The Swedish pension system and pension projections until 2070

This document is the Swedish pension fiche prepared for the EPC Working Group on Ageing Populations and Sustainability peer reviews 2020.

1. An overview of the pension system

The Swedish public old-age pension system covers everyone who has worked or lived in Sweden and 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. On top of that, most employees are covered by occupational pension schemes. The possibility to make tax-deductions for private pension savings was abolished in 2016.

1.1 The Swedish public pension system

The present Swedish public old-age pension system was fully implemented in 2003. The earnings-related old-age pension system consists of a notionally defined contribution (NDC) PAYG component and a fully funded, defined contribution (DC) pension component.[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 by general taxes from the central government budget. The same pension rules apply to all persons regardless of occupational sector and for employees and self-employed alike. The old-age pension system is independent in the sense that income and expenditure are governed by a fixed set of rules, and not part of the Government budget. This independence is further strengthened by the fact that its rules are decided in agreement by a six-party working group in Parliament.

The public pension system which was replaced in 2003 consisted of a flat-rate pension provided in full to everyone with at least 40 years of residence in Sweden 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. Only persons born before 1938 receive their full pension

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[1] The latter part is classified as private savings in the National Accounts.

based on these rules, and there are transition rules for those born between 1938 and 1953, so it is only of minor importance in 2020.

The Pension Group in Parliament

There is a pension group in Parliament with representatives from all but two parties, representing a broad majority. The group was formed when the new system was first introduced in 2003, and it is still responsible for the maintenance of the pension reform. As a praxis, any change in the pension system requires consensus in the group. This means that it is a relatively time-consuming process to introduce change to the pensions system as only change which is supported by the whole group will be accepted. Hence, relatively few modifications have been made to the system since its introduction. Instead there is a tendency for the Government to use changes in the tax system or outside the pension system if they want to change the economic conditions for pensioners.

Pension rights are credited to the individual accounts for 18.5 percent of the annual pensionable income up to a 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] The individual's pension contribution is fully deductible on other income taxes, so very few individuals do in fact pay contributions. Contributions over the pension ceiling are transferred to the central government budget as general tax and do not affect the income-based pension system. Contributions are also paid by the central government to cover pension entitlements credited for social insurances, such as benefits for unemployment, sickness, disability or parental leave.

The retirement age is flexible, and individuals can claim benefits from the age of 62 without any upper limit.[4] The decision to draw a pension does not mean that the individual must stop working. He or she can continue to work and earn new pension entitlements. Under the Employment Protection Act an employee is entitled to stay in employment until his or her 68th birthday.[5] Since it is possible

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[2] The income base amount was SEK 66 800 or approx. 6 300 € in 2020, so the public pension ceiling was SEK 539 100 or approx. 51 000 €. It is indexed to the change of average earnings.

[3] The contribution is calculated on earnings net of the employee contribution, i.e. (0.07+0.1021)/(1-0.07) = 0.185

[4] The earliest age for an old age pension was raised by 1 year for both women and men 1 January 2020.

[5] Employment protection will be extended to 69 years at 1 January 2023.

to start drawing a pension and continue to work, the average exit age from the labour market is disconnected from the average age for first pension.

Table 1. Qualifying conditions for retiring

For all men and women and all years 2020 – 2070
The earliest possible retirement age is 62 years for earnings related income pension and 65 years for non-earnings-related guarantee pension.
The yearly pension is calculated on the individual's pension entitlements at retirement and the expected remaining life length. Hence, if a person retires early, at the age of 62, the pension will be correspondingly smaller than if he or she decides to retire later.
The non-earnings-related guarantee pension is reduced in proportion to the time spent in Sweden, with a full pension awarded after 40 years of residence.

Source: Ministry of Finance

The average age for pension withdrawals has been more or less constant at a bit less than 65 years the last 10 years, and there is no clear trend. The fact that the age limit for the disability pension and the first possibility do draw a guarantee pension is 65 years helps preserve the 65-year norm. However, more people now draw a pension before the age of 65, just as more people wait until after 65 years, so the spread in the age of first pension withdrawal is increasing. Even if the exit age from the labour market shows an increasing trend, see graph 1, in the projections the exit age, just as the first age to draw a pension is unchanged, see table 5a and 5b.

The NDC PAYG system

The main part of the public pension system is NDC PAYG and works on an actuarial basis. At the time of retirement an annuity is calculated by dividing the individual's cumulated account assets by a divisor reflecting unisex life expectancy at the specific date of retirement.[6] 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 delayed the retirement from 65 to 67 the annuity divisor decreased from 16.31 to 15.16 and the NDC pension consequently increased with 7.6 % for an unchanged level of cumulated account assets.

The NDC savings is as a primary rule indexed by the average rate of growth of earnings per contributor. However, pensions are front-loaded so that

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[6] 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 expectancies.

pensioners receive a share of the real economic growth in advance. This makes the fall in income after leaving employment smaller and gives a pensioner a relatively higher income at the beginning of retirement than towards the end.

In case of financial sustainability problems though, an automatic balancing mechanism is activated, and the indexation is reduced until stability is restored. The automatic balancing mechanism 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. The balancing indexation was activated for the first time in 2010 due the financial crisis in 2008. This balancing period ended in 2018, when pensions were restored to the income index level, and normal indexing rules was applied from 2019.[7] The balance index for 2020 was 1.0505 and it is not expected to below 1 due to the Corona virus pandemic. Hence, the balancing indexation is not activated in the projection period.

Non-earnings-related minimum pensions and basic security

The non-earnings-related 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 general social assistance. All forms of basic security benefits for the elderly can only be received from the age of 65. The guarantee pension is price indexed and fully taxed.[8] Unlike the earnings-related pension, the guarantee pension is paid only to pensioners living in Sweden and the EES area.

The guarantee pension is means-tested against public pension income and survivor benefits, from Sweden and other countries, 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, so that it is fully phased out when pension income reaches 3.07 price base amounts (PBA) for single households and 2.72 PBA's for cohabitants. The annual benefit amounts to a maximum of 2.13 PBA's for single households (some 9 700 € in 2020), and 1.90 PBA's per person for cohabitants (some 8 650 € in 2020).[9]

The tax-free means tested Housing supplement for pensioners (BTP) is formally outside the old-age pension system, but de facto closely interlinked.[10]

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

[8] Income indexation is assumed from the end of the medium-term projection period 2023 for all transfers and taxes regardless if legislation states otherwise.

[9] The price base amount 2020 is SEK 47 300 or some 4 570 €. It is indexed to the change of the consumer price index.

[10] BTP amounts to maximum SEK 6 540 a month (618 €) for a single household in 2020.

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.

Occupational pensions

Most employees in the public and the private sector, some 95 per cent of all female and 93 per cent of all male employees, are covered by semi-mandatory occupational pension schemes 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 more 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.[11]

Information of pension entitlements and expected benefit

The Pension Agency sends a yearly statement of account to every insured person in which the fees which were payed into the system and the size of the accumulated assets are reported, together with an assessment of the expected monthly benefit at different pension ages. It is also possible for an insured person to log on to a web page[12] at any time and obtain personal information of accumulated pension assets and estimated benefit levels, including data for occupational pensions. In this way, the individual can make an informed decision whether to retire at a specific time or not.

There is no statutory retirement age

It is possible to retire and stop working at the age of 62 but the loss for the individual is twofold. First, the benefit is based on lifetime contributions, which implies that all years with earnings will increase the benefit. Second, the level of

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[11] The occupational systems have been renegotiated to harmonize with the reformed public pension system, towards more defined contribution and less defined benefit. There are long transitional periods. The calculations only cover negotiated pensions paid out as a supplement to public pensions, and no other negotiated cessation compensation, etc. paid out before the age of 65.

[12] www.minpension.se

the benefit is calculated using the cohort-specific unisex life expectancy at the date of retirement. Hence, leaving working life early implies both a lower acquired pension capital and a longer period of payment, a higher annuity divisor, 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 statutory retirement age in the old system. However, as has been pointed out earlier, to claim a pension is not the same as leaving the labour force. In 2019 the average age for the first public pension payment was 64.6 years, which has varied very little the last 15 years.[13] On the other hand, the average age for withdrawal from the labour market, which shows a clearly increasing trend for both women and men since the mid-1990s, was estimated at 64.0 years in 2019 (see graph1).

Graph 1. Average exit age from the labour market
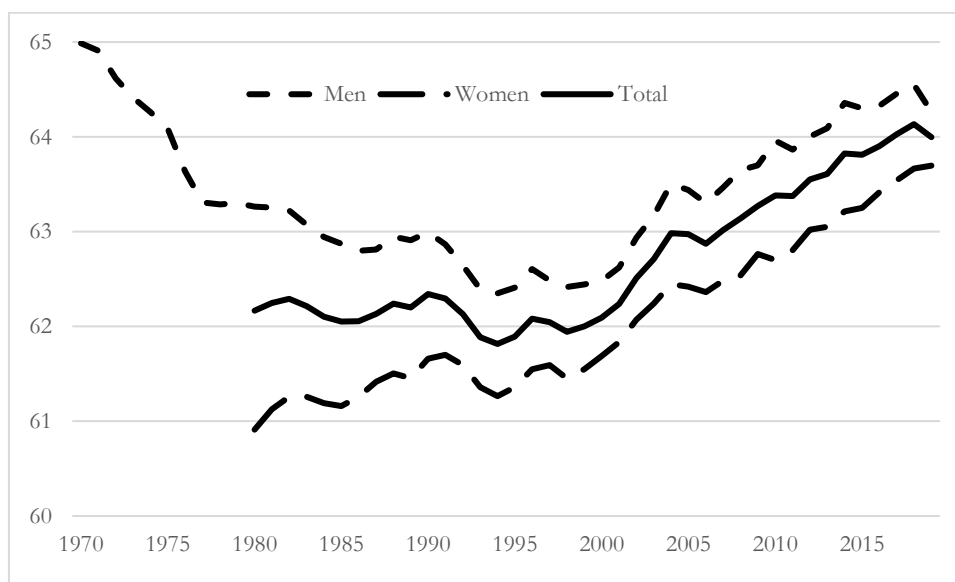
Note: Calculations based on the labour market survey.
Source: Swedish National Pension Authority

Survivor's and disability pension

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

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[13] The average pension age for persons working at age 50 including disability pensioners. Source: The Swedish Pensions Agency.

system, a survivor will receive an adjustment allowance for 12 months as a standard, but the payments continue if 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. The benefit is only available till age 65, and individuals with disability benefits continue to accumulate pension entitlements in the public pension system. The pension 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.[14]

Private individual pensions

The mandatory premium pension system

The second part of the public system is a mandatory fully funded defined-contribution part, the Premium pension. 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. In the National Accounts, however, this system is a part of household savings.[15] Individuals can choose from more than a hundred different funds when investing their capital. A government run default fund caters for people who do not make an active choice. The individual mutual funds earn a market rate of return. At retirement, at any age from 62 years, individuals can choose a fixed or variable annuity, in part or in full. It is possible to include a survivor's protection component for this part of the public system which will give a partner the right to accumulated funds. In this case the pension will be lowered to reflect the expected longer payment period.

Voluntary private pensions

Until 2016 it was possible for all people to make tax-deductions for private pension saving. For self-employed not eligible for occupational pension plans deductions are still allowed. The maximum yearly deduction allowed for self-employed is 35 percent of business income not exceeding 10 PBAs (SEK 470 300 or EURO 44 700).

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[14] Disability pensioners receive extra pension rights based on a calculated wage they should have had if they had worked. Survivors and disability pensions are income indexed in the calculations.

[15] The reclassification to the private sector in 2007 reduced general government net lending by approximately 1 percent of GDP.

Taxes and pensions

Old-age (including guarantee pension), disability and survivors pension, are 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. People who are 65 years or older are subject to lower employment fees and also pay a lower income tax on earned income.

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

Reform to the Premium Pension System

An aspect of the pension system that is being discussed is the complexity of the Premium pension system and the number of funds for investment in this system. The last few years there have been examples of aggressive telephone promotion of certain funds with high administrative fees. There have also been cases of financial transactions in funds which have led to a poor result for the fund holders, and even to criminal investigations. Another problem with the Premium pension system is that relatively few people bother to make an active choice of funds. As a response, the Pensions Authority has introduced a number of measures to reduce the number of funds, increase the control of remaining funds and to make the system less sensitive to mis use and fraud.

An increase in the earliest age to draw a public old age pension

The first of January 2020, the earliest age to receive an old age pension was increased one year for both women and men, from 61 years to 62 years. This was a first step of a more comprehensive pension reform which is described in the box below. The effect of this first step on both pension expenditure and labour supply was only minor as only some 9 000 people applied for an old age pension in 2019, and the majority of these did not leave the labour market.

A new pension supplement for mid-income pensioners

In March 2020 the Parliament Pension Group agreed to increase pensions 2021 through a new supplementary pension benefit of maximum 600 SEK per month (55 Euro) for people with a monthly pension of 9 000 – 17 000 SEK (870 – 1 635 Euro). A measure of this size was proposed in the Budget proposal for 2021 and will take effect in 1 September 2021. The pension supplement is an expenditure item on the central government budget and is financed by taxes. The

permanent cost increase from this measure is estimated at some 0.1 percent of GDP, see table 19.

A substantial pension reform is under way

In 2013 a government inquiry, The Pension Age Committee, made several proposals on pension-related age limits and ways to promote a longer working life.[16] The committee proposed that the earliest age of retirement, 61 years at the time, and the earliest age for guarantee pension, 65 years, should both be indexed to the expected life length at 65 years. It also proposed a non-binding indicative age for retirement that should increase in the same way.

In December 2017 the Parliament Pension Group agreed on changes which are in line with The Pension Age Committee's proposal. As a first step of this pending pension reform the earliest age to draw an old-age pension was increased from 61 to 62 years at the first of January 2020. In the Government's budget proposal for 2021 a continuation of this reform was announced which will increase the earliest age one more year in 2023 and 2026 respectively, so that an old-age pension is available at age 64 at the earliest in 2026. Parallel to this the earliest age for the guarantee pension will be raised from 65 years today, till 67 years in 2026. The age at which employment protection ends will also be increased at the same time.

From 2026 and onwards exit ages will be indexed to a new "indicative age", which will increase in line with remaining lifetime at 65 years. The Eurostat population projection for Sweden foresees a further increase in all of the above exit ages again at 2035, 2051 and 2069, increasing the earliest age for an old-age pension to 67 and the earliest age for the guarantee pension to 70 in 2069.

As the above-mentioned reform is expected to be approved by Parliament only in the spring of 2021, it is not included in the baseline alternative, but only in the alternative where the retirement age is indexed to life expectancy.

1.3 Description of the "constant policy" assumptions in the projections

All types of pensions, benefits and thresholds in the pension and tax systems are income indexed from 2024 in the calculations, regardless if legislation states

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[16] 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).

otherwise (e.g. guarantee pension, BTP, SBPT and ÄFS are price indexed by law).[17] The fact that the Pension Group in Parliament need to approve changes to the pension system means that it is easier for the government to help low-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 to compensate for the indexation only to prices. 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

2.1 Demographic developments

The Swedish population is expected to increase fairly rapidly from a bit more than 10 million in 2020 to just over 13 million in 2070 in the latest Eurostat projection, or by some 26 percent, see graph 2 and table 2. This is a slower increase than in the previous Eurostat population projection where the population reached 13.9 million in 2070.

The population increase is mainly driven by a strong positive net migration. In a scenario with zero net migration, Eurostat predicts that the Swedish population would continue to grow until around 2030, but at a much slower rate, and then decline so that there would be some 610 000, or around 6 per cent, fewer people in Sweden 2070 than in 2020.

Life expectancy at birth is expected to increase by some 5.5 years for both sexes from 2019 to 2070, from 81.4 years for men and 84.7 years for women, to 86.8 and 90.3 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 for people who decide to retire at that age, increases by 4.0 years for men and 4.6 years for women.

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[17] By law some thresholds in these systems are not indexed at all or nominally fixed.

Graph 2. Total population, thousands of people
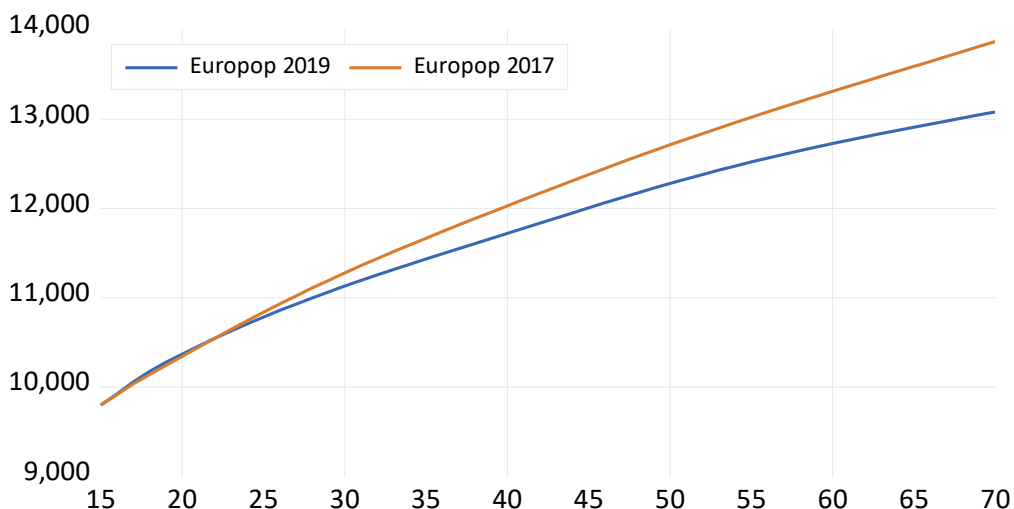
Strong immigration and rapid population growth make the old-age dependency ratio increase at a relatively slow rate compared to many other member states. Nevertheless, the number of people who are 65 years and older per 100 persons in the ages 20 to 64 years old is expected to increase from 35.2 in 2019 to 49.8 in 2070.

In table 2, 2070 is the peak year for the old age dependency ratio, but most likely this ratio will continue to rise, indicating continued cost increases in the years after 2070. In comparison with most other member states, however, the development in Sweden is relatively benign (see graph 3). Whereas Sweden has the eighth highest dependency burden in the union in 2019, it is projected to have the lightest burden in 2070. This means that Sweden is expected to have the smallest increase in the dependency burden of all member states. The difference between the latest Eurostat population forecast and the previous one is small, with slightly more people in active ages in relation to old people in the near future in the new projection, and a marginally higher dependency ratio in the long run.

Table 2. Main demographic variables

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Population (thousand)	10 276	11 131	11 722	12 280	12 727	13 082	13 082	2070	2 805
Population growth rate	1.0	0.6	0.5	0.4	0.3	0.3	1.0	2019	-0.7
Old-age dependency ratio (pop 65+ / pop 20-64)	35.2	38.4	41.2	43.0	48.4	49.8	49.8	2070	14.6
Old-age dependency ratio (pop 75+ / pop 20-74)	13.6	17.3	18.5	20.6	21.9	25.2	25.2	2070	11.6
Ageing of the aged (pop 80+ / pop 65+)	25.8	33.7	33.8	37.2	36.9	40.4	40.4	2070	14.6
Men - Life expectancy at birth	81.4	82.5	83.7	84.8	85.8	86.8	86.8	2070	5.4
Women - Life expectancy at birth	84.7	85.9	87.1	88.2	89.3	90.3	90.3	2070	5.6
Men - Life expectancy at 65	19.7	20.4	21.3	22.2	23.0	23.7	23.7	2069	4.0
Women - Life expectancy at 65	22.0	22.9	23.9	24.8	25.7	26.6	26.6	2070	4.6
Men - Survivor rate at 65+	90.2	91.6	92.6	93.6	94.4	95.1	95.1	2070	4.9
Women - Survivor rate at 65+	93.6	94.5	95.3	95.9	96.4	96.9	96.9	2070	3.4
Men - Survivor rate at 80+	64.9	69.4	73.0	76.3	79.2	81.8	81.8	2070	16.9
Women - Survivor rate at 80+	75.9	79.6	82.5	85.0	87.2	89.1	89.1	2070	13.2
Net migration (thousand)	66.7	52.1	45.5	39.8	35.1	30.3	69.2	2020	-36.4
Net migration over population change	**0.7**	**0.8**	**0.8**	**0.8**	**0.9**	**0.9**	**0.9**	**2064**	**0.3**

Source: Eurostat

Graph 3. The number of persons who are 65 years and older per 100 persons in ages 20 – 64 years
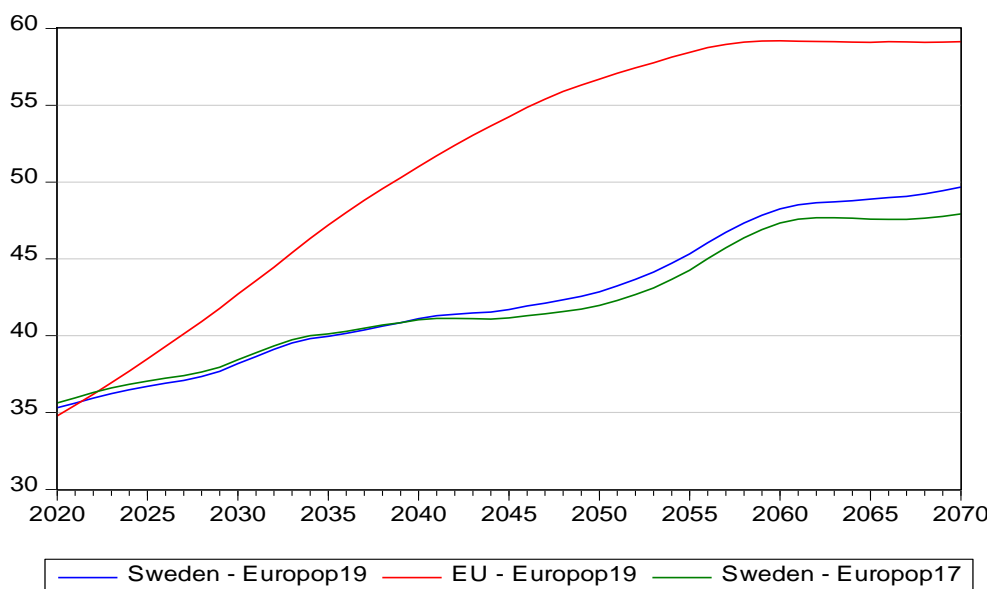
Source: Eurostat

The Age structure in graph 4 illustrates the increase of the population 65 years and older. While some 5.2 percent of the population was 80 years or older in 2019, and some 20.0 percent 65 years and older, the same numbers are expected to be 10.6 percent and 26.3 percent in 2070. The share of the population in ages 20–64 years falls from 56.8 percent to 52.8 percent in the same period.

Graph 4. Age structure comparison: 2019 vs 2070
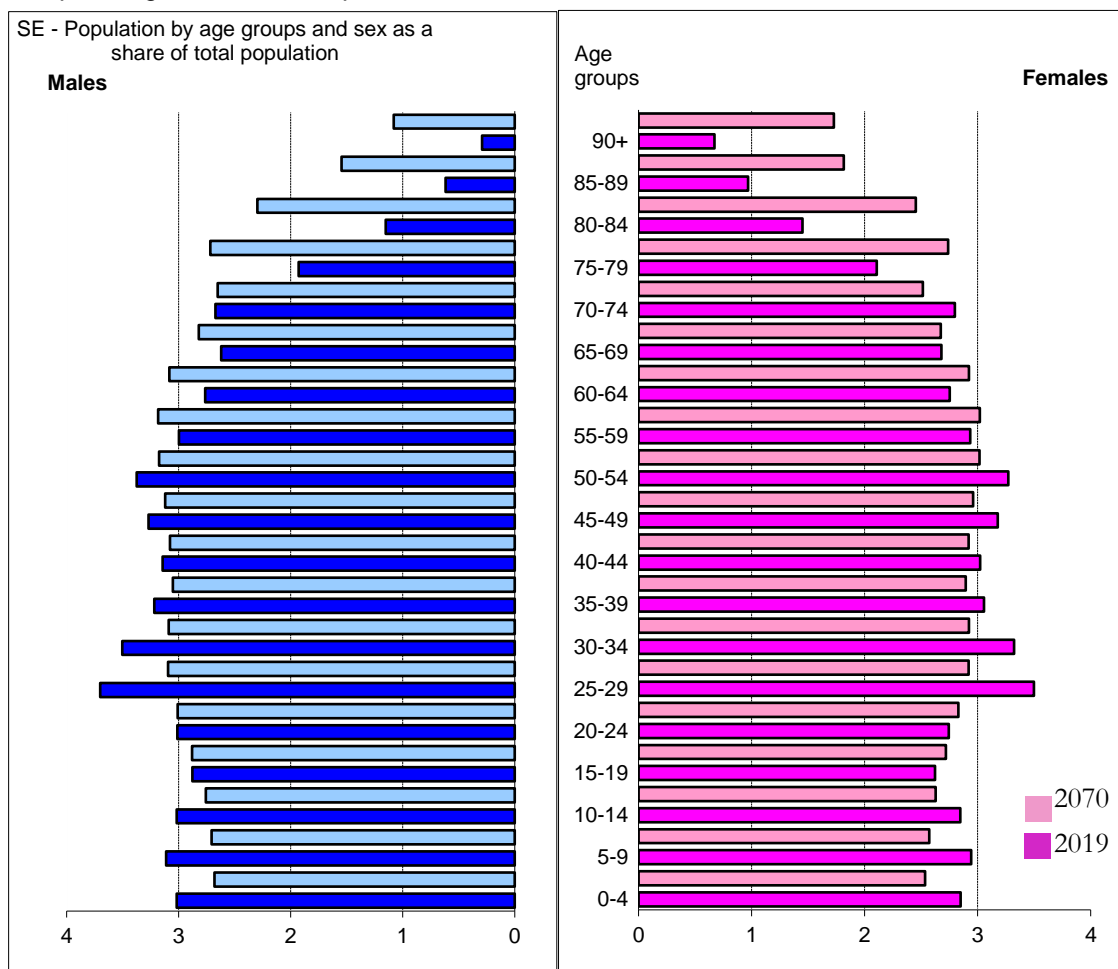
Source: Eurostat

2.2 The labour force

Table 3 shows the change in participation and employment rates in the age groups, 55 to 74 years. There is no statutory retirement age 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, are assumed to have no effect on the labour supply in the calculations. Hence, when participation and employment rates are unchanged by age and sex, changes in the composition of the population in working ages will result in small variations in

the aggregate rates over the period 2020–2070. Even if there is no clear trend, the fluctuations result in a high point relatively early in the period and a slightly lower labour supply per person in the age group 20-74 years in the long run.

The Cohort Simulation Model does not take origin into account, so all people coming to Sweden immediately is assumed to acquire average age- and sex specific probabilities of joining the labour force and being employed. This means that the labour supply in the projections most probably is over estimated, as immigrants coming to Sweden need some time to enter into the labour market, and on average work fewer hours than people born in Sweden even after several years in the country. A high positive net migration will also mean that there will be more people entering the Swedish labour force at a more advanced age, which will shorten the average career length and pensions. This effect will be even bigger as immigrants are more likely to leave Sweden than people born there.

Table 3. Participation rate, employment rate and share of workers for the age groups 55 - 64 and 65 – 74

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Labour force participation rate 20-64	87.3	87.2	87.3	87.1	87.3	87.1	87.5	2023	-0.3
Employment rate of workers aged 20-64	82.1	83.1	83.2	83.0	83.2	83.0	83.2	2061	0.8
Share of workers aged 20-64 in the labour force 20-64	94.1	95.3	95.3	95.3	95.3	95.3	95.3	2029	1.2
Labour force participation rate 20-74	76.2	76.6	76.1	76.2	74.8	75.6	77.1	2025	-0.6
Employment rate of workers aged 20-74	71.8	73.1	72.6	72.7	71.4	72.2	73.3	2029	0.4
Share of workers aged 20-74 in the labour force 20-74	94.2	95.4	95.4	95.4	95.4	95.4	95.4	2029	1.2
Labour force participation rate 55-64	81.7	79.4	78.9	78.9	78.9	78.9	81.7	2019	-2.8
Employment rate of workers aged 55-64	77.9	76.5	76.1	76.0	76.0	76.0	77.9	2019	-1.9
Share of workers aged 55-64 in the labour force 55-64	95.3	96.3	96.4	96.3	96.4	96.3	96.4	2033	1.0
Labour force participation rate 65–74	17.8	17.8	17.5	17.5	17.3	17.4	18.1	2033	-0.4
Employment rate of workers aged 65-74	17.4	17.5	17.2	17.2	17.0	17.1	17.8	2033	-0.3
Share of workers aged 65-74 in the labour force 65-74	97.7	98.2	98.2	98.2	98.2	98.2	98.3	2063	0.6
Median age of the labour force	41.0	40.0	41.0	41.0	41.0	41.0	41.0	2019	0.0

Source: Commission Services

The fact that the age of retirement and exit from the labour market is assumed unchanged is reflected in tables 4a and 4b. The average effective exit ages are more or less unchanged for both women and men, and the share of adult life spent in retirement increases steadily and will be above one third on average in 2070.

The projected contributory period is the same both 2019 and 2070 for men, while it increases by some 1.4 years for women. This is explained by the historic increase in the participation rate for women, i.e. that females that entered the

labour market 1960'ies and 1970'ies have a shorter contributory period on average, and by more primarily male immigrants which will have shorter than average careers. In addition, the phasing in of the reformed NDC pension system, where periods outside the labour market, i.e. unemployment, parental leave, generates pension rights, contributes to an increase.

Table 4a. Labour market effective exit age and expected duration of life spent at retirement - MEN

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Average effective retirement age (administrative data)*	64.4								
Average labour market exit age (CSM)**	65.6	65.6	65.6	65.6	65.6	65.6	65.6	2027	0.0
Contributory period	41.3	40.8	38.1	39.7	40.0	41.2	41.3	2020	-0.1
Duration of retirement***	18.7	19.6	20.4	21.3	22.1	22.8	22.8	2069	4.1
Duration of retirement/contributory period	0.5	0.5	0.5	0.5	0.6	0.6	0.6	2068	0.1
Percentage of adult life spent in retirement****	28.2	29.2	30.0	30.9	31.7	32.4	32.4	2069	4.2
Early/late exit*****	2.8	2.5	2.0	2.3	2.0	1.9	2.8	2020	-0.9

* The effective retirement age shows the age at which people on average start receiving a pension benefit. It is calculated on the basis of the administrative data for 2019 (see Annex Tables A4a and A4b);   ** "Average labour market exit age (CSM)" refers to year 2020 instead of 2019, and is calculated on Labour Force Survey data for the base year and estimated by the Cohort Simulation Model thereafter;   *** 'Duration of retirement' is calculated as the difference between the life expectancy at the average labour market exit age and that exit age itself;   **** The 'percentage of adult life spent in retirement' is calculated as the ratio between the duration of retirement and the life expectancy minus 20 years;   ***** Early/late exit is the ratio between those who retire and are below the statutory retirement age and those who retire at the statutory retirement age or above.

Source: Commission Services

Tabell 4b. Labour market effective exit age and expected duration of life spent at retirement - WOMEN

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Average effective retirement age (administrative data)*	64.4								
Average labour market exit age (CSM)**	64.5	64.6	64.6	64.6	64.6	64.6	64.6	2029	0.1
Contributory period	40.4	40.4	38.8	40.7	41.5	41.8	41.8	2070	1.4
Duration of retirement***	22.7	22.9	23.9	24.8	25.7	26.6	26.6	2070	3.9
Duration of retirement/contributory period	0.6	0.6	0.6	0.6	0.6	0.6	0.6	2063	0.1
Percentage of adult life spent in retirement****	32.8	32.9	33.9	34.7	35.5	36.3	36.3	2070	3.5
Early/late exit*****	2.3	3.2	2.6	3.0	2.5	2.3	3.2	2030	0.1

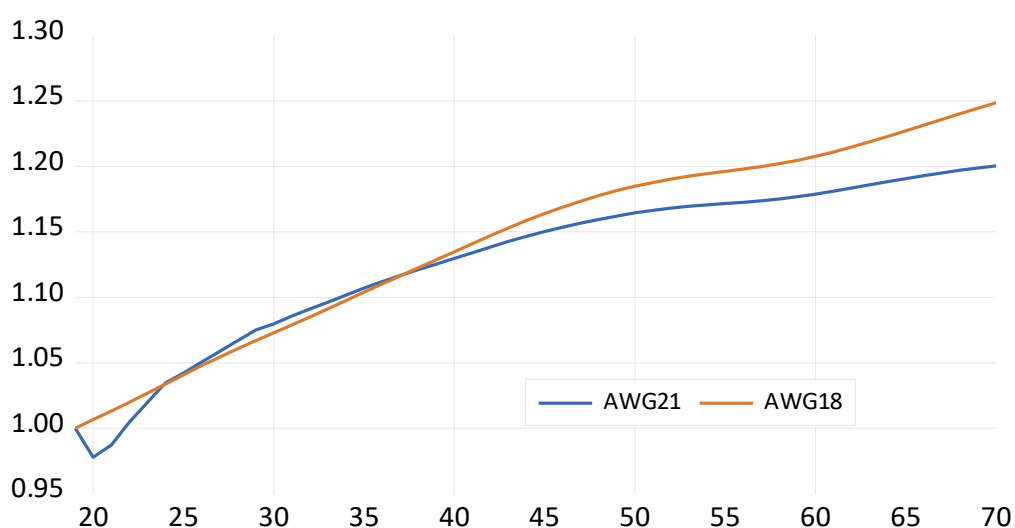Source: Commission Services

The assumption of an unchanged retirement age in combination with the expected increase in the longevity will make the duration of the retirement increase with approx. 4.0 years for men and 4.5 years for women between 2019 and 2070. 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.

Compared to the previous calculation, after the fall in 2020 employment and hours worked increases at a more rapid rate in the short run compared to the previous calculation, see graph 5. In the longer run labour supply increases at a slower rate when population growth is projected to be slower.

Graph 5. Hours worked, index 2019=1

Source: Commission Services

3. Pension projection results

3.1 The coverage of different 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.[18] Apart from the population living in Sweden, the calculations cover individuals with Swedish pensions living abroad.

There are minor differences between the ESSPROS data presented by Eurostat and the data used by AWG. First, there is a small difference between the ESSPROS data presented by Eurostat and Statistics Sweden. Second, there are definition differences between the ESSPROS numbers from Statistics

[18] In ESSPROS the housing subsidy is seen as a benefit in kind (function 7, housing), but in practise it is closely integrated with the pension system. The benefit is not a part in any other item calculated in the AWG projections.

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, and the GDP-ratio for the public expenditures remains approximately the same.

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

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	change 2009-2018
Eurostat total pension expenditure	12.2	11.4	11.2	11.6	12.0	11.6	11.3	11.3	11.2	10.9	-1.3
Eurostat public pension expenditure (A)	9.4	8.7	8.2	8.5	8.7	8.4	8.1	8.1	8.0	7.8	-1.6
Public pension expenditure (AWG: outcome) (B)	9.6	8.8	8.3	8.6	8.8	8.4	8.1	8.1	8.0	7.8	-1.8
Difference Eurostat/AWG: (A)-(B)	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.2

Sources: 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 7.5 % of GDP in 2070 in the baseline scenario, a decrease of 0.1 percentage points compared to the starting year 2019. The growing importance of the premium pension (which statistically speaking is outside the public sector) more than makes up for this development. This system will mature gradually and grow in importance until 2070, and thus the private individual mandatory part of total pension expenditure will increase. Other factors that hold back public sector expenditure are the phasing out of the widow's pension and a relatively small inflow into disability pension.

The importance of private occupational pensions will diminish over the entire projection period. Compared to the AR2018 projections the occupational pensions develop less favourably now, which is explained by a lower interest rate assumption in the current projection. The occupational and private individual schemes are mainly DC and sensitive to the interest rate. Compared to AR2018 the interest rate is assumed to be lower than income growth, leading to smaller pensions compared to PAYG systems, given the same contribution rate.

The development of the private individual pensions depends on two offsetting factors. Mandatory private premium pensions will increase from zero in 2003 to 1.2 per cent of GDP in 2070, as the system is maturing. On the other hand, non-mandatory private pensions will gradually fade out due to the abolition of tax deductibility for wage earners in 2016. Consequently, most people are expected to stop saving in the system. However, a small part will

remain in the system as contributions from self-employed without occupational pension still will be tax deductible. The fact that most pension expenditure are at their highest as a share of GDP in 2020, and the relatively big difference between the peak value and the value in 2019, is explained by the fall in GDP in 2020 due to Covid-19.

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

Expenditure	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Gross public pension expenditure	7.6	7.4	7.1	7.0	7.4	7.5	8.4	2020	-0.1
Private occupational pensions	3.3	2.6	2.0	1.7	1.3	1.2	3.6	2020	-2.1
Private individual mandatory pensions	0.2	0.5	0.8	1.0	1.2	1.2	1.2	2062	1.0
Private individual non-mandatory pensions	0.5	0.3	0.1	0.0	0.0	0.0	0.5	2020	-0.5
Gross total pension expenditure	11.6	10.7	10.0	9.8	10.0	9.9	12.7	2020	-1.7
Net public pension expenditure*	5.8	5.6	5.5	5.5	5.9	6.0	6.4	2020	0.2
Net total pension expenditure*	9.1	8.2	7.6	7.6	7.7	7.6	10.0	2020	-1.6
Public pension contributions	5.7	5.9	5.9	6.0	6.0	6.1	6.4	2020	0.3
Total pension contributions	**8.5**	**9.0**	**9.5**	**9.9**	**9.8**	**9.9**	**9.9**	**2069**	**1.4**

Source: Ministry of Finance

Pensions are taxed in the same way as other income in Sweden. Thus, it is not possible to differentiate tax rates between different pension schemes. The downward trend of tax revenues from public pensions (1.6% of GDP in 2019 versus 1.9% of GDP in 2070), is mainly explained by the fall in gross pensions. The average implicit tax rate for pensioners will decrease until 2070, as lower replacement rates will result in lower marginal taxes.

The earnings–related pensions will decrease until approx. 2050 due to the ageing effect, see table 7. The fall in the earnings–related pension ratio is mitigated by the gradual transition from the old DB system to the NDC system. In the old DB system, the effect of the growing female labour participation had a larger 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 the reformed NDC system.

The minimum top-up guarantee pension (including the housing supplement) will grow from 0.5 percent in 2019 to 1.0 of GDP in 2070, as a result of decreasing replacement rates from earnings-related pensions, which in turn is the consequence of longevity increasing more than the retirement age. Compared to AR2018 the increase in the minimum pensions will be somewhat lower due to a lower number of immigrants, who often have low earnings-related pensions

because of short and fragmented work careers. Note that the guarantee pension is indexed with average earnings from 2024, despite being price indexed in the legislation. The price indexation rules of the guarantee pension have not been changed since the system was introduced in 2003. The income indexation from 2024 might therefore be too generous.

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

Pension scheme	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Total public pensions	7.6	7.4	7.1	7.0	7.4	7.5	8.4	2020	-0.1
Old-age and early pensions	6.7	6.5	6.2	6.2	6.6	6.7	7.4	2020	0.1
Earnings-related	6.2	6.0	5.6	5.4	5.7	5.7	6.9	2020	-0.5
Minimum guarantee pension	0.5	0.5	0.6	0.8	0.9	1.0	1.0	2070	0.5
Disability pensions	0.76	0.78	0.80	0.84	0.76	0.76	0.8	2052	0.0
Survivors' pensions	0.22	0.10	0.03	0.02	0.02	0.02	0.24	2020	-0.2

Source: Ministry of Finance

The number of individuals with a 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 down to 368 000 in 2013 because of both higher outflow and lower inflow, i.e. a reduction of 1/3 from the peak. Between 2013 and 2019 the number of disability pensioners has continued to decrease and will continue to do so the next 20 years of the projections, which is in line with recent forecasts from the Swedish Social Insurance Agency.[19] 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 recent budget forecasts.[20] The risk to be disabled is then kept constant for the rest of the projection period, resulting in an increase in the number of disability pensioners after 2040, and a total increase of 16.6% between 2019 and 2070 due to an ageing population.[21]

The widow's pension is being phased out and replaced by a new, temporary and gender-neutral adjustment allowance. Even if the widow's pension only affects couples which were married or had common children before 1989, benefits will continue to be paid out for several decades, but in rapidly decreasing numbers. In the end of the projection period, only the relatively small temporary

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[19] The age limit 64 years is assumed to remain unchanged throughout the projection period.

[20] The projection is judgemental. For the years 2018 - 2024 the probability of inflow (as a share of the population at risk) is assumed to revert gradually to the average for the period 2008 - 2018.

[21] The calculation of the disability pension is sensitive to the inflow into the system and the choice of reference period.

adjustment allowance remains, which is paid out for 12 months to surviving spouses younger than 65, and mainly to families with children.

3.3 Description of the main driving forces

To explain the development of the ratio of pensions to GDP, this ratio is decomposed into its main driving factors.[22] The demographic increase in the *dependency ratio* contributes to a rise in public pension expenditure. The continued rise of the dependency ratio is due to an increase in longevity but mitigated by the fact that net migration and fertility rates are positive, which make the working age population continue to grow during the entire projection period.

Table 8. Factors behind the change in public pension expenditures between 2019 and 2070 (in percentage points of GDP) - pensioners

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	**-0.3**	**-0.3**	**0.0**	**0.4**	**0.1**	**-0.1**
Dependency ratio effect	**0.7**	**0.5**	**0.3**	**0.9**	**0.2**	**2.6**
Coverage ratio effect*	**0.0**	**-0.1**	**0.1**	**0.0**	**0.1**	**0.1**
Coverage ratio old-age	0.2	0.0	0.1	0.2	0.1	0.6
Coverage ratio early-age	-0.5	-0.6	0.1	-0.2	0.1	-1.0
Cohort effect	-0.7	-0.4	0.0	-1.0	0.1	-2.0
Benefit ratio effect	**-0.9**	**-0.7**	**-0.5**	**-0.4**	**-0.3**	**-2.7**
Labour market effect	**-0.1**	**0.0**	**0.0**	**-0.1**	**0.1**	**-0.1**
Employment ratio effect	-0.1	0.0	0.0	0.0	0.0	-0.1
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	0.0	0.0
Residual	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**-0.1**

* Subcomponents of the coverage ratio effect do not add up necessarily.
Source: Ministry of Finance

The small increase in the *coverage ratio* is due to high migration, which will result in more cross-border pensioners, often with shorter than average contribution periods. The increase is more prominent in the older age group, for the 65 years and older, but negative in the early ages, for the 50-64 years old.

The employment ratio and especially the *benefit ratio* act as offsetting factors on the demography. Several factors contribute to the fall in the benefit ratio. 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

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[22] See Annex 3 for definitions and technical details about the decomposition.

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, see table 6. In addition, the phasing out of the widow's pension also contributes.

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.[23] The RR and BR from public pensions will decrease. The assumption of an unchanged effective retirement age for both women and men in combination with the increase in the longevity will make the duration of the retirement increase with approximately 4 years for men and 4.5 years for women until 2070. This means that the annuity divisors used in the NDC, but also in other actuarial pension systems, will increase and the yearly pension payments will be correspondingly lower. If the conservative assumption of a fixed pension age is dropped, and people will work longer when life expectancy at 65 increases, the fall in BR and RR will be smaller or eliminated.

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

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public scheme (BR)	36%	32%	29%	27%	26%	25%	-11%
Coverage	100.0	100.0	100.0	100.0	100.0	100.0	0.0
Public scheme: old-age earnings related (BR)	33%	29%	25%	23%	22%	20%	-13%
Public scheme: old-age earnings related (RR)	34%	35%	34%	33%	31%	30%	-4%
Coverage	87.0	90.0	90.8	90.9	92.1	92.1	5.2
Private occupational scheme (BR)	20%	14%	10%	8%	5%	4%	-16%
Private occupational scheme (RR)	20%	18%	17%	11%	13%	14%	-6%
Coverage	75.3	79.0	82.5	85.7	88.3	88.9	13.6
Private individual schemes (BR)	7%	5%	5%	5%	5%	5%	-3%
Private individual schemes (RR)	9%	8%	7%	6%	6%	7%	-2%
Coverage	106.7	126.5	125.6	117.5	108.4	100.0	-6.6
Total benefit ratio	**54%**	**46%**	**41%**	**38%**	**35%**	**33%**	**-21%**
Total replacement rate	**42%**	**43%**	**41%**	**38%**	**37%**	**36%**	**-6%**

Source: Ministry of Finance

As the previous DB system is being phased out and replaced by the NDC part of the reformed system, the public RR will decrease significantly. This is counter-

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[23] 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 pensioners in the BR.

acted by an increase in the second part of the reformed system, the privately classified premium pension. Still, the total BR and the RR will decrease significantly over the projection period.

On aggregate pensions are indexed with average earnings. However, for the individual the replacement rate from the public income pension will become lower 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 simple 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 a Swedish pension living abroad. Many emigrants have only spent a part of their career in Sweden, and their Swedish benefits are thus relatively low although they may also have benefits from other countries. Migrants often move in and out of Sweden several times. Therefore, the number of pensioners with earnings-related pension (but not the expenditure) might be 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 included, the RR would be lower than the numbers presented in table 9.

In addition, the replacement rate from occupational pensions is expected to decrease in the future, due to both higher longevity and the growing importance of funded defined contribution components and the cautious interest assumptions. 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 during a fixed time period, usually the first five years of retirement, resulting in a higher average RR at the time of retirement and a shift down after 5 years. The development of the BR and the RR for private pensioners depends on two offsetting factors. The mandatory private premium pension will increase rapidly as the system is maturing. As the premium pension is funded and earns a market rate of return, the outcome is sensitive to the interest rate assumptions. If its higher than the income growth, the effect of increasing longevity is mitigated and vice versa. In these calculations the interest rate has been revised downward compared to the AR2018 calculations.

On the other hand, the replacement rate for private voluntary pensions will fall to close to zero due to the abolished tax-deductions for private pension savings for wage earners. 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. The phasing out of the voluntary part of private individual pensions also explain the decrease in the coverage ratio from 107% to 100%. At the same time as fewer pensioners will get voluntary private pension, more pensioners will receive a premium pension, as the latter system is mandatory and covers all taxpayers in Sweden and beneficiaries living abroad.

System dependency ratio

The number of pensioners is expected to increase the whole projection period. In addition, employment is projected to increase until 2070, but in a slower pace, resulting in an increase in the pension system dependency ratio (SDR) by 21.5 percentage points, see table 10. The old-age dependency ratio is expected to increase with 14.6 percentage points, resulting in a more or less stable system efficiency quota.

Table 10. System dependency ratio and old-age dependency ratio

	2019	2030	2040	2050	2060	2070	change 2019-2070
Number of pensioners (thousand) (I)	2 638	3 068	3 396	3 738	4 219	4 504	1 866
Employment (thousand) (II)	5133	5556	5809	5986	6062	6176	1043
Pension system dependency ratio (SDR) (I)/(II)	51.4	55.2	58.5	62.4	69.6	72.9	21.5
Number of people aged 65+ (thousand) (III)	2 051	2 384	2 674	2 891	3 257	3 441	1 390
Working age population 20-64 (thousand) (IV)	5833	6205	6489	6716	6730	6908	1075
Old-age dependency ratio (OADR) (III)/(IV)	35.2	38.4	41.2	43.0	48.4	49.8	14.6
System efficiency (SDR/OADR)	1.5	1.4	1.4	1.5	1.4	1.5	0.0

Source: Ministry of Finance

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, 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 over time due to fewer disability pensioners and a better labour market. For older age groups there will be an increase due to the growing participation among retired and a growing number of Swedish pensioners living abroad. This increase is most pronounced after 2040.

Table 11A. Pensioners (public scheme) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	5.2	4.8	5.0	4.7	4.8	4.8
Age group 55-59	100.2	77.5	72.5	72.9	74.5	74.4
Age group 60-64	128.5	104.0	94.4	93.0	90.0	95.0
Age group 65-69	145.6	144.8	146.7	151.0	149.4	150.1
Age group 70-74	126.2	130.1	124.4	129.5	135.2	129.2
Age group 75+	107.2	111.3	113.9	114.3	117.2	120.5

Source: Ministry of Finance

The number of pensioners as a share of both the total and the inactive population is above 100 % for all age groups above 65 years, see Tables 11a and 11b. This is because the pensioners numbers include pensioners living abroad, whereas the population only include people living in Sweden.[24] Another reason is that pensioners are working, and part of the labour force, even if they receive a pension benefit at the same time.[25]

Table 11b 3. Pensioners (public schemes) to total population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	2.0	1.8	1.8	1.8	1.8	1.8
Age group 55-59	11.0	9.1	9.2	9.2	9.2	9.3
Age group 60-64	33.6	30.8	28.3	28.0	27.2	28.5
Age group 65-69	109.5	108.6	110.1	113.7	112.9	113.0
Age group 70-74	112.3	117.7	112.4	117.0	122.0	116.8
Age group 75+	107.2	111.3	113.9	114.3	117.2	120.5

Source: Ministry of Finance

The pensioners to inactive ratio for women is similar to the ratio in the population as a whole, but somewhat lower, particularly in ages groups 60-69, see 11a and 12a. The difference is smaller for the pensioners to total population numbers in tables 11b and 12b. A somewhat technical explanation for the bigger difference between the female and overall pensioners to inactive ratio is that the ratios in tables 11 and 12 are a mix of two sources that is not fully consistent, i.e. exogenous assumptions (number of inactive people) from the CSM, and endogenous numbers from the pension model (number of pensioners).

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[24] If cross border pensioners are excluded the ratio in the age group 65-69 years will decrease.

[25] Many pensioners, particularly in the ages below 70, also have earned income, which is expected to become more common in the future.

Table 12A. Female pensioners (public scheme) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	5.7	5.2	5.3	5.2	5.3	5.1
Age group 55-59	101.2	77.2	69.5	73.6	73.1	78.6
Age group 60-64	114.6	85.4	78.2	79.2	74.3	82.2
Age group 65-69	144.1	139.1	140.5	142.5	140.5	140.0
Age group 70-74	128.4	129.5	118.8	122.1	129.7	122.2
Age group 75+	108.0	115.3	117.7	115.5	116.3	119.4

Source: Ministry of Finance

Table 12b   Female pensioners (public scheme) to total population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	2.2	2.0	2.0	2.0	2.0	1.9
Age group 55-59	12.8	10.0	10.1	10.0	9.7	10.5
Age group 60-64	33.9	29.9	27.7	28.1	26.5	29.0
Age group 65-69	114.5	110.6	110.8	113.2	111.6	110.6
Age group 70-74	116.5	122.5	112.0	115.2	122.3	115.4
Age group 75+	108.0	115.3	117.7	115.5	116.3	119.4

Source: Ministry of Finance

New public expenditure

In Table 13a-13c new earnings-related pension expenditure in the public NDC system is reported. Note that the numbers in the tables excludes pensioners with Swedish pension rights living abroad.

Table 13a. 3.   Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions)

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million Euro)*	1 477.5	2 204.2	2 655.0	4 127.6	5 534.0	8 207.3
I. Number of new pensions (1000)	111.3	128.4	122.3	143.9	139.9	146.9
II. Average contributory period (years)	40.5	40.6	38.5	40.2	40.7	41.5
III. Average accrual rate (%)	0.92	0.90	0.87	0.84	0.82	0.80
Notional-accounts contribution rate (c)	0.2	0.2	0.2	0.2	0.2	0.2
Annuity factor (A)	17.3	17.7	18.3	19.0	19.5	20.1
IV. Monthly average pensionable earnings (1000 Euro)	3.0	3.9	5.4	7.1	9.9	14.1
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	91%	92%	91%	84%	83%	83%

*New pension expenditure equals the product of I. II. III. IV. V & VI

Source: Ministry of Finance

The shorter contributory period for women initially is the result of their historically lower participation rates. The contributory period for women is expected to increase over time, with a marked reduction around 2040. For men the contributory period is more or less constant in the long run, but with an even more pronounced reduction at the middle of the projection. The reason for the difference in long trends is the increasing employment rate for women and the stable for men, whereas the mid-projection reduction for both sexes is due the large number of immigrants, with relatively shorter working careers, which came to Sweden around 2015. More male than female immigrants explain why the reduction is bigger for men. Note that individuals also earn non-contributory pension rights for e.g. studies and parental leave, and that the average contributory period therefore exceeds the average working career.

The average accrual rate is more or less the same for men and women, but the average pensionable earnings are some 10 percent higher for men than for women, which explains the difference in new pension expenditure per new pension and the benefit ratio between women and men of roughly the same magnitude.

Table 13b 3.   Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - MEN

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million Euro)*	799.2	1 183.7	1 394.3	2 125.3	2 952.4	4 334.3
I. Number of new pensions (1000)	56.5	64.6	62.6	71.5	72.9	75.0
II. Average contributory period (years)	41.1	40.8	38.1	39.7	40.0	41.2
III. Average accrual rate (%)	0.9	0.9	0.9	0.8	0.8	0.8
Notional-accounts contribution rate (c)	0.16	0.16	0.16	0.16	0.16	0.16
Annuity factor (A)	17.4	17.8	18.4	19.1	19.5	20.2
IV. Monthly average pensionable earnings (1000 EUR)	3.1	4.1	5.6	7.5	10.5	14.9
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	97%	98%	95%	89%	88%	88%

*New pension expenditure equals the product of I. II. III. IV. V & VI

Source: Ministry of Finance

Technically the base for the calculation of new pension expenditure 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 also adjusted for

the phasing in of the reformed NDC system until 2018, depending on what year the individual was born.[26]

There is therefore no straightforward relation between the growth of the "implicit pensionable earnings" and the average income growth. In the tables 14a-14d the sustainability factor is set to 1, because the effect of the balancing is already counted for implicitly in pension payments and pension wealth.[27] In the computations the average number of months paid out during the first year is 12, but in reality the number is close to 6.

Table 13c   Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - WOMEN

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million Euro)*	699.3	1 021.5	1 338.5	1 927.6	2 627.6	3 929.2
I. Number of new pensions (1000)	56.6	63.8	63.5	68.8	67.8	73.1
II. Average contributory period (years)	39.8	40.2	38.7	40.5	41.1	41.6
III. Average accrual rate (%)	0.9	0.9	0.9	0.8	0.8	0.8
Notional-accounts contribution rate (c)	0.16	0.16	0.16	0.16	0.16	0.16
Annuity factor (A)	17.2	17.6	18.2	18.9	19.4	20.0
IV. Monthly average pensionable earnings (1000 EUR)	2.8	3.7	5.2	6.8	9.5	13.4
V. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VI. Average number of months paid the first year	12.0	12.0	12.0	12.0	12.0	12.0
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	86%	87%	87%	81%	80%	79%

*New pension expenditure equals the product of I. II. III. IV. V & VI

Source: Ministry of Finance

3.4 Financing of the pension system

From 2019 to 2070 the number of pensioners will increase by some 71 %. During the same period the number of contributors will grow only by some 18 % and employment by some 20 %. The combined effect of this is that the support ratio, i.e. the number of contributors per employee, and contributions as a share of GDP, will remain approx. unchanged.

The number of pensioners substantially exceeds the number of individuals older than 65 as the calculations 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

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[26]Thus, note that the method of deriving the pensionable earnings makes the identities hold by definition.

[27] The balance indexation was terminated in 2018 and not applied again in the calculations after this.

unemployment, sickness, disability and parental leave. Self-employed individuals also participate in the system.

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

	Public employees	Private employees	Self-employed
Contribution base	Pensionable income	Pensionable income	Pensionable income
Contribution rate/contribution	18.5%	18.5%	18.5%
Employer	10.21% (including Premium Pension)	10.21% (including Premium Pension)	17.2%
Employee	7% (including Premium Pension)	7% (including Premium Pension)	
*State**	Employer contribution' for social insurance	Employer contribution' for social insurance	Employer contribution' for social insurance
*Other revenues**	Buffer funds	Buffer funds	Buffer funds
Maximum contribution	8.07 income base amounts	8.07 income base amounts	8.07 income base amounts
Minimum contribution	0	0	0

*only legislated contributions are reported

Note: The income base amount is SEK 66 800 (approx. 6300 €) in 2017. Hence. the contribution ceiling is SEK 539 100 or approx. 50 900 €. The contribution are calculated on earnings net of the employee contribution. i.e. (0.07+0.1021)/(1-0.07) = 0.185

Source: Ministry of Finance

Table 15. Revenue from contribution (%GDP) number of contributors in the public scheme (in 1000). total employment (in 1000) and related ratios (%)

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public pension contributions (%GDP)	5.7	5.9	5.9	6.0	6.0	6.1	0.3
Employer contributions	2.7	2.9	3.0	3.1	3.2	3.3	0.5
Employee contributions	2.6	2.5	2.5	2.5	2.4	2.4	-0.1
*State contribution**	0.4	0.4	0.4	0.4	0.4	0.4	-0.1
*Other revenues**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of contributors (I) (1000)	5 848	6 183	6 474	6 692	6 738	6 918	1 070
Employment (II) (1000)	5 133	5 556	5 809	5 986	6 062	6 176	1 043
(I) / (II)	1.14	1.11	1.11	1.12	1.11	1.12	-0.02

*only legislated contributions are reported

Source: Ministry of Finance

3.5 Pension assets and return on assets

There is a buffer fund to the public old-age pension system which takes care of yearly differences between pension payments and contributions. In 2019 the fund amounted to some 30.2 percent of GDP. The assets of the buffer fund are invested in interest bearing and non-interest-bearing assets, which since 2000 have had an average annual return of 5.8 percent including the value increase of non-interest-bearing assets.

In the calculations the average yearly return is assumed to be in line with AWG:s commonly agreed interest rate assumptions. This assumption is cautious as most of the assets in the fund is non-interest bearing and has in the past had a higher return than market interest rates.

Table 16   Pension assets and reserves (% GDP) and return on assets (%)

	average 1999-2008	average 2009-2018	2019	2030	2040	2050	2060	2070	average 2019-2070
Public pension scheme									
assets and reserves	26.1	30.2	30.2	23.2	22.3	28.6	35.8	42.2	29.3
average return	*3.2*	*8.1*	1,8	0,9	2,4	4,0	4,0	4,0	*2.6*

Source: Ministry of Finance

3.6 Sensitivity analysis

The sensitivity scenarios can be divided into four groups:

1   Productivity (Higher productivity / TFP risk)

2   Demographics (Higher life expectancy, Higher / Lower migration, Lower fertility)

3   Labour market (Higher employment, Older workers, Permanent / Temporary shock)

4   Policy risk (Linking the retirement age, Constant benefit ratio)

In the Swedish case, the unchanged retirement age scenario is the same as the baseline.

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 for public pensions in the TFP risk scenario and the higher productivity scenario are more or less identical to the baseline scenario as a share of GDP. The small difference in total pension expenditure, somewhat lower pensions as a share of GDP in the TFP scenario and vice versa, is due to the unchanged interest rate assumptions in all three scenarios, Baseline and high/low productivity, which gives pension expenditure a negative correlation to productivity induced growth.

In the **second** group demographic scenarios sensitivity is more evident. The biggest difference is in the *Lower fertility* scenario where the number of pensioners will grow faster than the labour force. Also, in the *Higher/Lower migration* scenarios the sensitivity is large. The effects are amplified by changes in the contributory period, as immigrants often have shorter careers. 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 **third** group, the scenarios with higher employment lower the pension to GDP ratio as higher employment result in higher production, but also in higher earnings-related 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 earnings-related pensions for the individuals who are prolonging their working lives. Whereas the temporary shock scenario only lowers pensions temporarily as a share of GDP, the permanent adverse structural shock scenario has a somewhat larger and permanent negative effect on the pensions to GDP ratio.

In the fourth group with policy scenarios, the linking the retirement age scenario is modelled on an upcoming reform of the pension system, see box in section 1.2 above. 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 two thirds of the increase in longevity[28], this will cause a higher GDP and earnings-related pensions and lower dependency of non-contributory pensions. The effect is strongest at the beginning when people start working longer at the same time as no one retires. After some years, 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 and retirement delayed, the pensions to GDP ratio will remain lower. Finally, in the scenario where the old age earnings related benefit ratio is not allowed to fall below 90 percent of its value in 2019, pension expenditure will increase by more than 3 percentage points of GDP in 2070.

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[28] More details about the method can be found in section 4.4

Table 17. 3. Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)

Public pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	7,6	7,4	7,0	7,0	7,4	7,5	-0,1
Higher life expectancy at birth (+2y)	0,0	0,1	0,1	0,1	0,2	0,2	0,2
Higher migration (+33%)	0,0	-0,1	-0,3	-0,3	-0,4	-0,3	-0,3
Lower migration (-33%)	0,0	0,2	0,3	0,4	0,5	0,4	0,4
Lower fertility (-20%)	0,0	0,0	0,1	0,3	0,6	1,0	1,0
Higher employment rate of older workers (+10 pps.)	0,0	-0,2	-0,2	-0,2	-0,3	-0,2	-0,2
Higher TFP growth (convergence to 1.2%)	0,0	0,0	0,0	0,0	0,0	0,0	0,0
TFP risk scenario (convergence to 0.8%)	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Policy scenario: linking retirement age to change in life expectancy	0,0	-0,3	-0,3	-0,4	-0,5	-0,7	-0,7
Policy scenario: unchanged retirement age	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Policy scenario: offset declining pension benefit ratio	0,0	0,2	1,2	2,0	2,8	3,4	3,4
Lagged recovery scenario	0,0	0,1	0,0	0,0	0,0	0,0	0,0
Adverse structural scenario	0,0	0,2	0,3	0,2	0,3	0,3	0,3

Total pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	11,6	10,7	10,0	9,8	10,0	9,9	-1,7
Higher life expectancy at birth (+2y)	0,0	0,1	0,1	0,2	0,2	0,2	0,2
Higher migration (+33%)	0,0	-0,2	-0,3	-0,5	-0,5	-0,4	-0,4
Lower migration (-33%)	0,0	0,2	0,4	0,5	0,6	0,5	0,5
Lower fertility (-20%)	0,0	0,0	0,1	0,4	0,8	1,2	1,2
Higher employment rate of older workers (+10 pps.)	0,0	-0,3	-0,3	-0,3	-0,3	-0,3	-0,3
Higher TFP growth (convergence to 1.2%)	0,0	0,0	-0,1	-0,1	-0,2	-0,2	-0,2
TFP risk scenario (convergence to 0.8%)	0,0	0,0	0,1	0,1	0,2	0,2	0,2
Policy scenario: linking retirement age to change in life expectancy	0,0	-0,2	-0,3	-0,3	-0,3	-0,6	-0,6
Policy scenario: unchanged retirement age	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Policy scenario: offset declining pension benefit ratio	0,0	0,2	1,2	2,0	2,8	3,4	3,4
Lagged recovery scenario	0,0	0,1	0,1	0,0	0,0	0,0	0,0
Adverse structural scenario	0,0	0,4	0,4	0,5	0,6	0,6	0,6

Source: Ministry of Finance

3.7 Description of the changes in comparison with earlier projections

Compared to the 2018 projections the public pensions to GDP ratio will be slightly higher, even if the contributions from the different components are similar. The dependency ratio will increase the pension to GDP ratio, whereas a lower benefit ratio will counter-act this effect.

Compared to AWG18 the benefit ratio now is slightly less negative, which is explained by the revision upward of the average pensions.[29] The average pension is dependent on the average contributory period, which in its turn depends on the number of people who come to and leave Sweden. Hence, the division of the net migration assumption into inflows and outflows is important for the results. In these calculations, emigration from Sweden is more realistically dependent on earlier immigration to Sweden, which means that the number of people who leave Sweden now is higher and increasing to nearly 58 000 persons in 2070. Larger in- and outflows for a given net migration will result in a shorter average contributory period, all else equal, and a smaller average pension balance at the time of retirement.

Table 18. Overall change in public pension expenditure to GDP under the2006. 2009. 2012 and 2015 projection exercises

	Public pension expenditure	Dependency ratio effect	Coverage ratio effect	Benefit ratio effect	Labour market effect	Residual (incl. interaction effect)
2006 Ageing Report (2004-2050)	**0,9**	4,8	-0,2	-2,8	-0,6	-0,2
2009 Ageing Report (2007-2060)	**-0,1**	5,6	-0,4	-4,3	-0,4	-0,6
2012 Ageing Report (2010-2060)	**0,6**	5,0	-0,8	-2,7	-0,5	-0,4
2015 Ageing Report (2013-2060)	**-1,4**	2,6	0,2	-3,7	-0,4	-0,1
2018 Ageing Report (2016-2070)	**-1,2**	2,4	0,6	-4,0	-0,1	-0,1
2021 Ageing Report (2019-2070)	**-0,1**	2,6	0,1	-2,7	-0,1	-0,1

- The disaggregation for 2006/2009/2012 is on the basis of pensions; for 2015/2018/2021 it is on the basis of pensioners.
- The projection horizon has been extended over consecutive Ageing Reports. limiting comparability over time.

Source: Ministry of Finance

The decomposition in table 19b is somewhat rough. The change due to the decreasing disability and the rest of the differences are classified as *Change in assumptions* and 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 as in AWG18, see also section 3.2.[30] The small *Policy-related change* in table 19b is due to the introduction the new Income Pension Supplement.

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[29] Between the projections in 2006 and 2009 the premium pension was reclassified from the public to the private sector.

[30] The long-run average was calculated on the reference period 2006-2014.

Table 19a. Breakdown of the difference between the 2018 projections and outcome figures (% of GDP)

	2016	2017	2018	2019
Ageing Report 2018 projections	8,2	8,0	7,9	7,7
Assumptions (pps of GDP)	-0,1	-0,1	-0,1	-0,1
Coverage of projections (pps of GDP)	0,0	0,0	0,0	0,0
Constant policy impact (pps of GDP)	0,0	0,0	0,0	0,0
Policy-related impact (pps of GDP)	0,0	0,0	0,0	0,0
Actual public pension expenditure	8,1	8,0	7,8	7,6

Source: Ministry of Finance

Table 19b. Breakdown of the difference between the 2018 and the new public pension projection (% of GDP)

	2019	2030	2040	2050	2060	2070
Ageing Report 2018 projections	7,7	7,2	6,8	6,6	7,0	7,0
Change in assumptions (pps of GDP)	-0,1	0,1	0,1	0,3	0,4	0,5
Improvement in the coverage or in the modelling (pps of GDP)	0,0	0,0	0,0	0,0	0,0	0,0
Change in the interpretation of constant policy (pps of GDP)	0,0	0,0	0,0	0,0	0,0	0,0
Policy-related changes (pps of GDP)	0,0	0,1	0,1	0,1	0,1	0,1
New projections	7,6	7,4	7,0	7,0	7,4	7,5

4. Description of the pension projection model

4.1 Introduction

As in the previous exercises, the projections have been made with the dynamic microsimulation model SESIM. Originally the model was developed at the Swedish Ministry of Finance in close cooperation with researchers at Swedish universities. The model has been further developed at the Ministry of Health and Social affairs.[31] SESIM is a general micro-simulation model that can be used for a broad set of analyses. The model has for example been used for analyses of health amongst elderly.[32] It has also been used by the Pension age committee, and in the reviews of the pension system.

All the AWG projections and model simulations have been made at the Ministry of Health and Social Affairs. No peer review etc. has been done nationally. For the period until 2021, the results have been validated against National Accounts outcome and projections from The Swedish Pension Agency. The results have also been validated against the AWG demographic and

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[31] A detailed documentation can be found in Flood et.al [2012], or at www.sesim.org.

[32] *The future need for care - Results from the LEV project*, Ministry of Health and Social Affairs, 2010.

macroeconomic assumptions, as well as with the previous round of AWG pension projections.

4.2 Overview of the model

SESIM is a conventional dynamic microsimulation model in the sense that the variables are updated in a yearly sequence. The initial sample of the Swedish population includes approximately 320 000 individuals and is from 1999.[33] All individuals are subject to a large number of possible life events, such as education, marriage, parenthood, work or retirement.

SESIM has a recursive structure, where the modules are executed in a predetermined order, see figure 6 below. The unit of simulation is the individual, but households are also important, as 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). Next in the sequence calculations relating to education and the labour market (unemployment, employment etc.) are executed. In order to capture the demographic features of the Eurostat projection and the labour market outcome of the Cohort Simulation Model, alignment (or calibration) procedures are necessary.

Every individual is assigned one out of nine possible statuses every specific year.[34] Every status is related to a main source of income. Employment results in earnings; retirement brings pensions etc. For employed individuals an estimated earnings equation is used to determine the income. For other statuses, for example unemployment, current rules are applied to calculate the income. Next capital income from financial assets and housing is calculated.[35]

Then transfers and pensions will be calculated. The rules for all types of pensions are implemented in relevant detail (i.e. public, occupational and private pensions). All persons are assumed to claim full time pension, since the model cannot handle part time retirement (or any other mixed statuses). Pensioners can also earn work income and pension simultaneous. Also, the automatic balancing mechanism is implemented in the model, but not used in the AWG calculations after the medium-term, as it will not affect the results in the long run (but may affect the general picture if pensions are balanced a single year).

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[33] If necessary, the sample can be extended

[34] The different statuses are: Child (0-15 years old), Old-age pension, Student, Disability pensioner, on parental leave, Unemployed, Employed, Miscellaneous, emigrated (individuals living abroad with Swedish pensions rights).
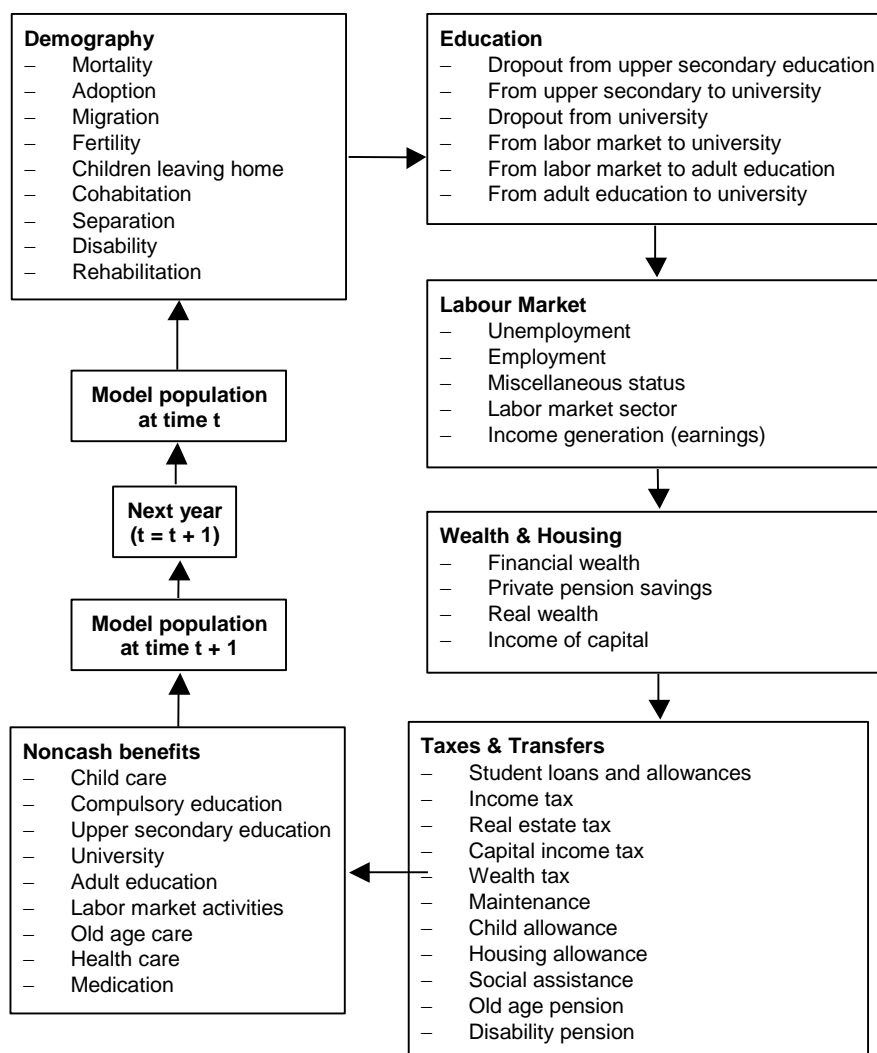
[35] Four separate assets are considered in the household portfolio: financial wealth, own homes, other real wealth and private tax-deductible pension savings.

SESIM also allows for a more 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 projections, the module for the labour market is central, especially employment, unemployment, retirement or disability. These functions are statistical rather than economic, in the sense that the probability of an event is influenced by individual characteristics, but not by financial incentives. For example, the probability of retirement is a function of the individual's education, age, gender, income etc., but not of the marginal tax. One important feature reflected in the retirement model is that spouses tend to coordinate their retirement.

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 observed age distribution. Most people retire at 65. Note that the average pension age 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 draw their pension and are thus counted as employed in LFS terms.

Graph 6. Structure of SESIM

Demography	**Education**
– Mortality – Adoption – Migration – Fertility – Children leaving home – Cohabitation – Separation – Disability – Rehabilitation	– Dropout from upper secondary education – From upper secondary to university – Dropout from university – From labor market to university – From labor market to adult education – From adult education to university

Model population at time t

Next year (t = t + 1)

Model population at time t + 1

Labour Market
– Unemployment
– Employment
– Miscellaneous status
– Labor market sector
– Income generation (earnings)

Wealth & Housing
– Financial wealth
– Private pension savings
– Real wealth
– Income of capital

Noncash benefits
– Child care
– Compulsory education
– Upper secondary education
– University
– Adult education
– Labor market activities
– Old age care
– Health care
– Medication

Taxes & Transfers
– Student loans and allowances
– Income tax
– Real estate tax
– Capital income tax
– Wealth tax
– Maintenance
– Child allowance
– Housing allowance
– Social assistance
– Old age pension
– Disability pension

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.[36] 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 other 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 accumulation of pension rights, can be traced back as far as 1960.

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[36] For a more detailed description of the data set, see e.g. Flood et al (2012) and Edin & Fredriksson (2000).

New individuals replace those that disappear from the data set due to death or emigration in order to maintain the statistical representability.

4.4 Assumptions and simulations

The most important exogenous economic variables in SESIM are inflation, real income growth per capita, short- and long-term interest rates and return on stocks. As far as possible, macro numbers are aligned to the AWG assumptions. In the calculations, the model is adjusted to the average unemployment and participation rates for five-year groups and sex, so that the simulated population and labour force tracks the AWG-assumptions. The model results are as far as possible calibrated to NA levels 2019.

The calculations are made in current prices. The indexation rules are implemented in detail in the model. All items that are price indexed by legislation, have been income indexed from 2024 in the projections (for example the housing allowance for pensioners and the guarantee pension). It is also assumed that the rate of return on funded assets in the individual public DC funds and the individual occupational pension accounts will be the same for all individuals. Upon retirement, individuals get their public DC pension as a fixed annuity

In the sensitivity scenarios, the pension age is normally based on actual pension behaviour, and are the same in the Baseline scenario and all other scenarios except the *"linking the retirement age policy scenario"*, where the age limits and the pension behaviour is shifted to increase the effective pension age in line with longevity. This is done by making people "younger," i.e. letting older people adapt to the behaviour of younger. In the policy scenario also, all relevant age limits are increased with two thirds of the increase in longevity, approximately keeping the share of adult life spent in retirement constant. This is in line with the forthcoming pension reform, which was announced in the 2021 budget proposal, see box on upcoming reform above.[37]

4.5 Additional information about the modelling

- The exchange rate in the base year 2019 is 10.5891 SEK/Euro, according to Eurostat, has been used from 2019 and onwards.

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[37] See https://www.regeringen.se/4a67b3/contentassets/c1063c03c89247b694cb895aae28741d/hojda-aldersgranser-i-pensionssystemet-och-i-andra-trygghetssystem_ds-2019_2.pdf.

- A real interest rate of 2 percent is used in the calculations from 2050. From 2019 the outcome is used, and the years 2020 to 2049 are interpolated. No deductions for costs for administration of the public funds are assumed.
- Some major pension expenditures and public contributions are adjusted to national account levels until 2019. From 2019 nominally constant add factors have been used.
- In SESIM, only individuals with a public pension receive an occupational pension. Thus, different types of collectively agreed early retirement options, agreed disability pensions etc. are not included. Compared to AWG18 the occupational pensions are adjusted to NA-levels.
- Only DC contributions to occupational pensions are reported, not DB contributions that are financed (and funded or insured) by the employers on an actuarial ground.
- The decomposition of private individual pensions only includes the mandatory DC premium pension (not the tax-deductible pension savings that is being phased out).
- The longevity in Sesim is not truncated at 100 years, as in the Eurostat forecast.
- The population in Sesim is endogenous, but of course based on Eurostats projections. The population is therefore aligned (calibrated). In order to do this, both emigration and immigration flows for Swedish born and individuals born outside Sweden are used. As data about origin is not reported in Europop2019, the pattern from the latest population projection from Statistics Sweden is used.

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Annex 1: Additional reporting

Economy- wide average wage at retirement

The economy-wide 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.[38]

Table A1. Economy wide average wage at retirement (1000 EURO)

	2019	2030	2040	2050	2060	2070	% change 2019-2070
Economy-wide average gross wage at retirement	41.6	55.7	80.5	112.9	158.6	223.8	438.5
Economy-wide average gross wage	38.8	50.7	71.1	101.0	143.3	203.3	424.5

Source: Ministry of Finance

Pensioners vs Pensions

Both the number of pensioners and the number of pensions is 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 everyone in line with legislated taxation rules. 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 used for reporting of all kinds of pension.

Disability pension

The modelling 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 2008-2018. See section 3.2 for more details.

The low inflow result in a gradual decrease, as existing disability pensioners reaches age 64 and are shifted to old-age pension. Table A.2 shows that disability

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

is increasing with age. According to the legislation no one over age 64 get disability pension. In the model calculations they are therefore shifted to old-age pension. Even though this is the normal procedure in real life, as an old age pension is more generous, 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 line with the indicative pension age.

Table A2. Disability rates by age groups (%)

	2019	2030	2040	2050	2060	2070
Age group -54	108	105	113	112	121	122
Age group 55-59	62	59	59	72	65	71
Age group 60-64	89	92	90	105	96	109
Age group 65-69	0	0	0	0	0	0
Age group 70-74	0	0	0	0	0	0
Age group 75+	0	0	0	0	0	0

Source: Ministry of Finance

Survivor pensions

In the microsimulation both individuals and households are modelled. If a member in a household dies the eligible survivors in the household will get the survivor benefit. In the calculations the very complicated legal rules are simplified due to limitations in the model and the data. All amounts are income indexed.

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 2024.

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.

Alternative pension spending decomposition

Table A3. Factors behind the change in public pension expenditure between 2019 and 2070 (percentage points of GDP) – pensions

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	-0.3	-0.3	0.0	0.4	0.1	-0.1
Dependency ratio effect	0.7	0.5	0.3	0.9	0.2	2.6
Coverage ratio effect	0.1	0.2	0.4	0.3	0.3	1.2
Coverage ratio old-age*	0.3	0.3	0.4	0.4	0.3	1.7
Coverage ratio early-age*	-0.5	-0.5	0.0	-0.2	0.1	-1.1
Cohort effect*	-0.7	-0.4	0.0	-1.0	0.1	-2.0
Benefit ratio effect	-1.0	-1.0	-0.7	-0.6	-0.4	-3.8
Labour market effect	-0.1	0.0	0.0	-0.1	0.1	-0.1
Employment ratio effect	-0.1	0.0	0.0	0.0	0.0	-0.1
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	0.0	0.0
Residual	0.0	0.0	0.0	0.0	0.0	-0.2

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

Administrative data on new pensioner

Tables A4 a-c show the age and sex distribution of new entrants into the different schemes.[39] There are no "other" pension schemes in Sweden and the survivors pension scheme has been closed to new entrants, so that pension payment from this scheme will be phased out gradually. At ages above 50 years more women than men receive a disability pension, which is in line with the use of the public health insurance.

Table A4a. Administrative data on new pensioners (2019) - men

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	-236	0	-236	0	0
50 - 54	238	0	238	0	0
55 - 59	341	0	341	0	0
60 - 64	22 334	21 825	509	0	0
65 - 69	28 049	28 046	3	0	0
70 - 74	696	696	0	0	0
75+	24	24	0	0	0

Source: **Swedish Pensions Agency**

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[39] In table A4a-c the number of retirements in a specific year and age bracket is the number of (positive) retirements minus the number of negative retirements.

Table A4b   Administrative data on new pensioners (2019) - women

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 – 49	-201	0	-201	0	0
50 – 54	279	0	279	0	0
55 – 59	396	0	396	0	0
60 – 64	20 375	19 908	467	0	0
65 – 69	28 173	28 182	-9	0	0
70 – 74	428	428	0	0	0
75+	10	10	0	0	0

Source: Swedish Pensions Agency

Table A4c   Administrative data on new pensioners (2019) - total

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 – 49	-437	0	-437	0	0
50 – 54	517	0	517	0	0
55 – 59	737	0	737	0	0
60 – 64	42 709	41 733	976	0	0
65 – 69	56 222	56 228	-6	0	0
70 – 74	1124	1124	0	0	0
75+	39	39	0	0	0

Source: Swedish Pensions Agency

Pensioners inside and outside Sweden

The number of pensioners with Swedish pension living abroad were 161 787 in 2020 (outcome).[40] The number is projected to increase to 760 000 in 2070, an increase of the cross-border share from 8.3% in 2019 to 18.1% in 2070. The number may seem high, but already in 2014 there were around 600 000 individuals with Swedish pension rights living abroad.[41] However, in the model simulations there is a risk that the number is overestimated as some individuals move in and out of Sweden several times. In money terms the overseas share is

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[40] Source: Swedish Pensions Agency

[41] https://www.sviv.se/wp-content/uploads/2019/04/Kapitel-Pension.pdf

lower, 1.4% in 2019 and 3.0% in 2070, but the relative increase until 2070 is expected to be the same.

Compared to the 2018 projections the number of pensioners starts to increase around 2040. The reason for this is that many of the immigrants that arrived 2016-2019 begin to retire, and many are assumed to emigrate when they retire.

Graph A1. Number of Swedish pensioners inside and outside Sweden (1000)
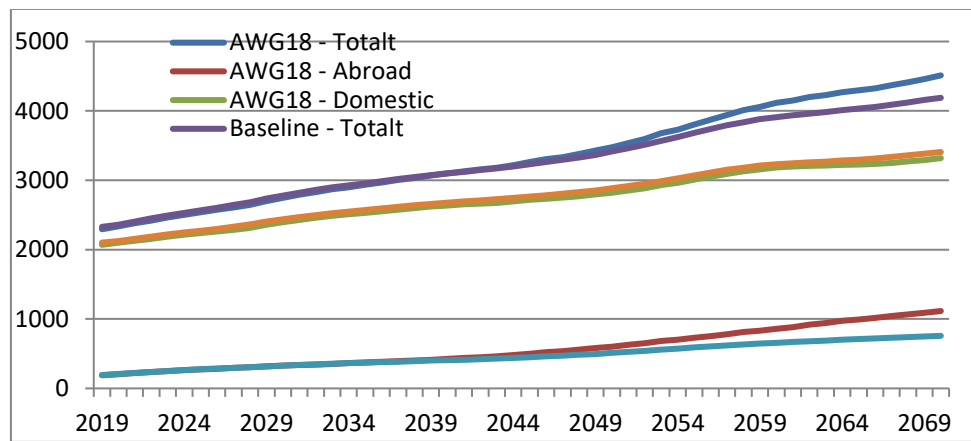

Source: Ministry of Finance

Annex 2

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 would give. The indexation is then reduced during the pay-out 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 who are active in the labour market. The income index is based on pensionable income for individuals between age 16 and 64, without any income ceiling.

Income indexation
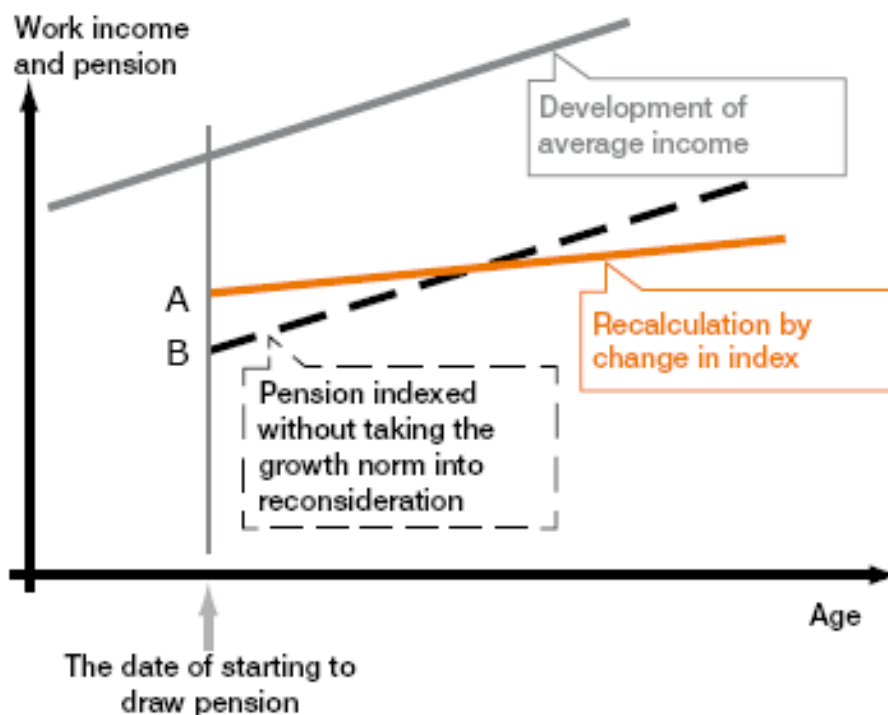
Automatic balancing

The Swedish PAYG NDC income pension system has 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 of both the active population's accrued pension entitlements and pension payments, if necessary.

If the current liabilities of the system are greater than the calculated assets, the balance ratio falls 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.

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.

Only one third of the deviation of the unsmoothed balance ratio affects the indexation. An example: If the balance ratio falls from 1.00 to 0.99, while the income index rises from 100 to 104, the smoothed balance ratio will be 0.9967 (i.e. 1+(0.99-1)/3). The balance index is then calculated to 103.65. The up rating of the pensions will then be 3.65 instead of 4 percent.

If the balance ratio exceeds 1 during a period when balancing is activated, pension balances and benefits will be indexed at a higher rate 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. The indexing mechanism was first activated in 2011, following the Lehman Brothers downturn, and dis-activated in 2018.

Income and Balance indexation
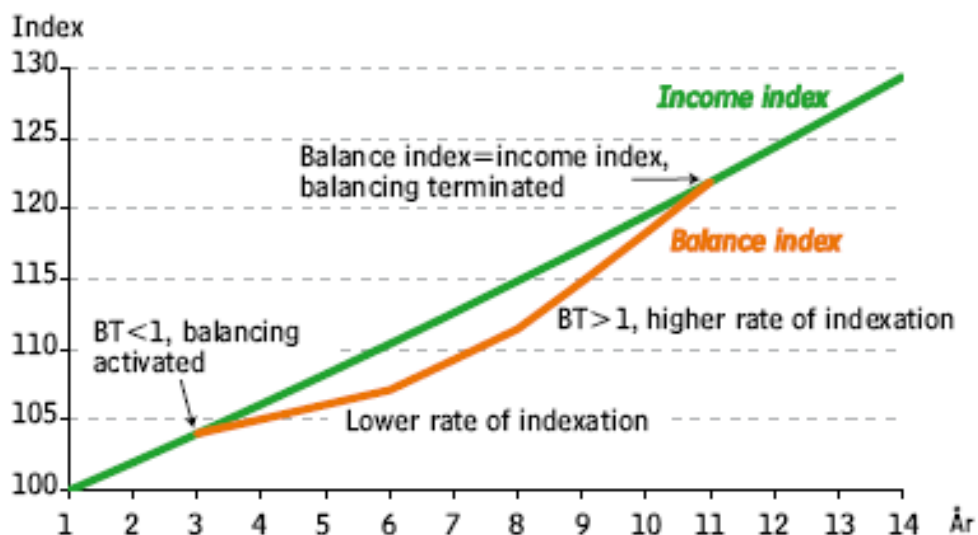
Annex 3: Decomposition of pension expenditures

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

[1]

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

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

The coverage ratio is further split with the scope of investigating the take-up ratios for old-age pensions and early pensions:

[2]

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

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

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

[3]

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

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

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