Economic Policy Committee - Ageing Working Group

2024 Ageing Report

Sweden - Country Fiche

2023-12-01

Ministry of Finance, Sweden

Jonas Norlin, jonas.norlin@gov.se

Linnéa Prytz, linnea.prytz@gov.se

Table of contents

List of tables

List of figures

INTRODUCTION

The present country fiche for Sweden is part of the 2024 Ageing Report, which provides long-term projections of the economic and budgetary impact of population ageing at unchanged policy. The 2024 edition is the eighth update and covers the period up to 2070.

This fiche was prepared by the Ministry of Finance in cooperation with staff at the Ministry of Social Affairs and The Public Health Agency. The pension projections presented in this fiche incorporate the macroeconomic assumptions and methodologies agreed within the *Ageing Working Group* of the *Economic Policy Committee*. The projections have been peer reviewed by other Member States and the European Commission within the *Ageing Working Group*. The projections were finalised in the autumn of 2023 and represent the situation of the pension system on 01/12/2023.

Section 1 provides a general overview of the pension system in Sweden. Section 2 describes the demographic and labour market assumptions underlying the pension expenditure projections presented in Section 3, which also discusses the sensitivity scenarios around the baseline. Finally, Section 4 gives an overview of the model used to produce the pension projections, with complementary data provided in the methodological annex.

1. Overview of the pension system[1]

The Swedish public old-age pension system covers everyone who has worked or lived in Sweden. It consists of, in a first pillar, an earnings-related component based on notional accounts, a private mandatory defined contribution system and a pension-income-tested minimum top-up, the guaranteed pension. On top of that, most employees are, in a second pillar, covered by occupational pension schemes. The possibility to make tax deductions for private pension savings was abolished in 2016, which makes third pillar pensions less important.

1.1. Description of the pension system

Pillar 1 – The public old-age pension system

The present Swedish public old-age pension system was fully implemented in 2003. It consists of an earnings-related notionally defined contribution (NDC) pay-as-you-go component and a fully funded, defined contribution (DC) pension component[2], both of which are based on lifetime earnings and individual accounts. In addition, there is the guaranteed pension, which is given with a low lifetime earned income and is reduced as public earned-related pension increases. The guaranteed pension is slightly higher for single individuals than for cohabiting ones and 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 earnings-related part of 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 central government budget.

The earlier 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 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 based on these rules, and there are transition rules for those born between 1938 and 1953, so it is only of minor importance in 2023.

In the present system, pension rights are credited to the individual accounts for 18.5 per cent of the annual pensionable income up to a ceiling amounting to 8.07 income base amounts (IBA), or some EUR 52 200.[3] 16 percentage points are paid to the NDC system and 2.5 percentage points to the funded DC system. The insured person pays a pension contribution amounting to 7 per cent of the gross pensionable income, and the employer 10.21 per cent.[4] 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 finance pension entitlements credited for social insurances, such as benefits for unemployment, sickness, disability and parental leave.

---

[1] For an exhaustive description of pension schemes, please consult the PENSREF database.
[2] This component is classified as private savings in the National Accounts.
[3] Amounts in social legislation are normally defined in terms of income or price base amounts, which are indexed to average earnings or CPI respectively. In 2023 an income base amount is approximately EUR 6 470 and a price base amount approximately EUR 4 570, calculated with an exchange rate of 11.48 SEK per EUR, which is used throughout this publication.
[4] The contribution is calculated on earnings net of the employee contribution, i.e. $(0.07+0.1021)/(1-0.07) = 0.185$.

There is no statutory retirement age

The retirement age is flexible, and individuals can currently claim earnings-related pension from the age of 63 without any upper limit. The earliest age to draw this pension will increase to 64 years in 2026, and then be linked to an "indicative" age, which will automatically increase in line with the same-sex life expectancy at 65 years, see section on pension reform below. The guaranteed pension can be claimed from the age of 66, which will be increased to 67 years in 2026 and then be linked to the indicative age.

Even if it is possible to retire at the age of 63, there are economic incentives not to do so. First, the benefit is based on lifetime contributions, which implies that all years with earnings will increase the benefit. Second, the level of the benefit is calculated using the cohort-specific unisex life expectancy at the date of retirement. Hence, drawing a pension 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 still a tendency to claim public pension at age 65, which was the statutory retirement age in the previous system. However, 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. It is also possible to temporarily stop pension payments from the public system once they have been started, or apply for 25, 50 or 75 per cent of a full public pension. These rules have been introduced to make it easier for the individual to draw down active life and leave the labour market gradually.

Under the Employment Protection Act an employee is entitled to stay in employment until his or her 69th birthday. In table 1 the earliest possible retirement age and lowest age for a guaranteed pension is reported based on the development of life expectancy at 65 in the 2022 Eurostat population projection. In 2022, the average age for the first public pension payment was 64.9 years.[5] The average age for pension withdrawals has been more or less constant just under 65 years for the last 10 years. 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. There was also a noticeable increase in the average pension age in 2020 when the statutory age was increased by one year.

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 64.2 years in 2022. In the projection both the exit age from the labour market and the first age to draw a pension show an increasing trend when the earliest pensionable age increases in line with life expectancy, see Table 1.

TABLE 1 – QUALIFYING CONDITIONS FOR RETIREMENT

	2023	2030	2040	2050	2060	2070
Earliest possible retirement age – men and women	63	64	65	65	66	67
Earliest age for a guaranteed pension – men and women	66	67	68	68	69	70

Source: Ministry of Finance

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 paid to 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[6] at any time and obtain personal information of accumulated pension assets and

---

[5] The average pension age for persons working at age 50 including disability pensioners. Source: The Swedish Pensions Agency.
[6] www.minpension.se

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.

The NDC pay-as-you-go system

The main NDC part of the public pension system works on an actuarial basis. When a person is working, pensions fees are paid into the individual's notional account. Accumulated assets earn a yearly interest equal to the average income increase in Sweden (unless the balancing mechanism is activated). At the time of retirement an annuity is calculated by dividing the individual's cumulated assets by a divisor reflecting unisex life expectancy at the specific date of retirement.[7] 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 1958 delays the retirement from 65 to 67 the annuity divisor decreases from 17.14 to 15.95 and the NDC pension consequently increases with 6.9 % for an unchanged level of cumulated account assets.

Pension payments from the NDC system are as a rule indexed by the average rate of growth of earnings per contributor. However, pensions are front-loaded so that 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, 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 unchanged rules regardless of the demographic or economic development. The balancing indexation is activated when the balance index falls below 1, meaning that the assets of the system, the numerator, are smaller than the liabilities, the denominator. This happened in 2010 due the financial crisis in 2008 and ended in 2017 when pensions were restored to the income index level. Normal indexing rules were applied from 2018. The balance index for 2023 is 1.1202.[8]

The funded DC premium pension system

The second part of the public earnings-related 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 NDC system. In the National Accounts, however, this system is a part of household savings.[9] Individuals can currently choose from approximately five hundred different funds when investing their capital. The number of funds will be reduced in the coming years. 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 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 longer expected payment period.

Non-earnings-related minimum pensions and basic security

For individuals with a low life-time income there is a non-earnings-related guaranteed pension which is financed by general tax revenue. The benefit is proportionally reduced if the number of residence years in Sweden falls short of 40. Individuals with less than three years of residence are not eligible for the benefit. There is also a means tested housing supplement for pensioners (BTP) and a special income

---

[7] The gender-neutral annuity divisors in the NDC system result in about 5 % higher pension for women (at age 66) compared to a system based on sex specific life expectancies.

[8] More details about the automatic balancing can be found in annex 1.

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

support for pensioners with very low income, usually immigrants with few years of residence in Sweden (AFS). The size of these two benefits depends on household income and housing costs but is by design always higher than the social assistance benefit.

All forms of basic security benefits for the elderly can only be received from the age of 66 at present. The earliest age for these provisions will increase to 67 years in 2026, and then be connected to the indicative age. The guaranteed pension is price-indexed and fully taxed.[10] Unlike the earnings-related pension, the guaranteed pension is paid only to pensioners living in Sweden.

The guaranteed pension is means-tested against public pension income and survivors' benefits, from Sweden and other countries, but not against work income, occupational pension or private pension. 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 3.7 price base amounts (PBA) for single households and 3.35 PBAs for cohabitants. The maximum annual benefit amounts to 2.43 PBAs for single households, some EUR 11 120 in 2023, and 2.2 PBAs per person for cohabitants, some EUR 10 060 in 2023. The PBA is indexed to the CPI development, June to June, and will increase from EUR 4 570 in 2023 to EUR 4 990 in 2024, or by some 9.1 per cent.

Survivors' and disability pension

The previous widow's pension (women only) has been replaced by a new, temporary and gender-neutral, adjustment allowance. However, due to the long phase out period, widow's pensions will continue to be paid out for several decades. In the reformed system, a survivor will receive an adjustment allowance for 12 months normally, 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, and financed by the central government budget. The benefit, which can be re-assessed if the individual's health status changes, is only available until the age of 66. This age is connected to the changes of age limit in the old-age pensions system so that individuals with disability benefits can receive these until they receive an old-age pension. A person who is granted a disability benefit continue to accumulate pension entitlements in the public pension system, based on earlier income. A person who is granted a disability benefit continues to accumulate pension entitlements in the public pension system, based on earlier income. The pension contributions are paid by the central government budget. This means that old-age pension benefits for disabled persons are based on lifetime earnings, just as for everyone else.[11]

Pillar 2 – Occupational pension

About 90 per cent of all employees in the public and the private sector 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: for blue- and white-collar workers in the private sector and employees in central and

---

[10] In the calculations, income indexation is assumed from the end of the medium-term projection period, i.e., from 2027, for all transfers and taxes even if legislation is based on price indexation.

[11] 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.

local governments separately.[12] Unlike the public system, it is not possible for the individual to draw a partial pension or turn it off once pensions have been started.

Pillar 3 – Private individual pension

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 per cent of business income not exceeding 10 PBAs (some EUR 45 750 in 2023).

Pensions and taxes

Old-age (including guaranteed pension), disability and survivors' pensions, are subject to income tax. The means-tested basic security allowances (BTP and AFS) 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 66 years or older at the beginning of a year are subject to lower employment fees and pay a lower income tax on earned income the entire year. They also have a higher basic deduction for income tax than younger people, resulting in a lower tax. This age limit in tax legislation will also increase in 2026 and be linked to life expectancy.

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

The independence of the pension system is strengthened by the fact that its rules are decided in agreement by an all-party working group in Parliament. 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 slow process to introduce changes to the pension system as only changes which are 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, like the housing supplement, if they want to change the economic conditions for pensioners. However, in May 2022 a major pension reform was passed in Parliament which will raise the age limits in the pension system in line with life expectancy.

The introduction of an indicative age which automatically raises age limits

The reform mentioned above started at the first of January 2020 when the earliest age to receive an earned income old-age pension was increased one year for both women and men, from 61 years to 62 years. The effect of this first step on both pension expenditure and labour supply was minor as only some 9 000 61-year-olds applied for an earnings-related old-age pension in 2019, and the majority of these did not leave the labour market.

On 1 January 2023 the earliest age to receive an old-age pension was increased once again, from 62 years to 63 years for both women and men. On 1 January 2023 the earliest age to receive an earnings-related old-age pension was increased once again, from 62 years to 63 years for both women and men. There will be one more increase in the earliest age in 2026 so that it then is available at age 64 at the earliest. Parallel to these changes, the earliest age for the guaranteed pension was raised to 66 years in 2023 and will be raised to 67 years in 2026. Also, the right to receive an unemployment benefit and health insurance will be extended to cover age groups which are no longer able to draw an old-age pension. The age at which employment protection ends will also be increased at the same time.

---

[12] 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.

From 2026 and onwards exit ages will be indexed to a new indicative age which will increase in line with two thirds of the change in the remaining lifetime at 65 years. Not only age limits in the pension system, but also in related social insurances and in tax legislation will be connected to the indicative age. The indicative age is calculated every year based on the unisex life expectancy at 65 years, but only applied six years later. So, the indicative age until 2029 has already been set to 67 years. The minimum age for drawing a general pension is three years before the indicative age, that is, from age 64. Based on the Eurostat population projection for Sweden further increases in the indicative age, and hence in all connected age limits, are foreseen for 2037, 2054 and 2069, increasing the earliest age for an old-age pension to 67 and the earliest age for the guaranteed pension to 70 by 2069.

Higher guaranteed pension and housing supplement for pensioners

In June 2022, the Parliament decided to increase the guaranteed pension from August 2022. For people born after 1938, the maximum annual benefit amount was increased by 0.249 PBAs to 2.43 PBAs for single households and 2.2 PBAs per person for cohabitants. The housing supplement for pensioners was also increased by SEK 300 (EUR 26) per month for single households and SEK 150 (EUR 13) per person for cohabitants. Because of the higher benefit amount in combination with the price-indexed guaranteed pension, the maximum level of earnings-related pension that entitles guaranteed pension and housing supplement were also raised. This means that people who receive a guaranteed pension will be able to have a higher earnings-related pension, which results in a new group of pensioners who receives guaranteed pension. The reform increased the number of pensioners that receives a guaranteed pension by approx. 350 000 people.

A new pension complement for mid-income pensioners

In March 2020, the Pension group agreed to increase pensions in 2021 through a new supplementary pension benefit of maximum SEK 600 per month (EUR 55) for people with a monthly pension of SEK 9 000–17 000 (EUR 870–1 635). The income pension complement is an expenditure on the central government budget financed by taxes.

Changes 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 the system. In 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 several 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.

1.3. Description of the actual 'constant policy' assumptions in the projection

All types of pensions, benefits and thresholds in the pension and tax systems are income-indexed from 2027 in the calculations, regardless of whether legislation states otherwise (e.g., guaranteed pension, BTP and AFS are price-indexed by law). The fact that the Pension Group in Parliament need to approve changes to the pension system by consensus means that it is often easier for the government to help low-income pensioners outside the pension system. Hence, even if the guaranteed pension was raised in 2020 and 2023, the price indexation rule has not been changed since the system was implemented in 2003. Instead, a tax deduction for seniors and the BTP, which are outside the pension agreement, have been made more generous to compensate for the indexation to prices only. The income indexation of the guaranteed pension in the AWG calculations might therefore be too cautious, while a price indexation probably would be too restrictive.

2. Overview of the demographic and labour force projections[13]

2.1. Demographic projections

The Swedish population is expected to rise from about 10.5 million in 2022 to 12.9 million in 2070 in the latest Eurostat projection, or by some 23 per cent (see Table 2). This is a slower increase than in the previous Eurostat projection where the population reached over 13 million in 2070. The population growth is driven by a positive net migration. Net migration is projected to be positive throughout the entire projection period, even though it is expected to fall in absolute numbers.

Life expectancy at birth is expected to increase by some 5.5 years for men and 5.3 years for women from 2022 to 2070, from 81.5 for men and 85.4 years for women, to 87.0 and 90.7 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 indicative age which sets age limits in the pension system, is expected to increase by 4.2 years for men and 4.4 years for women.

TABLE 2 – MAIN DEMOGRAPHIC VARIABLES

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Population (thousand)	10 507	11 050	11 609	12 155	12 581	12 899	12 899	2070	2 392
Population growth rate	0.9%	0.5%	0.5%	0.4%	0.3%	0.2%	0.9%	2023	-0.6%
Old-age dependency ratio (pop 65+ / pop 20-64)	36.0	38.1	40.7	42.4	48.7	50.4	50.4	2070	14.4
Old-age dependency ratio (pop 75+ / pop 20-74)	15.2	17.0	18.2	20.3	21.6	25.5	25.5	2070	10.4
Ageing of the aged (pop 80+ / pop 65+)	26.8	33.5	33.4	36.9	36.2	40.1	40.1	2070	13.3
Men - Life expectancy at birth	81.5	82.4	83.6	84.8	86.0	87.0	87.0	2070	5.5
Women - Life expectancy at birth	85.4	86.2	87.4	88.6	89.7	90.7	90.7	2070	5.3
Men - Life expectancy at 65	19.7	20.4	21.3	22.2	23.0	23.9	23.9	2070	4.2
Women - Life expectancy at 65	22.5	23.2	24.2	25.2	26.1	26.9	26.9	2069	4.4
Men - Survivor rate at 65+	90.7	91.5	92.6	93.6	94.4	95.1	95.1	2070	4.4
Women - Survivor rate at 65+	94.3	94.7	95.4	96.0	96.5	97.0	97.0	2070	2.7
Men - Survivor rate at 80+	65.3	68.1	72.0	75.5	78.6	81.3	81.3	2070	16.1
Women - Survivor rate at 80+	76.3	78.5	81.6	84.3	86.7	88.7	88.7	2070	12.4
Net migration (thousand)	98.8	49.9	47.5	42.0	36.9	32.2	98.8	2022	-66.6
Net migration (% population previous year)	0.9%	0.5%	0.4%	0.3%	0.3%	0.3%	0.9%	2022	-0.7%

Source: Eurostat, European Commission.

Strong immigration and moderate population growth makes the old-age dependency ratio increase at a relatively slow rate compared to many other Member States. Nevertheless, the ratio of persons aged 65 and above to 20–64-year-olds is expected to increase from 36.0 in 2022 to 50.4 in 2070. Whereas Sweden had the 10th highest dependency ratio in the Union in 2022, it is projected to have the lowest in 2070. This means that Sweden is expected to have the smallest increase in the dependency burden of all Member States. The peak year for the old-age dependency ratio over the projection horizon is 2070 (see Table 2), but the dependency ratio will most likely continue to rise after 2070, indicating continued cost increases in the years after 2070. The difference between the latest Eurostat population projection

---

[13] For more details, see European Commission and EPC (2023), *'2024 Ageing Report: Underlying assumptions and projection methodologies'* European Economy, Institutional Paper 257.

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.

The shift towards an older population is illustrated in Figure 1, which shows the change in the age structure between 2022 and 2070. While some 5.4 per cent of the population was 80 years or older in 2022, and some 20.3 per cent 65 years and older, the same age groups are expected to represent 10.7 per cent and 26.7 per cent of the population in 2070. The share of the population in ages 20–64 years is expected to fall from 56.4 per cent to 53.1 per cent during the same period.

FIGURE 1 – AGE STRUCTURE: 2022 VS 2070
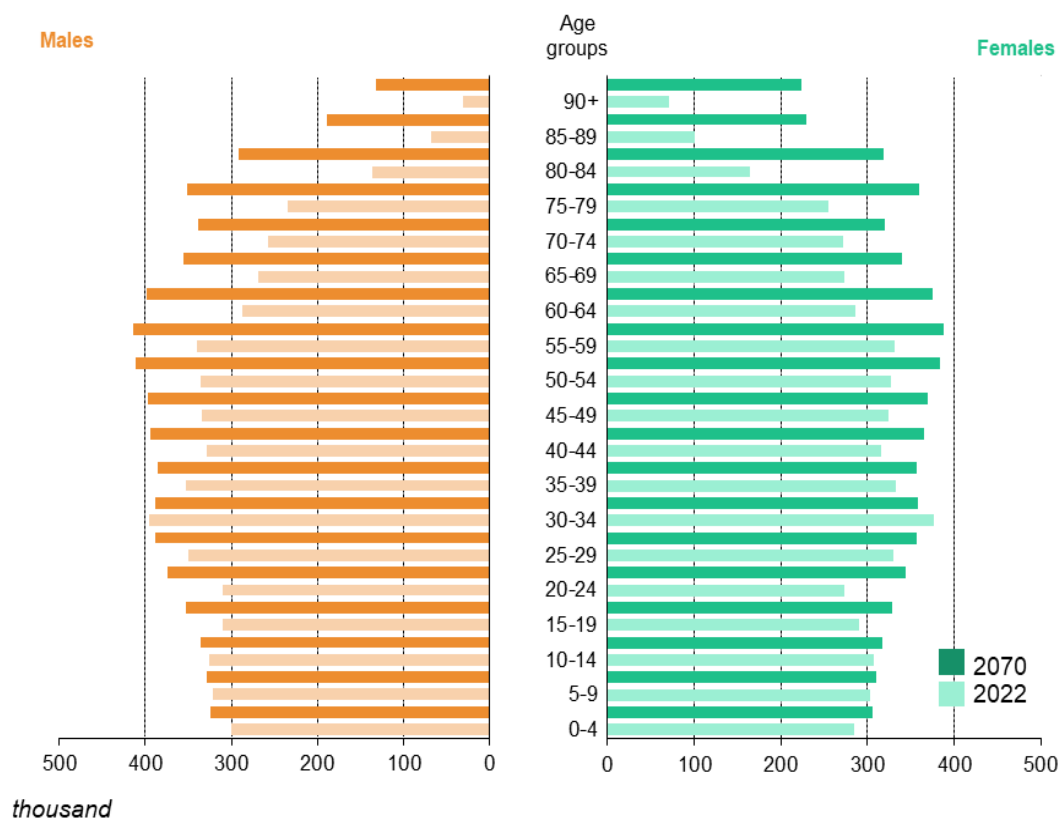
Source: Eurostat, European Commission.

2.2. Labour force projections

The labour force is projected by the Commission based on the demographic projections by Eurostat described in the previous section and the participation rates as projected by the Cohort Simulation Model.

Table 3 shows the expected changes in the employment and participation rates for the overall population at working age, and older age groups that are the most affected by pension reform. The pension age reform is expected to increase the labour supply significantly in older ages, above 55 and 65 years of age respectively, which has a positive effect on the overall labour supply. For people aged 55–64 years, labour force participation is projected to increase from 82.2 in 2022 to 86.5 in 2070. At the same time, the participation rate for people aged 65–74 is expected to increase by 9.4 percentage points, from 20.3 in 2022 to 29.7 in 2070.

TABLE 3 – PARTICIPATION RATE, EMPLOYMENT RATE AND SHARE OF WORKERS

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022–2070
Labour force participation rate 20–64	87.8	87.8	88.6	88.5	89.1	89.1	89.1	2070	1.3
Employment rate of workers aged 20-64	82.3	83.0	83.6	83.6	84.1	84.2	84.2	2070	1.9
Share of workers aged 20-64 in the labour force 20-64	93.7	94.5	94.4	94.4	94.5	94.5	94.5	2027	0.8
Labour force participation rate 20–74	77.4	77.3	77.9	78.5	78.0	79.3	79.3	2070	1.9
Employment rate of workers aged 20-74	72.6	73.1	73.6	74.2	73.8	75.0	75.0	2070	2.4
Share of workers aged 20-74 in the labour force 20-74	93.8	94.6	94.5	94.5	94.6	94.6	94.6	2060	0.8
Labour force participation rate 55–64	82.2	81.0	83.6	83.5	85.4	86.5	86.5	2070	4.3
Employment rate of workers aged 55-64	77.8	77.3	79.7	79.6	81.4	82.4	82.4	2070	4.6
Share of workers aged 55-64 in the labour force 55-64	94.7	95.4	95.3	95.3	95.3	95.3	95.4	2028	0.6
Labour force participation rate 65–74	20.3	18.9	21.9	23.8	28.4	29.7	29.7	2070	9.4
Employment rate of workers aged 65-74	19.4	18.2	21.0	22.9	27.3	28.6	28.6	2070	9.1
Share of workers aged 65-74 in the labour force 65-74	95.8	96.4	96.3	96.3	96.2	96.2	96.4	2027	0.4
Median age of the labour force	40.0	40.0	41.0	41.0	42.0	42.0	42.0	2053	2.0

Source: European Commission.

The Cohort Simulation Model does not take origin into account, so all people coming to Sweden are immediately 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 might be overestimated, as immigrants coming to Sweden in general need some time to enter the labour market, and on average work fewer hours than people born in Sweden even after several years in the country. A 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 4 summarises the estimated development of career duration, the average labour market exit that corresponds with the participation rate projections, and the years spent in retirement for men and women. The average effective retirement age is expected to increase by 2.2 years between 2022 and 2070, which is an effect of the pension age reform. Over the same period, the average labour market exit age is expected to increase by 2.9 years, with the exit from the labour market on average taking place approximately one year after one starts to draw a pension.

The contributory period is expected to increase by 2.4 years between 2022 and 2070, with a higher increase for women (3.1 years) than men (1.8 years). This is explained by the historic increase in the participation rate for women, as females that entered the labour market in the 1960s and 1970s 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 and parental leave, generates pension rights, contributes to the increase. The increase in the contributory period will lead to higher average pensions as the pensioners are actuarially compensated.

The expected increase in longevity will raise the duration of the retirement by 1.6 years between 2022 and 2070. However, the increase is expected to be smaller than in the 2021 projections due to the higher age limits in the pension system (the pension age reform). The increase in the duration of retirement 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 guaranteed pension. This effect is enhanced by the relatively fast increase in the CPI at present, which will raise the price-indexed guaranteed pension faster than the income-indexed earnings-related pension.

TABLE 4 – LABOUR MARKET EFFECTIVE BEHAVIOUR

TOTAL	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Average effective retirement age*	64.5	64.6	65.1	65.2	66.3	66.7	66.7	2070	2.2
Average labour market exit age (CSM)**	65.0	65.8	66.4	66.4	67.1	67.9	67.9	2069	2.9
Contributory period	40.0	39.7	38.3	39.6	41.5	42.4	43.7	2069	2.4
Duration of retirement***	21.2	20.9	21.9	22.8	22.8	22.7	23.4	2068	1.6
Duration of retirement/contributory period	53%	53%	57%	58%	55%	54%	59%	2044	1%
Percentage of adult life spent in retirement****	32%	31%	32%	33%	33%	32%	33%	2068	0%
Early/late exit*****	1.7	1.6	1.2	1.2	0.8	1.0	2.4	2025	-0.8

MEN	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Average effective retirement age*	64.2								
Average labour market exit age (CSM)**	65.0	65.8	66.4	66.4	67.2	67.9	67.9	2069	2.9
Contributory period	40.6	40.0	38.5	39.5	41.5	42.4	43.8	2069	1.8
Duration of retirement***	19.7	19.5	20.4	21.3	21.3	21.2	21.9	2068	1.5
Duration of retirement/contributory period	48%	49%	53%	54%	51%	50%	55%	2045	1%
Percentage of adult life spent in retirement****	30%	30%	31%	31%	31%	31%	32%	2068	0%
Early/late exit*****	1.4	1.8	1.3	1.3	0.8	1.0	2.1	2025	-0.4

WOMEN	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Average effective retirement age*	64.3								
Average labour market exit age (CSM)**	65.0	65.7	66.4	66.4	67.1	67.9	67.9	2070	2.9
Contributory period	39.3	39.5	38.2	39.7	41.4	42.4	43.7	2069	3.1
Duration of retirement***	22.6	22.3	23.3	24.3	24.2	24.2	24.9	2068	1.6
Duration of retirement/contributory period	58%	56%	61%	61%	58%	57%	63%	2049	0%
Percentage of adult life spent in retirement****	33%	33%	33%	34%	34%	34%	35%	2068	0%
Early/late exit*****	2.0	1.4	1.0	1.0	0.7	0.9	2.7	2025	-1.1

The 'average effective retirement age' is the age at which people start receiving a pension benefit (old-age, early or disability). It is calculated on the basis of the administrative data on new pensioners for 2022, showing projected data for the other years for the total.
** *'Average labour market exit age (Cohort Simulation Model)' refers to 2023 instead of 2022.*
*** *'Duration of retirement' is the remaining life expectancy at the average labour market exit age.*
**** *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 exit the labour market before reaching the statutory retirement age and those who exit at or beyond the statutory retirement age. For 2022, the value refers to 2023.*

3. Pension projection results

3.1. Coverage of the pension projections

All pension systems from the three pillars described in Section 1 are covered in the calculations, just as they were in the calculations for the previous 2021 Ageing Report. Hence, the projections include the public income pension and the means tested guaranteed pension, as well as disability and survivors' pensions. The calculations also include occupational and private pension schemes. Also Housing supplement for pensioners and other means tested transfers for pensioners are included. 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 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 disabled people but include the housing supplement for the elderly and disabled. The excluded and included items are approximately of the same magnitude, and the GDP-ratio for the public expenditures remains almost the same.

The small increase in pension expenditure as a share of GDP in 2020 and the return of this value to previous levels in 2021, is primarily a GDP denominator effect during the Covid years.

TABLE 5 – ESSPROS AND AWG DEFINITION OF PENSION EXPENDITURE (%GDP)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	change 2013-last available year
Eurostat total pension expenditure	12.0	11.6	11.2	11.3	11.1	10.9	10.7	11.2	10.6	-1.4
Eurostat public pension expenditure (A)	8.7	8.4	8.0	8.1	7.9	7.8	7.7	8.0	:	-0.8
Public pension expenditure (AWG: outcome) (B)	8.6	8.5	7.9	7.8	7.7	7.6	7.7	7.9	7.4	-1.2
Difference Eurostat/AWG: (A)-(B)	0.1	-0.2	0.1	0.3	0.2	0.3	-0.1	0.1	:	-0.1

Source: Eurostat, European Commission.

3.2. Overview of projection results

Projected gross public pension spending as a percentage of GDP will end up at 7.2 per cent of GDP in 2070 in the baseline scenario, a decrease of 0.2 percentage points compared to the starting year 2022. The growing importance of the premium private individual mandatory pension compensate for this fall. 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 to disability pension.

The importance of private occupational pensions will also increase somewhat over the projection period. Compared to the 2021 projections, the occupational pension is expected to develop more favourably, which is explained by a higher interest rate assumption in the current projection. The occupational and private individual schemes are mainly defined contribution and sensitive to the interest rate. In the long run, the interest rate is assumed to be higher than the average income growth rate, leading to higher pensions compared to a 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 some 0.9 per cent of GDP in the late 2060s, 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.

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 (1.5% of GDP in 2022 versus 1.2% of GDP in 2070), is mainly explained by the fact that the average implicit tax rate for pensioners will decrease as lower replacement rates will result in lower marginal taxes.

The ratio of public pensions net of taxes to GDP only increases marginally, whereas the total-pensions-to-GDP ratio increases somewhat more. This is due to the increase in private pensions before taxes as well. The negative balance of the public pension system is explained by the fact that pension contributions only finance the earnings-related part of the public pension system, whereas the non-income related guaranteed pensions, disability and survival pensions are financed by taxes on the central government budget. For demographic reasons, the balance of contributions and pension expenditure shows an improving trend.

TABLE 6 – PROJECTED GROSS AND NET PENSION SPENDING AND CONTRIBUTIONS (%GDP)

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Expenditure									
Gross public pension expenditure	**7.4**	**7.6**	**7.2**	**7.0**	**7.3**	**7.2**	**8.0**	**2024**	**-0.2**
Private occupational pensions	1.7	1.8	1.8	1.7	2.0	2.2	2.3	2068	0.6
Private individual mandatory pensions	0.3	0.5	0.7	0.8	0.8	0.8	0.9	2068	0.6
Private individual non-mandatory pensions	0.3	0.2	0.1	0.0	0.0	0.0	0.3	2022	-0.3
Gross total pension expenditure	9.7	10.1	9.8	9.6	10.2	10.3	10.6	2068	0.6
Net public pension expenditure*	5.9	6.1	5.8	5.8	6.0	6.0	6.4	2024	0.1
Net total pension expenditure*	7.7	8.1	8.0	7.9	8.4	8.5	8.8	2068	0.8
Contributions									
Public pension contributions	5.4	5.9	5.9	5.9	5.8	5.9	5.9	2024	0.5
Total pension contributions	7.8	8.8	9.2	9.4	9.3	9.4	9.4	2068	1.6
Balance of the public pension system **	-0.7%	0.1%	0.7%	1.0%	0.8%	1.0%	-0.7%	2022	1.7%

*Net pension expenditure excludes taxes on pensions and compulsory social security contributions paid by beneficiaries.
**Public pension contributions - gross public pension expenditure (peak value/year shows most negative value).
Source: European Commission, EPC.

The earnings–related pensions will decrease until approx. 2050 due to the ageing effect, see Table 7. The price-indexed minimum top-up guaranteed pension (including a housing supplement) will grow from 0.4 per cent in 2022 to 0.8 per cent of GDP in 2030 due to a high inflation rate. A continued increase after 2030 is a result of decreasing replacement rates from earnings-related pensions. Another explanation is a relatively high number of immigrants, who often have low earnings-related pensions because of short work careers.

The number of individuals with a disability pension started to increase sharply in 2003. After a peak of more than 550 000 individuals in the spring of 2007, the yearly average went down to some 370 000 in 2013 because of policy that led to both a higher outflow and a lower inflow, i.e., a reduction of 1/3 from the peak. After 2013, the number of disability pensioners has continued to decrease due to a continued lower inflow. In the calculations, a prudent approach has been chosen, where the lower probability to receive a disability pension seen in the last years is maintained, while the outflow will be negatively affected by the increase in the lowest age to receive an old-age pension. This means that the share of the population in working ages, 20–69 years, which are receiving a disability pension will gradually increase from around 4.1 per cent in 2023 to 5.0 per cent in 2070.

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

TABLE 7 – GROSS PUBLIC PENSION SPENDING BY SCHEME (%GDP)

	2022	2030	2040	2050	2060	2070	peak value	peak year	change 2022-2070
Total public pensions	7.4	7.6	7.2	7.0	7.3	7.2	8.0	2024	-0.2
Old-age and early pensions	6.5	6.5	6.2	6.1	6.4	6.4	7.0	2024	-0.1
Earnings-related	6.1	5.7	5.2	4.9	5.0	4.9	6.4	2023	-1.2
Minimum pensions (non-contributory)	0.4	0.8	1.0	1.2	1.4	1.5	1.5	2068	1.1
Disability pensions	0.7	0.9	1.0	0.9	0.9	0.8	1.0	2037	0.2
Survivor pensions	0.2	0.1	0.0	0.0	0.0	0.0	0.2	2023	-0.2

Source: European Commission, EPC.

3.3. Description of main driving forces behind the projection results and their implications

To explain the development of the ratio of pensions to GDP, this ratio is decomposed into its main driving factors according to the disaggregation in Figure 2. The demographic increase in the dependency ratio is the main positive driver behind the 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.

FIGURE 2 – DISAGGREGATION OF PUBLIC PENSION EXPENDITURE

$$\frac{pension\ expenditure}{GDP} = \underset{\text{dependency ratio}}{\frac{population\ 65+}{population\ 20-64}} \times \underset{\text{coverage ratio}}{\frac{number\ of\ pensioners}{population\ 65+}} \times \underset{\text{benefit ratio}}{\frac{average\ pension\ income}{\frac{GDP}{hours\ worked\ 20-74}}} \times \underset{\text{labour market effect}}{\frac{population\ 20-64}{hours\ worked\ 20-74}} \quad [1]$$

$$\frac{number\ of\ pensioners}{population\ 65+} = \underset{\text{coverage ratio old-age}}{\frac{number\ of\ pensioners\ 65+}{population\ 65+}} + \left(\underset{\text{coverage ratio early-age}}{\frac{number\ of\ pensioners\ \leq 65}{population\ 50-64}} \times \underset{\text{cohort effect}}{\frac{population\ 50-64}{population\ 65+}} \right) \quad [2]$$

$$\frac{population\ 20-64}{hours\ worked\ 20-74} = \underset{\text{1/employment rate}}{\frac{population\ 20-64}{employed\ people\ 20-64}} \times \underset{\text{1/labour intensity}}{\frac{employed\ people\ 20-64}{hours\ worked\ by\ people\ 20-64}} \times \underset{\text{1/career shift}}{\frac{hours\ worked\ by\ people\ 20-64}{hours\ worked\ by\ people\ 20-74}} \quad [3]$$

Source: European Commission, EPC.

The coverage ratio and employment ratio act as offsetting factors on the demography. The gradual increase in the earliest age to draw a pension will reduce the coverage ratio, especially among those who are 65 years or younger, and increase employment. Even so, there is a fall in 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. The fact that only two thirds of life expectancy at 65 increases the lowest retirement age, and that relatively small groups are affected by the first increases of the retirement age, only partly offsets the effect of the increased longevity. Another important factor is the reclassification of the premium pension from the government to the private sector, which leads to a lower public but a higher private benefit ratio, see Table 6. In addition, the phasing out of the widow's pension also contributes.

TABLE 8 – FACTORS BEHIND THE CHANGE IN PUBLIC PENSION EXPENDITURE BETWEEN 2019 AND 2070 (PPS OF GDP) – PENSIONERS[14]

	2022-30	2030-40	2040-50	2050-60	2060-70	2022-70
Public pensions to GDP	0.2	-0.4	-0.1	0.3	-0.1	-0.2
Dependency ratio effect	0.5	0.5	0.3	1.0	0.3	2.5
Coverage ratio effect*	-0.2	-0.3	-0.1	-0.3	-0.1	-1.0
Coverage ratio old-age	-0.1	-0.1	0.0	-0.2	-0.1	-0.5
Coverage ratio early-age	-0.8	-1.2	-0.7	-0.3	-0.4	-3.5
Cohort effect	-0.5	-0.4	0.1	-1.1	0.1	-1.8
Benefit ratio effect	0.0	-0.5	-0.4	-0.2	-0.3	-1.3
Labour market effect	0.0	-0.1	0.0	-0.2	0.0	-0.3
Employment ratio effect	-0.1	-0.1	0.0	0.0	0.0	-0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.0	-0.1	0.0	-0.1	0.0	-0.2
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: European Commission, EPC.

Evolution of the benefit ratio and replacement rate

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. The RR and BR from public pensions will decrease. The increase in longevity will make the duration of retirement increase by approximately 1.5 years for men and 1.6 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. Compared with the 2021 projections, the BR and RR are expected to decrease less due to the increase in the earliest age to receive an old-age pension, which will shorten the period in retirement.

---

[14] For the disaggregation based on the number of *pensions*, see Table A3 in the methodological annex.

	2022	2030	2040	2050	2060	2070	change 2022-2070 (pps)
Public scheme (BR)	36%	36%	34%	32%	32%	30%	-6%
Coverage	100%	100%	100%	100%	100%	100%	0%
Public scheme: old-age earnings related (BR)	34%	32%	28%	25%	24%	23%	-11%
Public scheme: old-age earnings related (RR)	31%	31%	26%	25%	26%	25%	-5%
Coverage	88%	88%	88%	88%	89%	89%	1%
Private occupational scheme (BR)	11%	12%	11%	10%	11%	12%	0%
Private occupational scheme (RR)	16%	15%	15%	12%	14%	14%	-2%
Coverage	73%	75%	78%	80%	81%	82%	9%
Private individual schemes (BR)	2%	3%	4%	4%	4%	4%	2%
Private individual schemes (RR)	5%	5%	5%	4%	4%	4%	0%
Coverage	74%	82%	86%	88%	89%	89%	16%
Total benefit ratio	47%	49%	47%	44%	44%	43%	-4%
Total replacement rate (earnings-related benefits)	37%	38%	37%	35%	35%	33%	-4%

Coverage of each pension scheme is calculated as a ratio of the number of pensioners within the scheme and the total number of pensioners in the country. In case data on pensioners are not available, the calculation is based on the number of pensions.
Source: European Commission, EPC.

The fact that the previous DB system is being phased out and replaced by the NDC part of the reformed system contributes to a lower public RR. This is counter-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 over the projection period.

On aggregate pensions are indexed on 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 1 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.

In addition, the replacement rate from occupational pensions, which is not reported in Table 9, 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.

Some pensioners chose to have a part of the occupational and the private voluntary DC-pensions 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 upward compared to the 2021 projections.

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.

System dependency ratio

The number of pensioners is expected to increase during the projection period. At the same time, employment is projected to increase but at a slower pace, resulting in an increase in the pension system dependency ratio (SDR) by 8.4 percentage points. However, the increase in SDR is significantly smaller than in the previous projections due to the increase in the lowest retirement age. In the 2021 projections, the SDR was expected to be 72.9 in 2070, compared to 59.8 in the new projections (see Table 10).

The old-age dependency ratio is expected to increase by 14.4 percentage points. As a result, the system efficiency is projected to decrease from 1.4 to 1.2.

TABLE 10 – SYSTEM DEPENDENCY RATIO AND OLD-AGE DEPENDENCY RATIO

	2022	2030	2040	2050	2060	2070	change 2022-2070
Number of pensioners (thousand) (I)	2 701	2 896	3 106	3 331	3 648	3 803	1 102
Employment (thousand) (II)	5 253	5 543	5 874	6 092	6 243	6 357	1 104
Pension system dependency ratio (SDR) (I)/(II)	51.4	52.2	52.9	54.7	58.4	59.8	8.4
Number of people aged 65+ (thousand) (III)	2 134	2 360	2 638	2 850	3 257	3 449	1 315
Working-age population 20-64 (thousand) (IV)	5 930	6 190	6 481	6 718	6 689	6 848	918
Old-age dependency ratio (OADR) (III)/(IV)	36.0	38.1	40.7	42.4	48.7	50.4	14.4
System efficiency (SDR/OADR)	1.4	1.4	1.3	1.3	1.2	1.2	-0.2

Source: European Commission, EPC.

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 age groups below 69, the ratio falls over time due to fewer disability pensioners and the increase in retirement age. The increase for the age group 55–59 years between 2030 and 2040 is driven by demography. A relatively large number of immigrants who came to Sweden in the first two decades of this millennium will reach the age 55–59 between 2030 and 2040, and they have a higher probability to receive a disability pension than people of the same age who were born in Sweden. 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 11 – PUBLIC PENSIONERS TO (INACTIVE) POPULATION BY AGE GROUP (%)

pensioners / inactive population	2022	2030	2040	2050	2060	2070
Age group -54	6.1	6.1	5.4	4.8	4.8	4.8
Age group 55-59	77.9	87.6	111.8	79.7	85.2	89.6
Age group 60-64	100.6	63.2	55.1	55.2	58.8	59.0
Age group 65-69	152.5	142.3	148.9	156.4	140.7	119.6
Age group 70-74	126.9	119.8	115.4	120.2	128.4	125.8
Age group 75+	108.1	110.7	110.9	108.9	110.4	112.0

pensioners / total population	2022	2030	2040	2050	2060	2070
Age group -54	2.3	2.3	1.9	1.7	1.7	1.7
Age group 55-59	8.4	8.6	11.0	7.9	7.8	7.4
Age group 60-64	26.1	17.9	12.9	12.9	11.9	11.2
Age group 65-69	108.1	98.9	94.4	96.7	76.8	61.0
Age group 70-74	112.5	113.3	108.0	110.6	115.7	114.1
Age group 75+	108.1	110.7	110.9	108.9	110.4	112.0

Source: European Commission, EPC.

The number of pensioners as a share of both total and inactive population is above 100 per cent for all age groups above 65 years in 2022, see Table 11. This is explained by the fact that pensioners also include pensioners living abroad, whereas the population only include people living in Sweden. Another reason is that pensioners can be working, and part of the labour force, even if they receive a pension benefit at the same time. However, the number of pensioners as a share of the population for those aged 65–69 will decrease successively during the projection period because of the pension age reform.

TABLE 12 – FEMALE PENSIONERS TO (INACTIVE) POPULATION BY AGE GROUP (%)

female pensioners / inactive population	2022	2030	2040	2050	2060	2070
Age group -54	6.8	6.8	6.0	5.2	5.1	5.1
Age group 55-59	75.9	80.5	97.3	72.6	79.0	83.7
Age group 60-64	94.6	57.6	56.1	56.7	60.7	62.7
Age group 65-69	149.8	145.3	151.2	158.8	141.1	116.5
Age group 70-74	127.0	124.5	114.8	118.5	127.5	123.0
Age group 75+	109.8	114.6	114.2	110.2	110.4	111.9

female pensioners / total population	2022	2030	2040	2050	2060	2070
Age group -54	2.7	2.6	2.2	2.0	1.9	1.9
Age group 55-59	10.6	10.3	12.6	9.3	9.0	8.5
Age group 60-64	26.8	18.2	15.0	15.1	13.8	13.0
Age group 65-69	113.1	99.1	95.2	97.1	77.3	60.6
Age group 70-74	117.1	117.2	107.2	108.6	114.7	112.8
Age group 75+	109.8	114.6	114.2	110.2	110.4	111.9

Source: European Commission, EPC.

New public expenditure

In Table 13 new earnings-related pension expenditure in the public NDC system is reported. The initial shorter contributory period for women is a result of the historically lower participation rates among women. The contributory period is expected to increase over time for both men and women, with a marked reduction around 2040. The mid-projection reduction for both sexes is due to 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 slightly larger 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 almost the same for men and women, but the average pensionable earnings are higher for men than for women. This explains the difference in new pension expenditure per new pension and the benefit ratio between women and men of roughly the same magnitude.

TABLE 13 – BREAKDOWN OF NEW PUBLIC PENSION EXPENDITURE (OLD-AGE AND EARLY EARNINGS-RELATED PENSIONS)

TOTAL	2022	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	1554	2351	2703	3830	6428	6591
I. Number of new pensions (1000)	110.4	126.0	120.6	131.7	155.5	114.6
II. Average contributory period (years)	40.0	39.7	38.3	39.6	41.5	42.4
III. Average accrual rate (%) (c/A)	0.93	0.95	0.94	0.90	0.90	0.90
Notional-accounts contribution rate (c)	16.0	16.0	16.0	16.0	16.0	16.0
Annuity factor (A)	17.2	16.9	17.1	17.7	17.8	17.8
IV. Monthly average pensionable earnings (1000 EUR)	3.2	4.1	5.2	6.8	9.2	12.6
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	89%	98%	90%	83%	81%	80%

MEN	2022	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	840	1270	1411	2099	3457	3639
I. Number of new pensions (1000)	55.4	64.1	58.0	66.4	76.6	58.6
II. Average contributory period (years)	40.6	40.0	38.5	39.5	41.5	42.4
III. Average accrual rate (%) (c/A)	0.92	0.94	0.93	0.90	0.90	0.89
Notional-accounts contribution rate (c)	16.0	16.0	16.0	16.0	16.0	16.0
Annuity factor (A)	17.3	17.1	17.2	17.8	17.8	17.9
IV. Monthly average pensionable earnings (1000 EUR)	3.4	4.4	5.7	7.4	10.1	13.7
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	95%	104%	98%	91%	89%	87%

WOMEN	2022	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	713	1081	1291	1731	2971	2952
I. Number of new pensions (1000)	55.0	61.9	62.6	65.3	78.9	56.0
II. Average contributory period (years)	39.3	39.5	38.2	39.7	41.4	42.4
III. Average accrual rate (%) (c/A)	0.94	0.96	0.95	0.91	0.90	0.91
Notional-accounts contribution rate (c)	16.0%	16.0%	16.0%	16.0%	16.0%	16.0%
Annuity factor (A)	17.0	16.7	16.9	17.6	17.7	17.6
IV. Monthly average pensionable earnings (1000 EUR)	2.9	3.8	4.8	6.1	8.4	11.4
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	83%	91%	82%	75%	74%	73%

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

Source: European Commission, EPC.

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.[15]

There is therefore no straightforward relation between the growth of the "implicit pensionable earnings" and the average income growth. In Table 13, the sustainability factor is set to 1, because the effect of the balancing is already counted for implicitly in pension payments and pension wealth.[16] 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.

3.4. Financing of the pension system

The financing of the pension system is described in Section 1.1 and summarized in Table 14.

TABLE 14 – FINANCING OF THE PUBLIC PENSION SYSTEM

	Public and private employees	Self-employed
Contribution base	Pensionable income	
Contribution rate/contribution	18.5 %	
Employee	7% (including Premium Pension)	-
Employer	10.21% (including Premium Pension)	17.21%
State*	Contributions for social insurance	
Other revenues*	Buffer funds cover yearly discrepancy between contributions and pension payments	
Maximum contribution	Contributions are paid on all pensionable income but only gives pension rights to a maximum of 8.07 income base amounts, roughly EUR 52 230 in 2023	
Minimum contribution	0	

*Only legislated contributions are reported.
Note: The contribution is calculated on earnings net of the employee contribution, i.e. (0.07+0.1021)/(1-0.07)=0.185.
Source: European Commission, EPC.

From 2022 to 2070, the number of pensioners will increase by 41 per cent (see Table 10). During the same period, the number of contributors will grow only by some 25 per cent and employment by 21 per cent. 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 increase slightly (see Table 15).

---

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

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

	2022	2030	2040	2050	2060	2070	change 2022-2070 (pps)
Public pension contributions (%GDP)	5.4	5.9	5.9	5.9	5.8	5.9	0.5
Employer contributions	*3.0*	*3.3*	*3.3*	*3.3*	*3.2*	*3.3*	*0.3*
Employee contributions	*2.1*	*2.3*	*2.3*	*2.3*	*2.3*	*2.3*	*0.2*
State contribution*	*0.2*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.0*
Other revenues*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Number of contributors (I) (1000)	5 785	6 224	6 640	6 902	7 006	7 238	1 453
Employment (II) (1000)	5 253	5 543	5 874	6 092	6 243	6 357	1 104
(I) / (II)	1.10	1.12	1.13	1.13	1.12	1.14	0.04

Includes only legislated contributions.
Source: European Commission, EPC.

The number of pensioners substantially exceeds the number of individuals over 65 years (see Table 10) as the calculations also cover individuals with Swedish pensions living abroad as well as disability pensioners and survivors younger than 65 years. The number of contributors also exceeds the number of employed, as contributions are paid by the central government to cover pension entitlements for unemployment, sickness, disability, and parental leave. Self-employed individuals also participate in the system.

3.5. Public pension funds

The public pension fund's primary function is to smooth the yearly differences between incoming contribution payments and outgoing pensions. In the last 15 years, pension contributions have been lower than pension expenditure and administrative costs, a primary deficit which the fund has covered. However, this deficit has on average been smaller than the property income of the fund, and hence, the fund has increased both in nominal terms and as a share of GDP. The fund is free to invest in all interest-bearing and non-interest-bearing assets, and its objective is to maximise the return for pensioners. Even if the fund fell in value by some 7 per cent of GDP in 2001 and 2008, its value increase by some 0.5 per cent of GDP on average in the period 2000–2022. Since its start in 1960 the fund has had a yearly real rate of return of 3.4 per cent. In 2022 it amounted to some 35 per cent of GDP, which is enough to finance pension payments for more than 5 years.

The fund value is, together with the contribution asset, included in the calculation of the pension system balancing number, the ratio of pension system assets in the nominator and the liabilities in the denominator. If the balancing number falls below 1, meaning that the liabilities exceed the assets, the balancing mechanism is activated, and pension entitlements and pension payments are indexed at a slower pace. This happened in 2008–2017. This mechanism ensures that the central government budget will never be burdened, leaving all financial risk on the pensioners.

On the other hand, if the balancing number exceeds 1.1, it has been proposed that a similar mechanism should increase pension entitlements and pension payments faster than the normal average income indexation. Even if the balancing number was 1.1202 in 2023, such a positive balancing mechanism has not been enacted, and is not included in the pension calculations.

In the projection, the fund is assumed to earn an early rate return of 4 per cent in the long run, whereas the change in asset values is assumed to be zero. In the mid-2020s and onwards, the primary net lending of the system is positive, meaning that pension contributions cover pension expenditure and the administrative expenses of the system. Given that there is no positive balancing mechanism in the calculations, a positive primary balance and average 4 per cent return on fund assets, the fund grows faster than GDP and will reach more than 60 per cent of GDP in the late 2060s, which is more than 13

times yearly payments of the income NDC income pension. This indicates that the balancing mechanism will likely be supplemented with an "accelerator" in a coming pension reform.

	average 2012-2021	2022	2030	2040	2050	2060	2070	average 2022-2070
Stock of assets (end-of-year; %GDP)	30.3	30.8	28.8	30.2	38.6	50.6	61.8	39.2
Fund balance (million EUR)		104	6 079	16 651	36 597	58 836	100 453	
Fund expenditure		33 722	40 187	53 054	72 960	106 735	147 161	
Disbursements (to pension scheme)		33 522	39 939	52 690	72 424	105 964	146 050	
Other expenditure (incl. administrative costs)		200	248	364	537	771	1 112	
Fund revenues		33 826	46 267	69 705	109 557	165 571	247 614	
Return on assets		3 029	4 691	8 937	20 851	40 948	70 299	
Other income (incl. pension contributions)		30 797	41 576	60 768	88 706	124 622	177 315	
Nominal rate of return (%)	1.2	1.5	2.4	3.0	3.8	4.0	4.0	3.3
Change in asset valuation (million EUR)		-25 867	0.0	0.0	0.0	0.0	0.0	

Source: European Commission, EPC.

3.6. Sensitivity analysis

Sensitivity analysis is used to demonstrate how public pension expenditure evolves in alternative economic, demographic and policy scenarios. Table 17 presents the results of the alternative scenarios as deviations (percentage points of GDP) from the baseline. The sensitivity analysis shows that public pensions expenditure will increase as share of GDP if the working age population grows less in the scenario with lower fertility or lower migration. This is also the case if the retirement age is unchanged, which demonstrates the importance of the reform which links the retirement age limits to the change in life expectancy at 65. On the other hand, public pension expenditure is set to grow less rapidly in relation to GDP if migration or the employment rate among older worker are higher.

Higher life expectancy at birth also has a small negative effect on public pension expenditure as it would increase GDP more than pension expenditure, as a higher life expectancy in older ages would actuarially increase the divisor which determines the average pension, so that a given amount of pension assets would last for a longer time period. A faster increase in the life expectancy at 65 would lead to an earlier increase in the retirement age.

The pension to GDP ratio is insensitive to variations in productivity, as these tend to influence GDP and pension expenditure to the same extent. Although pension expenditure will be higher if productivity increases more rapidly, so will GDP.

In the linking retirement age to longevity scenario, retirement ages are linked to three quarters of the increase in the expected life length at 65, instead of two thirds which is the current legislation in Sweden. This change leads to marginally faster increase in the earliest retirement age, and hence lowers public pension expenditure in relation to GDP somewhat.

A higher inflation rate will increase the guaranteed pension and housing supplement in the first few years of the projection, until 2027, when these benefits are price-indexed. From 2027 onwards, all benefits are assumed to be income-indexed and will grow at the same rate as in the baseline projection.

The alternative scenario where the benefit ratio cannot fall below 90 per cent of the 2022 level, does not differ from the baseline projection as the benefit ratio is not projected to fall below this level.

Adding the occupational pension and the mandatory and voluntary private pensions, will only increase the differences between the different scenarios somewhat, but not change the overall picture (see Table 17). However, a notable difference is that productivity does influence total pension expenditure as a

share of GDP as benefits in the private systems are sensitive to the interest rate assumption, which is the same in both productivity scenarios and the baseline. Higher productivity will therefore lower the total pensions to GDP ratio somewhat, via the denominator effect, and vice versa.

TABLE 17 – EXPENDITURE PROJECTIONS UNDER DIFFERENT SCENARIOS (PPS DEVIATION FROM BASELINE)[17]

Public pension expenditure	2022	2030	2040	2050	2060	2070	change 2022–2070 (pps)
Baseline (%GDP)	7.4	7.6	7.2	7.0	7.3	7.2	-0.2
Higher life expectancy at birth (+2y)	0.0	0.0	0.1	-0.1	-0.1	-0.2	-0.2
Higher migration (+33%)	0.0	-0.1	-0.2	-0.4	-0.4	-0.4	-0.4
Lower migration (-33%)	0.0	0.1	0.3	0.4	0.5	0.5	0.5
Lower fertility (-20%)	0.0	0.0	0.0	0.2	0.4	0.7	0.7
Higher inflation scenario (2% by 2052)	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Higher employment rate of older workers (+10 pps)	0.0	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Higher productivity (TFP converges to 1%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lower productivity (TFP converges to 0.6%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Policy scenario: link retirement age to longevity	0.0	-0.1	0.0	-0.2	-0.3	-0.1	-0.1
Policy scenario: constant retirement age	0.0	0.1	0.3	0.3	0.6	0.9	0.9
Policy scenario: constant benefit ratio	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Total pension expenditure	2022	2030	2040	2050	2060	2070	change 2022–2070 (pps)
Baseline (%GDP)	9.7	10.1	9.8	9.6	10.2	10.3	0.6
Higher life expectancy at birth (+2y)	0.0	0.0	0.1	-0.2	-0.3	-0.4	-0.4
Higher migration (+33%)	0.0	-0.2	-0.3	-0.5	-0.6	-0.6	-0.6
Lower migration (-33%)	0.0	0.1	0.3	0.5	0.7	0.8	0.8
Lower fertility (-20%)	0.0	0.0	0.0	0.2	0.6	0.9	0.9
Higher inflation scenario (2% by 2052)	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Higher employment rate of older workers (+10 pps)	0.0	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Higher productivity (TFP converges to 1%)	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2
Lower productivity (TFP converges to 0.6%)	0.0	0.0	0.0	0.1	0.2	0.3	0.3
Policy scenario: link retirement age to longevity	0.0	-0.2	0.1	-0.4	-0.5	-0.1	-0.1
Policy scenario: constant retirement age	0.0	0.1	0.5	0.4	0.9	1.2	1.2
Policy scenario: constant benefit ratio	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: European Commission, EPC.

---

[17] For more information on the design of the sensitivity scenarios, see Chapter 5 of Part 1 in European Commission and EPC (2022), '*2024 Ageing Report: Underlying assumptions and projection methodologies*' European Economy, Institutional Paper 257.

3.7. Changes in comparison with previous Ageing Report projections

Table 18 compares the present pension projections with the projections in previous Ageing Reports. The change in the public pension expenditure to GDP ratio is expected to be slightly smaller (-0.1 pp.) than in the 2021 projections. The dependency ratio will increase the pension to GDP ratio, but the lower benefit ratio and coverage ratio will counter-act this effect. Compared to the 2021 projection, the coverage ratio effect is now negative due to the increase in the retirement age.

TABLE 18 – DISAGGREGATION OF THE CHANGE IN THE PUBLIC PENSION EXPENDITURE-TO-GDP RATIO IN CONSECUTIVE AGEING REPORTS (PPS OF GDP)

	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*
2024 Ageing Report (2022–2070)	**-0.2**	*2.5*	*-1.0*	*-1.3*	*-0.3*	*-0.1*

- The disaggregation for 2006/2009/2012 is on the basis of the number of pensions; for the other vintages it is on the basis of pensioners.

- The projection horizon has been extended over consecutive Ageing Reports, limiting comparability over time.

Source: European Commission, EPC.

Table 19 presents the differences between the 2021 projections and outcome. The main explanation for the fall in the pensions to GDP-ratio is the much higher than expected increase in the GDP deflator in the last few years. In the 2021 projections, GDP in current prices increased by less than 2 per cent between 2019 and 2022, whereas the actual increase was close to 17 per cent. The policy-related changes, an increase in the level of the guaranteed pension and in the number of people who are eligible to guaranteed pension which was passed in 2022 (see Section 1.2), are assessed to permanently increase pension expenditure with some 0.1 per cent of GDP from that year.

TABLE 19 – BREAKDOWN OF THE DIFFERENCE BETWEEN THE 2021 PROJECTIONS AND OUTCOME FIGURES (% OF GDP)

	2019	2020	2021	2022
Ageing Report 2021 projections (%GDP)	7.6	8.4	8.3	8.1
Assumptions (pps of GDP)	0.1	-0.5	-0.8	-0.9
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	0.1
Actual public pension expenditure (%GDP)	7.7	7.9	7.4	7.4

Source: European Commission, EPC.

Comparing the period after 2022 in Table 20, the differences are smaller and more stable over time. The policy-related changes explains the higher pension to GDP ratio compared to the previous projections in the near future, and the opposite effect in the longer perspective. We assess that the more generous rules for the guaranteed pension introduced in 2022 increases the pension expenditure, but that the negative effect on the pension to GDP ratio of the pension age reform will change the sign of the policy-related changes after 2040.

TABLE 20 – BREAKDOWN OF THE DIFFERENCE BETWEEN THE 2021 AND THE NEW PUBLIC PENSION PROJECTION (% OF GDP)

	2022	2030	2040	2050	2060	2070
Ageing Report 2021 projections	8.1	7.4	7.0	7.0	7.4	7.5
Change in assumptions (pps of GDP)	-0.9	0.1	0.0	0.0	0.0	-0.1
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)	0.1	0.1	0.1	0.0	-0.1	-0.2
New projections	7.4	7.6	7.2	7.0	7.3	7.2

Source: European Commission, EPC.

4. Description of the pension projection model and the base data

4.1. Institutional context in which the projections are made

Reprogramming SESIM

As in the previous exercises, all off the projections have been made with the dynamic microsimulation model SESIM[18]. However, since the last round of the AWG calculations, the model has been completely reprogrammed in R. The functionality of the new version is basically the same as the old one, but the interior is completely new. The old model was abandoned for several reasons, among others that the modelling language was obsolete and not supported by the original manufacturer any longer.

The choice of R as the new model environment was preceded by a pre-study comprising an inventory of different programming alternatives. After prototyping and testing, "R" and "RStudio", which is an integrated development environment (IDE) for R, were finally chosen. The implementation is based on data.table, that is an R package that provides an enhanced version of "data.frames", which are the standard data structure for storing data in base R. Also, the programming languages C++ and Julia are used in some cases.

Originally (around 1997) the SESIM model was developed at the Swedish Ministry of Finance in close cooperation with researchers at Swedish universities. The model has been further developed at several times, most recently at the Swedish Public Health Agency, on behalf the Ministry of Health and Social affairs. The reprogramming and validation in R have been done by the Public Health Agency, who also have done all the model simulations for AR24.

SESIM background

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. 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 at the Swedish Public Health Agency. No peer review etc. has been done nationally. The results have been validated against National Accounts outcome and projections from The Swedish Pension Agency. The results have also been validated against the previous round of the AWG pension projections.

4.2. Data used to run the model

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.[19] The database is created from administrative registers and covers about 3.5 per cent 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. New individuals replace those that disappear from the data set due to death or emigration in order to maintain the statistical representability.

---

[18] A detailed documentation of SESIM can be found in Flood et. al (2012), or at www.sesim.org.

[19] For a more detailed description of the data set, see e.g., Flood et al (2012) and Edin & Fredriksson (2000). Data is available for the years 1968–2018. LINDA is no longer updated.

4.3. Reforms incorporated in the model

The most important reforms incorporated in the calculations since Ageing Report 2021 include:

The introduction of an indicative age which automatically raises age limits

In 2013, several proposals on pension-related age limits were made to promote a longer working life. It was proposed that the earliest age of retirement, 61 years at the time, and the earliest age for guaranteed pension, 65 years, should both be indexed to 2/3s of the expected life length at 65 years. It was 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 proposals. As a first step of this pension reform, the earliest age to draw an old-age pension was increased from 61 to 62 years at the first of January 2020. This first step was implemented in the 2021 projections.

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 to get guaranteed pension will be raised from 65 years today, till 67 years in 2026. At the same time the age at which employment protection ends will also be increased. From 2026 and onwards exit ages will be indexed to a new "indicative" or "standard" pension age, which will increase in line with two thirds of remaining lifetime at 65 years. The Eurostat population projection for Sweden foresees a further increase in all of the above exit ages again in 2037, 2054 and 2069, increasing the earliest age for an old-age pension to 67 and the earliest age for the guaranteed pension to 70 in 2069. As the above-mentioned reform was approved by Parliament in the spring of 2021, it is included in the projections for the Ageing Report 2024. However, this reform was also included in the linking retirement age to life expectancy scenario in the Ageing Report 2021.

Higher guaranteed pension and housing supplement for pensioners

In June 2022, the Parliament decided to increase the guaranteed pension from August 2022. For people born after 1938, the maximum annual benefit amount was increased by 0.249 PBAs to 2.43 PBAs for single households and 2.2 PBAs per person for cohabitants. The housing supplement for pensioners was also increased with SEK 300 (EUR 26) per month for single households and SEK 150 (EUR 13) per person for cohabitants. Because of the higher benefit amount in combination with the price-indexed guaranteed pension, the maximum level of earnings-related pension that entitles guaranteed pension and housing supplement were also raised. This means that people who receive a guaranteed pension will be able to have a higher earnings-related pension, which results in a new group of pensioners who receives guaranteed pension. The reform increased the number of pensioners that receives a guaranteed pension with approx. 350 000 people.

4.4. General description 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 populations include approximately 320 000 individuals and is from 1999.[20] All individuals are subject to a significant 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 3. The basic 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

---

[20] If necessary, the sample can be extended.

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 used.

Every year all individuals are assigned one out of nine possible statuses.[21] Every status is linked 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 legal rules are applied to calculate the income. Next capital income from financial assets and housing is calculated.[22] The legal, or negotiated, rules for all types of pensions are implemented in relevant detail (i.e., public, occupational and private pensions). At the time of retirement all persons are assumed to claim full time pension. The model does not handle part time pensions. However, pensioners can also earn work income and pension at the same time. Also, the automatic balancing mechanism is implemented, although it is not activated during the actual projection period.
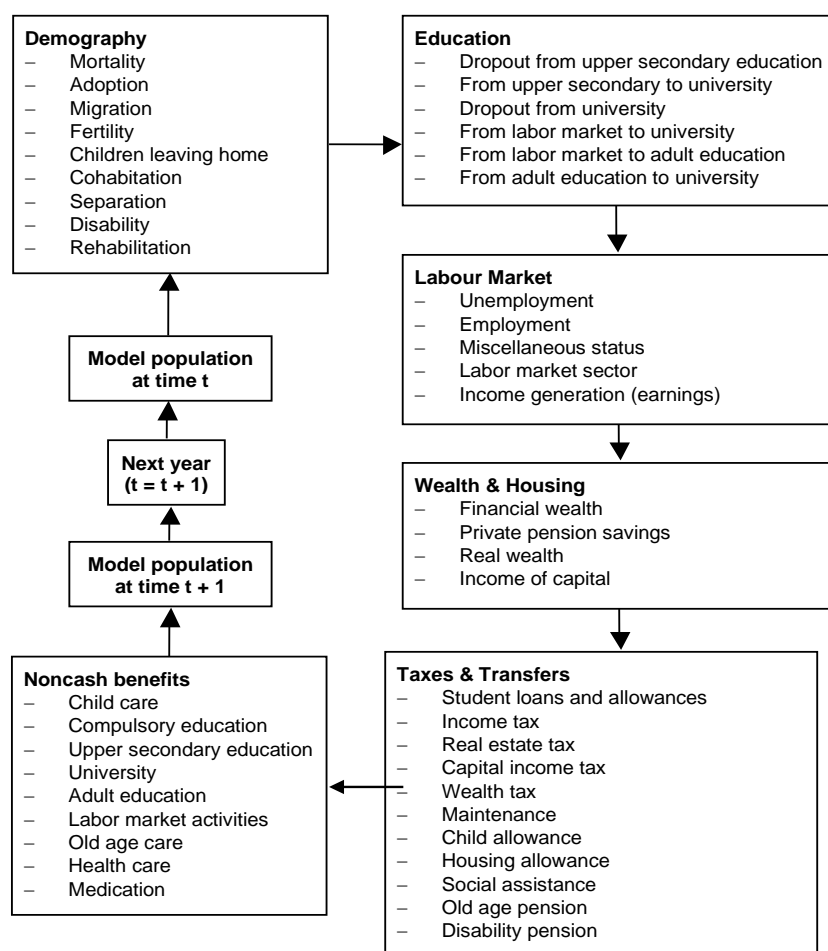
In the AWG projections the labour market module is central, especially employment, unemployment, retirement, or disability. These functions are statistical rather than economic, in the sense that the probability of an event is influenced by individual characteristics, but not by financial incentives. For example, the probability of retirement is a function of the individual's education, age, gender, income etc., but not of the marginal tax.

There are several ways of simulating the date when people retire in SESIM. The number of new pensioners is aligned by picking the individuals with the highest estimated probability to retire. It is most common to 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. One important characteristic is that spouses tend to coordinate their retirement.

---

[21] 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).

[22] Four separate assets are considered in the household portfolio: financial wealth, own homes, other real wealth, and private tax-deductible pension savings.

FIGURE 3 – STRUCTURE OF SESIM

Demography
– Mortality
– Adoption
– Migration
– Fertility
– Children leaving home
– Cohabitation
– Separation
– Disability
– Rehabilitation

Education
– 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

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

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

Model population at time t

Next year (t = t + 1)

Model population at time t + 1

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

Note: Non-cash benefits are not yet implemented in the R-version.

4.5. Other features of the projection model

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 projections, the model is adjusted to the average unemployment and participation rates for five-year age groups and sex, so that the simulated population and labour force tracks the AWG assumptions.

The indexation rules are implemented in all relevant detail in the model. All items that are price-indexed by legislation, have been income-indexed from 2027 in the projections (for example the housing allowance for pensioners and the guaranteed 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.

References

Edin, P. A. and Fredriksson, P., [2000], "LINDA – Longitudinal Individual Data for Sweden", Working Paper 2000:19, Uppsala University, Economics department

Flood L, Jansson F, Pettersson T, Pettersson T, Sundberg O, Westerberg A [2012] "The Handbook of SESIM – a Swedish dynamic micro simulation model" (www.sesim.org)

Methodological annex

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.[23]

TABLE A1 – ECONOMY-WIDE AVERAGE WAGE AT RETIREMENT (1000 EUR)

	2022	2030	2040	2050	2060	2070
Economy-wide average gross wage at retirement	45.6	60.6	84.9	118.2	161.1	225.6
Economy-wide average gross wage	42.4	50.6	69.5	97.6	135.8	187.5

Source: European Commission, EPC.

Pensioners vs pensions

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

Pension taxation

The taxes are modelled for all individuals in line with the 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 then used for reporting of all kinds of pension income.

Disability pensioners

The modelling of the disability pension in SESIM 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 a reference period.

The low inflow of new disability pensioners results in a gradual decrease in the stock, as existing disability pensioners reaches the standard indicative age and are shifted to old-age pension.

Table A.2 shows that disability is increasing with age. According to the legislation, no one over age 64 was entitled to a disability pension before 2023. In 2023, this age was raised to 65 years in line with the increase of the earliest age for a guaranteed pension. Most individuals with a disability pension have a low earned income pension, so even if they can apply for an earnings-related old-age pension earlier, it is common to wait until they are entitled to a guaranteed pension before applying for an old-age pension. When the earliest age to draw a guaranteed pension increases with life expectancy, the age limit for disability, as well as other relevant age limits, is shifted in line with the indicative pension age. This explains the increasing number of individuals with a disability pension in ages 60–69 years. The increase in disability pensioners in the age group 55–59 in 2030 and 2040 is explained by demographics. Between these years, the large number of immigrants which came to Sweden in the period 2000–2020 will reach

---

[23] 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.

the age 55–59, and they have a higher probability to receive a disability pension than their peers who were born in Sweden.

TABLE A2 – DISABILITY RATES BY AGE GROUPS (%)

	2022	2030	2040	2050	2060	2070
Age group -54	3.1	3.0	2.5	2.3	2.3	2.3
Age group 55-59	7.9	8.3	10.2	7.6	7.6	7.2
Age group 60-64	11.5	11.7	12.5	12.6	11.7	11.0
Age group 65-69	0.0	6.1	9.1	11.0	12.7	16.4
Age group 70-74	0.0	0.0	0.0	0.0	0.0	0.0
Age group 75+	0.0	0.0	0.0	0.0	0.0	0.0

Source: Ministry of Finance.

Survivors' 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 modelling of 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 2027.

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 disaggregation

TABLE A3 – FACTORS BEHIND THE CHANGE IN PUBLIC PENSION EXPENDITURE BETWEEN 2022 AND 2070 (PPS OF GDP) – PENSIONS

	2022–30	2030–40	2040–50	2050–60	2060–70	2022–70
Public pensions to GDP	0.2	-0.4	-0.1	0.3	-0.1	-0.2
Dependency ratio effect	0.4	0.5	0.3	1.0	0.3	2.5
Coverage ratio effect*	0.3	-0.2	0.1	-0.2	-0.1	-0.1
Coverage ratio old-age	0.5	-0.1	0.2	-0.1	-0.1	0.3
Coverage ratio early-age	-0.6	-1.2	-0.7	-0.3	-0.4	-3.3
Cohort effect	-0.5	-0.4	0.1	-1.1	0.1	-1.8
Benefit ratio effect	-1.0	-0.5	-0.5	-0.3	-0.3	-2.7
Labour market effect	-0.1	-0.1	0.0	-0.2	0.0	-0.4
Employment ratio effect	-0.1	-0.1	0.0	0.0	0.0	-0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.0	-0.1	0.0	-0.1	0.0	-0.2
Residual	0.5	0.0	0.0	0.0	0.0	0.5

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

Source: European Commission, EPC.

Annex 1

Income indexation

The PAYG-pensions are 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.

FIGURE A1 – INCOME INDEXATION.
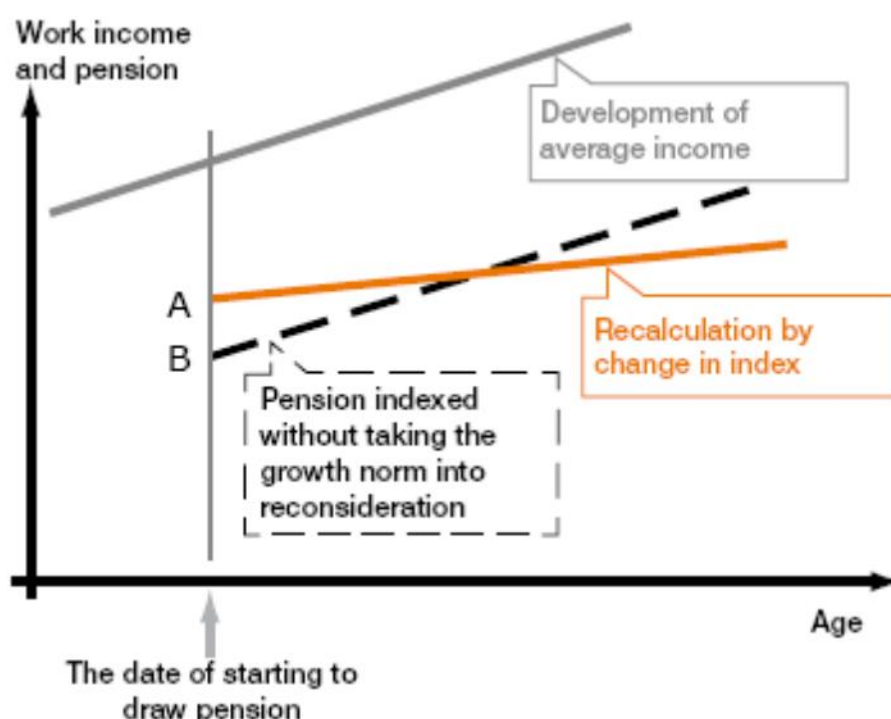
Automatic balancing

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 per cent.

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 balancing mechanism was first activated in 2011, following the Lehman Brothers downturn, and deactivated in 2018.

FIGURE A2 – INCOME AND BALANCE INDEXATION.