ratio has changed sign from negative to positive compared to AWG12. This is explained by different development in different age groups. The effect of fewer disability pensioners decreases the coverage ratio in early-age, and the increasing number of old-age pensioners, due to higher migration and a higher number of cross-border pensioners, increases the old-age coverage ratio. In the long run the latter effect out weights the former.

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[33] This is in line with the proposals from the Pensions age committee. More details about the method can be found in section 4.4.
[34] See section 4.4 for a description of the modelling of the dynamic ageing scenario.

Compared to AWG12 the benefit ratio now contributes more negatively. This is explained by the revision downward of the disability and minimum pensions. Regarding the minimum pension, the revision is partly explained by improvements in the modelling and partly by the fact that pensions now are price indexed until 2019, compared to 2016 in AWG12. The difference in the minimum pensions in the base year 2013 is due to a forecasting error in AWG12.

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

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	0,88	4,75	- 0,20	- 0,64	- 2,79	:	- 0,23
2009 **	-0,13	5,61	-0,37	- 0,41	- 4,32	:	- 0,63
2012 ***	0,63	5,02	-0,76	- 0,50	- 2,73	- 0,01	- 0,39
2015****	-1,46	2,75	0,19	- 0,37	- 3,83	- 0,01	- 0,20

Source: Commission Services

Note: * 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060
Table 16 presents the average annual change of pension expenditure and the contribution of the underlying components to that change, in analogy with Table 8b above. The components do not add up because of a residual component.

The decrease in the GDP ratio in 2050 between the projection rounds of 2006 and 2009 is to a large part explained by the reclassification of the funded premium pension in the national accounts from the government to the private sector. The reclassification reduces general government net lending by approximately 1 percent point of GDP.

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

	2013	2020	2030	2040	2050	2060
Ageing report 2012	9.6	9.6	10.1	10.2	9.9	10.2
Change in assumptions	- 0.3	- 0.8	- 1.3	- 1.5	- 1.4	- 1.4
Improvement in the coverage or in the modelling	0	- 0.2	- 0.6	- 0.9	- 1.0	- 1.0
Change in the interpretation of constant policy	0	0	0	0	0	0
Policy related changes	0	0	0	0	0	0
New projection	9,3	8,6	8,2	7,8	7,5	7,8

Source: Ministry of Finance

The decomposition in table 17 is somewhat rough. The change in the minimum pensions between AWG12 and AWG15 is reported as *"Improvement in the coverage or in the modelling* in the table.*

The change due to the decreasing disability and the rest of the differences is classified as *"Change in assumptions"* and is calculated residually. The changes in the assumptions include both the demographic and economic assumptions. Regarding the revised disability pension projection the same methodology was used in AWG12, but the long-run average was calculated on another reference period 2000-2015 compared to 2006-2014 this time, see also section 3.2.

4   Description of the pension projection model and its base data

4.1   Introduction

The projections have been made with the dynamic microsimulation model SESIM. The model was developed at the Swedish Ministry of Finance in close cooperation with researchers at Swedish universities. The model has then been further developed at the Ministry of Health and Social affairs.[35] SESIM is a general microsimulation model that can be used for a broad set of analyses. The model has for example been used for analyses of health amongst elderly recently.[36] The model has also been used in by the Pension age committee, and the in the review of the Premium pension system.

All the AWG projections and model simulations have been made at the Ministry of Finance, the Economic Affairs Department. No peer review has been done nationally. For outcome and medium term years, the results have been validated against National Accounts, and calculations from The Swedish Pension Agency. The results have also been validated against the AWG demographic and macroeconomic assumptions as well as the previous round of AWG pension projections.

4.2   Overview of the model

SESIM is a mainstream dynamic microsimulation model in the sense that the variables (events) are updated in a sequence, and the period between the updating processes is a year. The starting point is 1999 and the initial sample of the Swedish population is approximately 110 000 individuals.[37] All individuals are subject to a large number of possible events, reflecting real life phenomena, such as education, marriage, parenthood, work or retirement.

SESIM has a recursive structure, where different modules are executed in a predetermined order, see figure 3.1 below. The unit of simulation is the individual but the household also plays a significant role. Many of the simulated processes refer to household as well as individual properties. The simulation sequence starts with a set of demographic modules (mortality, adoption, migration, household formation and dissolution, disability pension, rehabilitation and regional mobility). In the next step, calculations concerning education and the labour market (unemployment, employment etc.) are executed.

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[35] Documentation that is more detailed can be found in Flood et.al [2005], or at www.sesim.org.
[36] *The future need for care - Results from the LEV project,* Ministry of Health and Social Affairs, 2010.
[37] If necessary, the sample can be extended.

Every year the individuals are assigned a status. Each individual can have only one out of nine different statuses during a specific year.[38] Every status is related to a source of income. Employment results in earnings; retirement brings pensions etc. For employed individuals an earnings equation is used to determine the income. For other kind of statuses, for example unemployment, different rules are applied to obtain the income. After the calculation of income, a module for wealth capital income and housing is executed. Four separate assets are considered in the household portfolio: financial wealth, owned homes, other real wealth and private pension savings.

Figure 1: Structure of SESIM
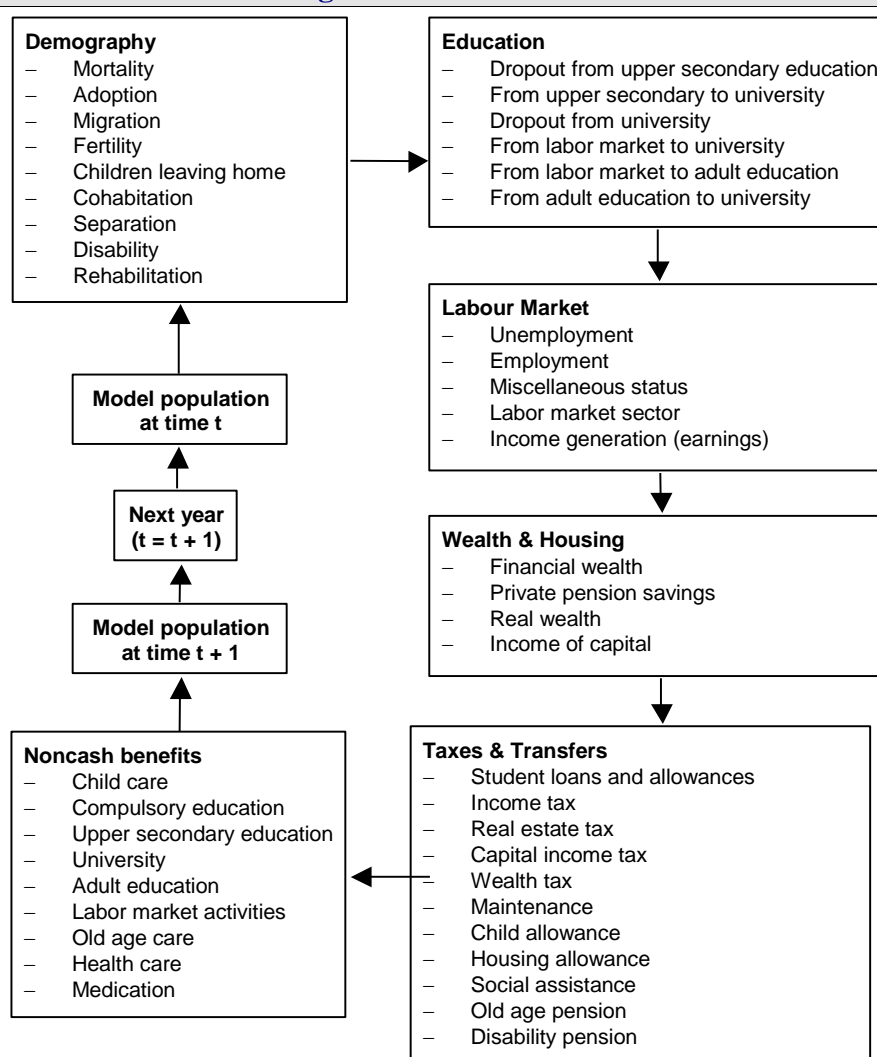
After the wealth/housing module taxes, transfer and pensions will be calculated. The rules for all three pillars of pensions have been implemented in all relevant detail (i.e. public, occupational and private

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[38] The different statuses are: Child (0-15 years old), Old-age pension, Student, Disability pension, Parental leave, Unemployed, Employed, Miscellaneous, Emigrated (individuals living abroad with Swedish pensions rights).

pensions). All persons are assumed to claim full time pension, since the model cannot not handle part time retirement (mixed statuses), but can also earn work income. Also, the automatic balancing mechanism is implemented in the model, but switched off in the AWG calculations, as it will not change the results in the long run (but risk disturb the general picture if pensions are balanced a year that is reported in the fiche).

Given the information above the household disposable income can be defined. SESIM allows for an extensive definition of income since the value of various non-cash benefits can be included, e.g. education, childcare and health care.

In the AWG analysis, the models for the labour market are central, especially regarding employment, unemployment, retirement or disability. These models are statistical rather than economic, i.e. in the sense that the risk of these events is influenced by individual characteristics but not by changes in financial incentives. For example, the probability of retirement is a function of the individual's education, age, gender, income etc., but not by the marginal taxes. The retirement model also accounts for the fact that spouses tend to coordinate their retirement decisions.

There are several ways of simulating the date of retirement. The number of new pensioners is aligned by picking the individuals with the highest estimated probability to retire. People retire according to an empirical distribution. Most people retire at 65. Note that the average pension age pensioners is endogenously determined, although the average effective retirement age is aligned to track the AWG labour market assumptions. Some pensioners continue to work after they started to pick up their public pension, and might thus be counted as employed in LFS terms.

4.3   Data Issues

The primary database for SESIM, both for the estimation of the statistical models and for the creation of the base population, is the Statistics Sweden longitudinal database LINDA. The database is created from administrative registers and covers about 3.5 percent of the Swedish population. In 1999, the primary sample was 308 000 individuals. Including their household members the total sample size was 786 000 individuals. The selected individuals are followed over time and all relevant information is collected. Some information, for instance pension rights, can be traced as far back as to 1960. New individuals replace individuals that are omitted from the data due to death or emigration in order to maintain the statistical representativity.
For a more detailed description of the data set, see e.g. Flood et al (2012) and Edin & Fredriksson (2000).

4.4   Assumptions and simulations

The most important exogenous economic macro variables in SESIM are inflation, real income growth per capita, short- and long interest rates and return on stocks. All relevant macro numbers are implemented in line with the AWG assumptions. In the calculations, the model is aligned in order to achieve exogenous average unemployment and participation rates (for 5-year groups). The simulated population and labour force tracks the AWG-assumptions closely. The "raw" model results are calibrated to NA levels 2013 where possible.

All calculations are made in current prices. The indexation rules are implemented in detail in the model. Items that are price indexed by legislation, have been income indexed from 2019 in the projections (e.g. the housing allowance for pensioners and the guarantee pension). It is also assumed that the rate of return on the funded assets in the individual public DC funds and the individual occupational pension accounts will be the same for all individuals. Upon retirement, it is assumed that all individuals choose to get their public DC pension benefits as a fixed annuity. The automatic balancing mechanism has been switched off in the model simulations after 2019.

In the sensitivity scenarios the pension age is normally based on the actual pension behaviour today. However, in the older workers and the policy scenario, the age limits and the pension behaviour is shifted in line with the assumptions in order to increase the average pension age. In the model this is technically achieved by making people younger, i.e. letting older people borrowing the behaviour of younger. In the policy scenario also, all relevant age limits are increased with 2/3ds of the increase in longevity, approximately keeping the percentage of adult life spent at retirement constant.[40]

4.5   Additional information about the modelling

- The exchange rate 8.9870 SEK/Euro, the projected average rate in 2014 according to Eurostat (2014-07-30) has been used from 2014 on.
- The real interest rate, 3 percent, is used in the baseline calculations. No deductions for costs for administration of the public funds are assumed.
- Pension expenditures and public contributions are adjusted to national account levels until 2013. From 2013 constant add factors have been used.
- In SESIM, only occupational pensions to individuals with public pension are calculated. Thus, different types of early retirement

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[40] This is in line with the proposals from the Swedish Pensions age committee. For more details see Ministry of Health and Social affairs [2014] (in Swedish only).

option programs in collective agreements, agreed disability pensions etc. are not included. The numbers are not adjusted to NA-levels due to lack of data.

- Only the DC contributions to occupational pensions are reported, not the DB contributions that are financed (and funded) by the employers on an actuarial ground.
- The decomposition of private individual pensions, only include the mandatory part (the DC premium pension).
- The longevity in Sesim is not truncated at 100 years, as in the Eurostat forecast.
- Sesim is a stochastic model, and the population is endogenous, but of course based on the AWG assumptions. The population is therefore aligned (calibrated). Despite the alignment the total model population varies from +0.5% in 2013 to +0.1% of the Eurostat population in 2060. The reason for the positive bias is that Sesim is counting the continuously growing population the 31st of December, but AWG in the middle of the year. The bias disappears if the same measurement date would be used. Apart from the bias, there is also some stochastic variation. In general the deviations are bigger the smaller the studied stratum is. However, the errors are small and even out in the long run.

References

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Annex 1: Additional reporting

Economy- wide average wage at retirement

The economy average wage is somewhat lower than the average wage at retirement. The average wage is growing at the same pace as the productivity. The average gross wage at retirement is calculated as the average for earned income for individuals 60-64 years old. The growth in the wage at retirement is basically the same, but small deviations occur as a result of composition effects in the population and stochastic variation in the model.[41]

Table A1 – Economy wide average wage at retirement evolution (in thousands euro)							
	2010	2013	2020	2030	2040	2050	2060
Economy - wide average wage	32,4	39,0	46,7	65,8	93,5	132,8	188,5
Average gross wage at retirement	37,6	44,4	52,8	76,3	110,3	153,3	217,2
Source: Ministry of Finance							

Pensioners vs Pensions

Both the number of pensioners and the number of pensions are calculated in the microsimulation model. Most people get their pension from more than one source. The average number of pensions per pensioner varies over the projection period due to phasing in and out of different systems.

Pension taxation

The taxes are modelled for each individual in line with the taxation rules yet legislated. The average tax and earnings for different groups are then summed up, and an implicit tax ratio calculated for every year. The same implicit tax ratios are then used on all kinds of pension.

Disability pension

The modeling of the disability pension is done with estimated equations for the in- and outflow from the system. Also programmed rules, e.g. age limits, affect the calculations. The inflow of pensioners is then aligned to the average incidence for the reference period 2006-2014. See section 3.2 for more details. Compared to AWG12 the numbers are down revised, as outcome data show that the decrease in the incidence for disability is robust and lasting. The decreasing number of disabled is driven by the

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[41] In the microsimulation model used in the calculations the individual wages are calculated using an estimated equations, including explaining variables as e.g. age, sex and education.

low inflow, resulting in a gradual decrease as old disability pensioners reaches age 64 and is shifted to old-age pension. The bulk of the transitions will take place before 2020 as the number of disability pensioners is growing with age.

The reform does not affect the individual payments, only the number of pensioners. However, the average might be affected due to shifts in the age structure etc.

Table A.2 clearly shows that the disability rate is increasing with age, but decreases over time as a result of the reforms. No one over the age limit 64 get disability pension. In the model calculations they are therefore automatically shifted to old-age pension. Even though this is the normal procedure also in real life, it is formally up to the individuals if they want to apply for old-age pension or not. In the policy scenario, when linking the retirement age to increases in life expectancy, the age limit for disability, as well as other relevant age limits, is shifted in proportion to the pension age.

Table A2 – Disability rates by age groups (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	1,9	1,5	1,3	1,4	1,3	1,4
Age group 55-59	11,2	9,2	8,3	8,1	8,9	8,7
Age group 60-64	17,9	13,8	13,8	13,6	12,7	13,8
Age group 65-69	0,0	0,0	0,0	0,0	0,0	0,0
Age group 70-74	0,0	0,0	0,0	0,0	0,0	0,0
Age group 75+	0,0	0,0	0,0	0,0	0,0	0,0

Source: Ministry of Finance

Survivor pensions

In the microsimulation the households are modelled. If any member in the household dies the eligible survivors will get the benefit. In the calculations the rules are simplified due to model constraints. All amounts are income indexed.

Alternative pension spending decomposition

Table A3 - Factors behind the change in public pension expenditures between 2013 and 2060 (in percentage points of GDP) - pensions

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	-0,7	-0,4	-0,4	-0,3	0,3	-1,5
Dependency ratio effect	0,8	0,9	0,6	0,0	1,2	3,6
Coverage ratio effect	-0,2	0,6	0,4	0,5	0,3	1,6
*Coverage ratio old-age**	0,1	0,9	0,6	0,6	0,4	2,5
*Coverage ratio early-age**	-1,8	-0,2	-0,4	0,0	-0,1	-2,5
*Cohort effect**	-0,5	-0,9	-0,5	0,2	-1,0	-2,6
Benefit ratio effect	-1,0	-1,4	-0,9	-0,6	-0,4	-4,2
Labour Market/Labour intensity effect	-0,3	-0,1	0,0	0,0	-0,1	-0,5
Employment ratio effect	-0,3	-0,1	0,0	0,0	0,0	-0,4
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0
Career shift effect	0,0	0,0	0,0	0,0	-0,1	-0,1
Residual	-0,1	-0,4	-0,5	-0,3	-0,7	-2,0

Source: Commission Services

Table A4 - Factors behind the change in public pension expenditures between 2013 and 2060 (in percentage points of GDP) - pensioners

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
Public pensions to GDP	-0,7	-0,4	-0,4	-0,3	0,3	-1,5
Dependency ratio effect	0,8	0,9	0,6	0,0	1,2	3,6
Coverage ratio effect	0,0	0,1	0,0	0,2	0,0	0,2
*Coverage ratio old-age**	0,4	0,3	0,1	0,2	0,2	1,2
*Coverage ratio early-age**	-1,8	-0,1	-0,4	0,0	-0,1	-2,5
*Cohort effect**	-0,5	-0,9	-0,5	0,2	-1,0	-2,6
Benefit ratio effect	-1,1	-1,0	-0,6	-0,4	-0,3	-3,5
Labour Market/Labour intensity effect	-0,3	-0,1	0,0	0,0	-0,1	-0,5
Employment ratio effect	-0,3	-0,1	0,0	0,0	0,0	-0,4
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0
Career shift effect	0,0	0,0	0,0	0,0	-0,1	-0,1
Residual	-0,1	-0,3	-0,3	-0,1	-0,5	-1,3

Source: Commission Services

Non-earnings related minimum pension

The non-earnings related minimum pension, the guarantee pension, is endogenously calculated in the microsimulation model, depending on other sources of income. The guarantee pension is price indexed formally, but in the AWG projections income indexation is assumed from 2019.

Contributions

The different sources of income are calculated for each individual. The different contribution rates are then applied for each source of income and summed up. The different contribution rates are assumed constant over the projection horizon.

Annex 2: Indexation and automatic balancing

Income indexation
The PAYG-pensions is on average indexed by wages. The system is front-loaded, though, and the pensioners receive a share of the real economic growth in advance. Technically this is achieved by calculating the annuity factor with a 1.6 per cent discount factor, resulting in a higher initial benefit than a straightforward application of the actuarial principles imply. The indexation is then reduced during the payout time by subtracting 1.6 per cent from the yearly income indexation.

The development of income is measured by the income index, which measures the change in average income for individuals active in the labour market. The income index is based on pensionable income for individuals between age 16 and 64, without any income ceiling. To avoid cyclical swings the index is calculated as a three-year moving average.

Income indexation
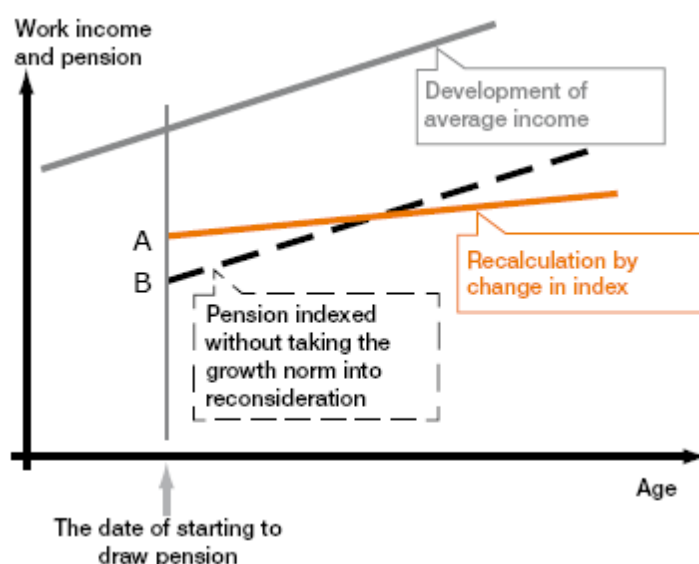
Automatic balancing
The Swedish PAYG NDC income pension system is equipped with an automatic balancing mechanism that will secure the financial stability of the system. Regardless of the demographic or economic development, the system will be able to finance its obligations with a fixed contribution rate and fixed rules for calculation of benefits. This is achieved by reducing the rate of indexing, if necessary.
If the current liabilities of the system are greater than the calculated assets, the balance ratio becomes below one (1) and the balancing is activated. The balance ratio is calculated by the Swedish Social Insurance Agency, and published yearly in the pension system annual reports.

The balancing ratio is obtained by dividing the assets of the system by the pension liability. As a reaction on the financial crises that started in

2008, it was decided to implement a smoothing of the fund value in order to mitigate temporary swings in the balance ratio. If the balance ratio exceeds one (1), the assets are greater than liabilities. If the balance ratio is less than one, liabilities exceed assets, and the balancing is activated. When balancing is activated, pension balances and pension benefits will be indexed by the so-called balance index instead of the change in the income index.

An example: If the balance ratio falls from 1.0000 to 0.9900, while the income index rises from 100.00 to 104.00, the balance index is calculated to 102.96. The indexation of pension balances and benefits is then reduced to 2.96 instead of 4 percent.

If the balance ratio exceeds 1.0000 during a period when balancing is activated, pension balances and benefits will be indexed at a rate higher than the increase in the income index. When the level of the balance index reaches the level of the income index, the balancing is deactivated and the system returns to indexation by the normal income index.

Income and Balance indexation
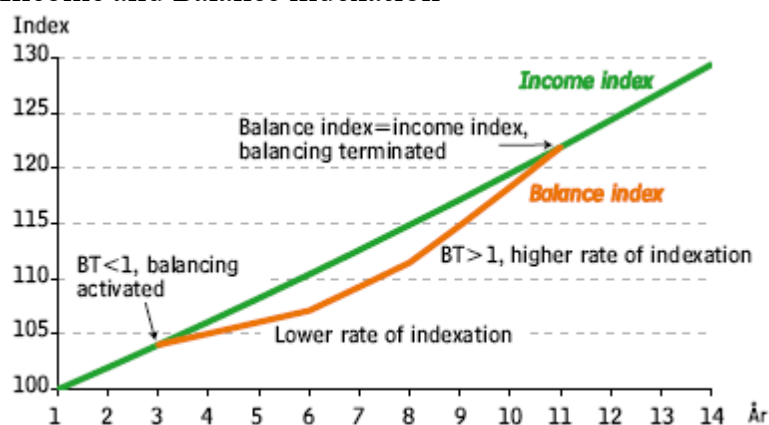
Annex 3: Decomposition of pension expenditures

The ratio of pension expenditures to GDP can be decomposed into different factors; the dependency, coverage, benefit ratio, employment rate and labour intensity.

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

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

[1]

For the projection round 2015, two further sub-decompositions have been agreed. The coverage ratio is further split with the scope of investigating the take-up ratios for old-age pensions and early pensions:

$$\overbrace{\frac{\text{Number of Pensioners}}{\text{Population } 65+}}^{\text{Coverage Ratio}} =$$

$$= \overbrace{\frac{\text{Number of Pensioners } 65+}{\text{Population } 65+}}^{\text{Coverage Ratio Old-Age}} + \left(\overbrace{\frac{\text{Number of Pensioners} \leq 65}{\text{Population } 50-64}}^{\text{Coverage Ratio Early-Age}} \times \overbrace{\frac{\text{Population } 50-64}{\text{Population } 65+}}^{\text{Cohort effect}} \right)$$

[2]

The labour market indicator is further decomposed according to the following:

$$\overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / Labour Intensity}} =$$

$$\overbrace{\frac{\text{Population } 20-64}{\text{Working People } 20-64}}^{1/\text{Employment Rate}} \times \overbrace{\frac{\text{Working People } 20-64}{\text{Hours Worked } 20-64}}^{1/\text{Labour intensity}} \times \overbrace{\frac{\text{Hours Worked } 20-64}{\text{Hours Worked } 20-74}}^{1/\text{Career shift}}$$

[3]

where the former term is labelled "*Career Shift*".