REPUBLIC OF ESTONIA
MINISTRY OF FINANCE

Pension projection for 2021 Ageing Report

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1. Overview of the pension system

1.1. Description

The Estonian pension system is based on the widely used **three-pillar approach**. The first pillar is a defined-benefit public pension scheme. The second pillar was a mandatory (now voluntary)[1] defined-contribution scheme (was mandatory to newcomers to the labour market and to all persons born as of 1983). The third pillar is a voluntary private pension scheme. The second pillar is included in this EPC-AWG projection exercise because it has a significant impact on future pension size.

A multi-pillar pension scheme rests on the assumption that income after retirement comes from several different sources, each with its different legal, organisational and financial principles. Current broad legal principles of the pension system are used since 1999-2000 with some changes from 2021 (see section 1.2). It was then established that the right and the amount of future old-age pension is tied to the amount of social tax paid by or on behalf of the person over their career. The state pension is based on the principle of solidarity, which means that the current pensions are paid from the taxes of people who are currently working. The mandatory funded pension scheme was launched in 2002. The aim of the second pillar is to reduce the future stress of pension expenditure on taxation arising from changing population composition by making people accrue pension assets themselves. The third pillar, possibility for a voluntary supplementary funded pension, was created in 1998, even before the second pillar. It was established with the aim of providing people with an opportunity to insure their retirement years are even more financially sound.

The first pillar of the Estonian pension scheme is a state pension insurance based on a pay-as-you-go financing principle and covers three social risks: old age, permanent incapacity for work (this is being phased out, see section 1.2 for more detail) and loss of a provider (survivor pension).

Protection ensured by state pension insurance includes two levels:

1. National, flat-rate, pension ensured for all residents of Estonia;
2. Old-age, (incapacity-for-work) and survivor pension based on former work input.

Right to a national pension (**minimum pension**) starts at the statutory pension age, on the condition that the pension applicant has lived in Estonia for at least 5 years. The benefit is flat, the same for every applicant, and is currently 221.63 euro per month (from 1.04.2020). It is indexed annually along with other pension types with the same index (see below). The aim of the national pension is to ensure a basic income for retired people who have not earned the right to an old-age pension.

In 2021, the **statutory retirement age** for men and women is 64 years. The retirement age will gradually continue to increase for both sexes to 65 years by 2026. As of 2027, it will be **linked to changes in life expectancy** (average remaining life expectancy at 65y). For each year, an average of 5 years of life expectancy (at 65) increase (or decrease) is added. For any given year t, years t-4 to t-8 are used and compared to base years 2018-2022. There is an upper limit of three months for the annual pension age increase and each increase will be announced two years before coming into effect (see Table 1 below).

The qualification period for receiving an old-age pension is 15 years of pension system contributions or pensionable service (see Table 1 below).

Old-age pension consists of four parts: (1) base amount, (2) length-of-service component, (3) insurance component and (4) compound insurance and solidarity component.

[1] This reform law was announced during the preparation work for this report. See below and section 1.3 for more detail.

1. The base amount is a flat-rate element.
2. The length-of-service component applies to periods of pensionable service until the end of 1998 and depends only on the length of service (in years).
3. The insurance component applies to pensionable service from 1999 to 2020 and depends on social tax paid by the insured (self-employment) or on their behalf by the employer or by the state.
4. Compound insurance and solidarity component applies to pensionable service from 2021 onwards. It also depends on social tax paid by the insured (self-employed) or on their behalf by the employer or by the state, but has a flat element which is described below.

The pension system is a point system and includes a gradual transition through several rule changes which have tweaked the conditions with which pension points are accumulated. Depending on the period when a person has had a pensionable service, a person can have three different types of pension points accumulated in addition to the flat component of the pension.

The pension formula is as follows:

$$P = B + V \cdot \sum (s + A + \frac{A + s_2}{2})$$

where:

P – amount of pension (in euro);

B – base amount (in euro);

s – pensionable length of service[2] (until 1998, in years);

A – pension insurance coefficients[2] (from 1999 to 2020);

s_2 – pensionable length of service with minimum contribution requirement[2] (the solidarity component) (from 2021);

V – cash value of one year of pensionable length of service, the pension insurance coefficient (1.0 for average contribution) and the solidarity component (1.0 for a minimum or above contribution) (in euro).

To calculate the annual pension insurance coefficient (*A*) for a given individual, the public pension part of social tax paid in the specific calendar year are divided by the annual average amount of the pension part of the social tax. Hence, the annual pension insurance coefficient (*A*) reflects the ratio of social tax calculated on the earnings of the person to the average earnings. The solidarity component (s_2) is the same for all people earning the current minimum wage or more and is proportionally smaller for people who earn less (e.g. part-time workers, seasonal workers). This component was added to address projected pension inequality in the future arising from general wage inequality and also the gender wage gap, which in Estonia is large.

Real values of pensions are influenced by the values of the base amount (*B*) and the cash value of the annual score (*V*), which are subject to regular indexation (see next two paragraphs). From 01.04.2020, the base amount (*B*) is €215.51, which is about 41% of the average old-age pension and the cash value of the annual score *(V)* is €7.01.

[2] All of these can be considered points in pension system terminology, but we don't call them that in Estonian. The closest translations would be seniority or tenure.

Adjustment of pension benefit size is done through regular **indexation**. The current pension index is used since 2008. Its aim is to guarantee a stable increase of pensions in line with economic development and to diminish the need for *ad hoc* increases, as governments tended to do before the change.

The indexation system is based on social tax (wages) and inflation. The pension index is a sum of 80% of social tax revenue increase and 20% of the annual change in consumer price index. In addition, when applying the index to the four parts of the pension formula, different coefficients are used – 0.9 for the cash value *V* and 1.1 for the base pension amount, in order to further increase the solidarity in the system. When the index is negative, it is not applied (except for Parliament member pensions).

The index is calculated as follows:

$$i_{YearN} = 0.8 \cdot \left(\frac{SocialTax_{Year(N-1)}}{SocialTax_{Year(N-2)}} - 1 \right) + 0.2 \cdot CPI_{Year(N-1)}$$

Early retirement is possible for up to 5 years before the statutory retirement age. The minimum requirement for early retirement is 20 years of contribution to retire a single year early. For 2 years, 25 years of contribution is required and so forth with 5 year increments for each additional year of early retirement. The maximum early retirement of 5 years requires 40 years of contributions. Pension can be postponed indefinitely. Each year, new penalty and bonus rates for early or late retirements are calculated based on pension size, life expectancy and interest rates[3] so that the expected payouts for the overall public scheme remain neutral. The idea here is that whether a person retires early or late will not have an effect, on average, on pension spending. No restrictions or penalties are in place for working during early retirement or afterwards.

In addition to early and late retirement, the old-age pension has a **flexibility system** where a pensioner can take out half of the pension, or halt the pension payments altogether. In this case, the unused pension share will increase in the same way as if a person had postponed retirement. People can change their mind or even halt pension payments once a month – or 12 times in a calendar year. Changes take effect from the following calendar month. This is a recent change which could possibly increase old-age employment.

Besides the general state pension insurance, the Estonian pension system also includes some **special schemes** – old-age pensions with favourable conditions and superannuated pensions, enabling representatives of specific professions or persons with specific social status to retire before the general retirement age. Also, some categories of civil servants (for example judges, prosecutors, officials of the State Audit Office, police officers, members of the Defence Forces, Chancellor of Justice) have a right to favourable special pensions. The size of special pensions, although increasing, has remained limited (close to 0.1% of GDP). Government has committed to reduce the special rights; the pension addition paid to the public sector workers based on the length of service was for example abolished from 2013. The pension projections include all special schemes.

Public pensions are **financed** mainly from the state pension insurance part of social tax (33% of gross wage). The effective rate of state pension insurance part of social tax is 16% for persons having joined the 2nd pension pillar and 20% for those who have not joined. Any deficit is covered by the state budget. Surplus can not be used for other purposes than public pensions (see section 3.4 for a more detailed description).

According to the Pension Insurance Act, the Government of Estonia must analyse the impact of the increase in pensions on financial and social sustainability of the pension system in every five years. There is no strict mandate for the government to propose changes to the Parliament when problems

[3] Interest rates are used to calculate a discount rate to calculate the net present values of early or late pension sizes compared to the statutory pension size.

arise, but the analysis is public, and the government and the parliament usually discusses the results and proposals.

The second pillar of the Estonian pension system is a mandatory (voluntary as of 2021) funded scheme based on full pre-financing and covering only the risk of old age. Private asset management companies administer the second pillar pension funds. The second pillar is, in essence, an individual savings scheme, where the size of the pension depends on the total contributions over the career and rate of return of the pension fund.

Participation in the second pillar was mandatory for people born in 1983 or later. People born prior to 1983 and participating in the labour market could and can join the second pillar on a voluntary basis. The rate of second pillar contribution is 6% of wages – the employee pays 2% of his gross wage, which is supplemented by the state with 4% of gross wage on the account of social tax paid by the employer. In 2021, different opt-out options were introduced, making the pillar, in effect, voluntary (see section 1.3 for more detail). New entrants to the labour market are automatically added to the second pillar, but have the same opt-out options.

The retirement age in the second pillar is the same as in the first pillar. An additional requirement to receive a funded pension is that at least 5 years need to have passed since the first contribution to the scheme. The second pillar was launched in July 2002. Thus, the first benefits were paid in 2009 (benefits based on inheritance started from 2007). According to the law the main payment modality is a compulsory lifetime annuity. Insurers can offer only base (insurance) products for policy holders. Joint products are also allowed but they must meet the requirements of the base product. A guaranteed period may be stipulated so that the beneficiary or beneficiaries specified in a contract are entitled to payments made pursuant to the contract if the insured dies during the guaranteed period.

In this projection exercise, the second pillar is still treated as mandatory (see explanation in section 1.3).

Table 1 presents the qualifying conditions for retirement in Estonia. These are used for projecting the pension expenditures.

TABLE 1 – QUALIFYING CONDITIONS FOR RETIREMENT

			2019	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Statutory retirement age – men*		63y6m	65y6m	66y7m	67y8m	68y9m	69y9m
	Statutory retirement age – women*		63y6m	65y6m	66y7m	67y8m	68y9m	69y9m
	Minimum requirements	Contributory period - men	15y	15y	15y	15y	15y	15y
		Retirement age - men	63y6m	65y6m	66y7m	67y8m	68y9m	69y9m
		Contributory period - women	15y	15y	15y	15y	15y	15y
		Retirement age - women	63y6m	65y6m	66y7m	67y8m	68y9m	69y9m
Qualifying condition for retirement *without* a full pension	Early retirement age - men		60y6m	60y6m	61y7m	62y8m	63y9m	64y9m
	Early retirement age - women		60y6m	60y6m	61y7m	62y8m	63y9m	64y9m
	Penalty in case of earliest retirement age**		14.4%	:	:	:	:	:
	Bonus in case of late retirement (1 year)**		10.6%	:	:	:	:	:
	Minimum contributory period - men		15y	20y	20y	20y	20y	20y
	Minimum contributory period - women		15y	20y	20y	20y	20y	20y
	Minimum residence period - men		5y	5y	5y	5y	5y	5y
	Minimum residence period - women		5y	5y	5y	5y	5y	5y

* Reported retirement ages are calculated on the basis of life expectancy expectation in the Eurostat population projections (EUROPOP2019).

** Future penalty and bonus rates are age-specific and depend on mortality and interest rate curve, see section 1.2 for a more detailed description.

Source: Ministry of Finance of Estonia

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

There are several major changes to the pension system compared to the 2018 Ageing Report (AR2018). The first four of these where passed as law in December 2018 as part of a broad pension reform.

1. Starting from 2027, the pension age will be **linked to life expectancy** (average remaining life expectancy at 65y). For each year, an average of 5 years of life expectancy (at 65) increase (or decrease) is added. For any given year t, years t-4 to t-8 are used and compared to base years 2018-2022. There is an upper limit of three months for the annual pension age increase and each increase will be announced two years before coming into effect. This change will have the largest impact on the pension projections compared to the previous projection round.
2. Starting from 2021, the **pension formula has been changed**. The old formula did not have the solidarity component, consisting of three components.

   The old pension formula was as follows:

   $$P = B + V \cdot s + V \cdot \sum A$$

   where:

   P – amount of pension (in euro);

   B – base amount (in euro);

   s – pensionable length of service (until 1998, in years);

   A – pension insurance coefficients (1999-2020) (points);

V – cash value of one year of pensionable length of service and the pension insurance coefficient 1.0 (in EUR).

Changes in the formula will have an effect on pension distribution rather than the overall pension expenditure.

3. Starting from 2021, the **early and late retirement rules** have been changed. Previously, early retirement was possible 3 years before the official retirement age, but the benefit received (pension) would have been reduced by 0.4% for each month of early retirement. One could have also postponed retirement, after reaching the statutory retirement age, with 0.9% higher pension benefit for each month of postponement. Working during early retirement would interrupt pension payments. Changes in these rules will have little effect on the overall public pension expenditure in the projections.
4. Starting from 2021, a new **flexibility system** was introduced where an old-age pensioner can take out half of the pension, or halt the pension payments altogether. In this case, the unused pension share will increase in the same way as if a person had postponed retirement. People can change their mind or even halt pension payments once a month – or 12 times in a calendar year. Changes take effect from the following calendar month. Changes in these rules will have little effect on the overall public pension expenditure in the projections.

Two recent changes will affect **the second pillar**. Firstly, as a response to the global coronavirus pandemic, the state stopped paying the additional 4% into the second pillar for all people from 1 July 2020 until 31 August 2021. People have the option to stop their own payments from 1 December 2020 until 31 August 2021. Those who continue their payments will be compensated by the state in 2023-2024 with the unpaid 4%. For the second change, see section 1.3.

Disability pensions have been reformed and this will have some impact on the projections. Disability pensions are being moved to the unemployment office (Estonian Unemployment Insurance Fund) and rebranded as **work ability benefits** (or work capability benefits). The last pensioners will receive the disability pension by the end of 2021. The reform started in 2016. Disability pensions were assigned to people based on a list of medical diagnosis rather than an assessment of their work capability. This lead to an excess of disability pensioners, especially in areas with higher unemployment.

The work ability assessment procedures and guidelines were overhauled, made much more thorough and oriented towards people's potential in the labour market, rather than their ability to continue in their previous job.

Briefly, the new scheme is as follows. The unemployment office evaluates whether an applicant has full work ability, partial work ability loss or full work ability loss. The first group will get no benefit and are treated as regular unemployed. The second group is assigned a partial benefit and are also treated as unemployed (to receive the benefit, certain conditions have to be met, like seeking work, participating in services etc). The third group gets the full benefit with no special conditions. Most are assigned the partial benefit. The partial and full benefits are the same for almost all people. If you earn a high wage, the benefit is reduced, but most benefits are not affected by this. Full average benefit in 2020 is 433 euro and partial average benefit is 247 euro a month. Work ability benefits have the same indexation as old-age pensions. Following this reform, we have seen some employment and labour participation gains. Also, the overall number of benefit recipients has dropped by about a tenth, which has implications on the overall spending outlook. When a person reaches the pensionable age, he/she can no longer claim the work ability benefit. Also, their personal old-age pension can not be smaller than his/her previous work ability benefit.

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

This projection exercise uses a single major constant policy assumption and it concerns a recent change in the second pillar. The Estonian Parliament passed as law a second pillar reform on 11 Mar 2020. The law was not announced by the president and petitioned the Estonian supreme court to declare the law unconstitutional. The supreme court rejected the petition on 20 Oct 2020[4] and the president announced the law on the same day. The reform allows people to opt out of the mandatory second pillar scheme as of 2021. People will have four basic options:

1. Continue as is;
2. The accumulated pension assets will be transferred to a special private investment account, the 2% and 4% payments will continue to that account, people will basically become their own second pillar pension fund investment manager;
3. Stop the payments into the pillar, existing assets remain invested in the fund, the person can opt in with their payments again after 10 years;
4. Stop the payments and take out assets (pay income tax), the person can opt in again after 10 years.

New entrants to the labour market are automatically added to the second pillar, but have the same four options as previously joined people.

The reform has sparked a fierce discussion in Estonia which is still ongoing. The main arguments for reform are that the private funds have underperformed and the money should go to increase the first pillar pensions. Also, people have the option to remain in the second and additionally save in the third pillar. Arguments against the reform assert that the reform is myopic, leaving future replacement rates much lower or the tax burden higher. Also, that the economic shock of a sudden consumption surge will create macroeconomic imbalances. Furthermore, the reform would be unjust to those who want to save. The reform is very recent with many practical details still unclear. Due to this we have no solid basis to predict the behaviour of people, so we have to treat the second pillar as still fully mandatory in the context of this projection exercise. If many people leave the second pillar, their contributions would not automatically go into the first pillar but governments would have a strong justification and public expectation to discretionarily increase pensions in the public scheme. If fever people do, the opposite is true. In the next round, the outcome of this reform will be clear and more informed projections can be made.

[4] https://www.riigikohus.ee/en/news-archive/supreme-court-did-not-declare-pension-reform-unconstitutional

2. Overview of the demographic and labour force projections

2.1. Demographic developments

Since regaining independence at the beginning of the 1990s, the Estonian population has been in a decline due to various reasons. In 1990-1999 we had a very sharply declining fertility rate (from 2.1 to 1.3); emigration (more than 10% of the population left); flat or even declining life expectancy at birth (from 70y to 68y to 70y). Population decline is expected to continue, although the more recent EUROPOP projections have softened the fall considerably compared to earlier projections and compared to other Baltic states, which are also facing a negative demographic outlook. The reason is that there has been considerable remigration in recent years which has resulted in a small uptick in the overall population. Ageing of the population is more rapid in comparison with other European countries as the starting levels of life expectancy are currently relatively low but are expected to converge closer to EU average levels by 2070. Overall, Estonia will lose a 10th of the population in the next 50 years while gaining 6.5 and 9.4 years of life expectancy for women and men respectively (see Table 1).

Compared to AR2018, the population decrease over the projection period is almost the same (close to -10%), with a small improvement coming from a more positive net migration outlook. Life expectancy has been revised slightly upwards. 2019 figures were higher than what was predicted for 2020 in the last round of projections used in the AR2018. Old-age dependency ratios have been revised upwards. The takeaway from these projections is that as the old-age dependency ratio is set to increase rapidly, pressure is added to the public pension system.

TABLE 2 – MAIN DEMOGRAPHIC VARIABLES

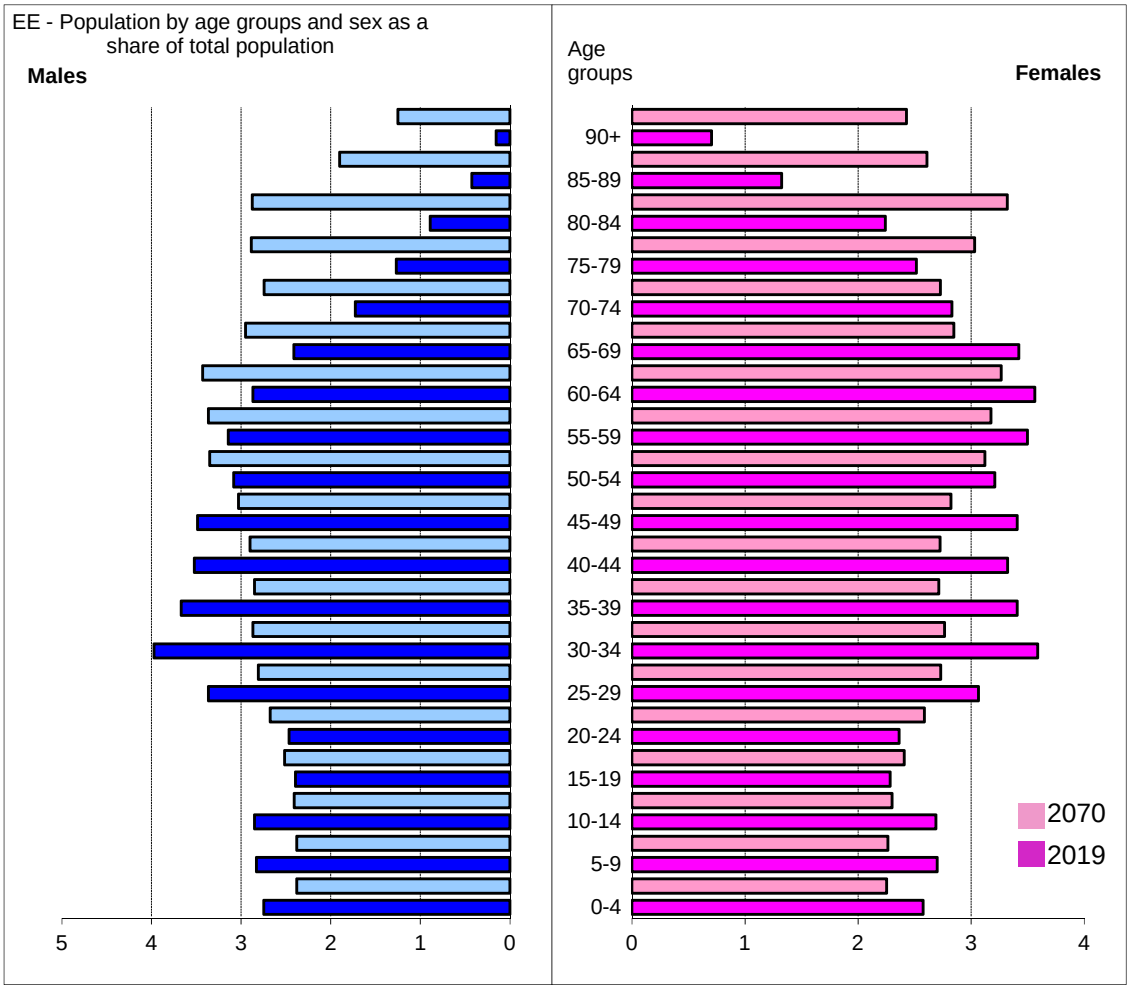
	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Population (thousand)	1 327	1 307	1 280	1 255	1 223	1 192	1330	2020	-135
Population growth rate	0.4	-0.2	-0.2	-0.2	-0.3	-0.2	0.4	2019	-0.7
Old-age dependency ratio (pop 65+ / pop 20-64)	33.8	40.9	46.1	53.8	61.5	59.4	61.5	2059	25.6
Old-age dependency ratio (pop 75+ / pop 20-74)	13.7	16.9	20.5	23.6	27.8	31.5	31.6	2068	17.8
Ageing of the aged (pop 80+ / pop 65+)	28.8	29.4	34.3	35.3	37.4	45.6	45.6	2070	16.7
Men - Life expectancy at birth	74.9	76.7	78.9	80.8	82.6	84.3	84.3	2070	9.4
Women - Life expectancy at birth	83.4	84.7	86.1	87.5	88.7	89.9	89.9	2070	6.5
Men - Life expectancy at 65	16.5	17.6	18.9	20.2	21.4	22.6	22.6	2070	6.1
Women - Life expectancy at 65	21.5	22.4	23.5	24.6	25.6	26.5	26.5	2070	5.0
Men - Survivor rate at 65+	76.1	80.6	84.0	86.9	89.2	91.2	91.2	2070	15.1
Women - Survivor rate at 65+	90.7	92.3	93.5	94.6	95.4	96.1	96.1	2070	5.4
Men - Survivor rate at 80+	41.2	49.4	56.4	62.7	68.4	73.3	73.3	2070	32.1
Women - Survivor rate at 80+	69.8	74.8	78.6	82.0	84.8	87.2	87.2	2070	17.4
Net migration (thousand)	6.6	1.8	1.9	2.2	2.4	2.6	6.6	2019	-4.0
Net migration over population change	1.2	-0.6	-0.8	-0.8	-0.7	-0.9	1.3	2020	-2.1

Source: EUROSTAT and European Commission

The age pyramid (Figure 1) shows a typical ageing population outlook. Currently, cohorts of more than 3% of population (25-59 for men and 25-69 for women) are mostly of working-age people. Age groups older than that decrease rapidly. The fertility rate is well below the natural replacement rate of 2.1 births per woman and thus, younger cohorts are considerably smaller than the current largest age groups. In the far future a much more uniform picture emerges with much smaller differences between age groups.

This will add pressure on the pension system and the social protection system as a whole since less people are working relative to those that are dependent.

FIGURE 1 – AGE PYRAMID, COMPARISON BETWEEN 2019 AND 2070



Source: EUROSTAT and European Commission

2.2. Labour force

Labour force participation in Estonia has been increasing steadily for the past decade and is near the top both in the EU and in the OECD for all age groups (see Table 3). The employment rate is also well above average and set to increase over the projection horizon. Only a slight decrease in the ratio of employment to participation is expected. Overall, the labour market outlook is strong. One of the main reasons for this, is the recent reform linking the retirement age to life excpectancy gains starting 2027. Labour force participation of older people (65-74) is projected to rise from 28% to 41%, while they are expected to be at almost full employment.

TABLE 3 – PARTICIPATION RATE, EMPLOYMENT RATE AND SHARE OF WORKERS FOR THE AGE GROUPS 20-64, 20-74, 55-64 AND 65-74

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Labour force participation rate 20-64	83.8	84.9	86.0	86.9	87.8	88.0	88.0	2070	4.1
Employment rate of workers aged 20-64	80.2	79.7	80.6	81.5	82.4	82.5	82.5	2070	2.3
Share of workers aged 20-64 in the labour force 20-64	95.6	93.9	93.8	93.8	93.8	93.8	95.6	2019	-1.8
Labour force participation rate 20-74	75.5	73.9	75.1	75.4	76.3	79.7	79.7	2070	4.2
Employment rate of workers aged 20-74	72.3	69.5	70.5	70.9	71.8	75.0	75.0	2070	2.7
Share of workers aged 20-74 in the labour force 20-74	95.7	94.0	93.9	94.0	94.1	94.0	95.7	2019	-1.7
Labour force participation rate 55-64	75.7	76.7	80.5	83.0	86.5	87.6	87.6	2070	11.9
Employment rate of workers aged 55-64	72.7	72.3	75.9	78.2	81.6	82.7	82.7	2070	10.0
Share of workers aged 55-64 in the labour force 55-64	96.0	94.3	94.3	94.3	94.4	94.4	96.0	2019	-1.6
Labour force participation rate 65-74	28.1	20.3	23.6	28.4	32.9	40.9	40.9	2070	12.7
Employment rate of workers aged 65-74	27.5	19.6	22.8	27.4	31.8	39.5	39.5	2070	12.0
Share of workers aged 65-74 in the labour force 65-74	97.8	96.7	96.6	96.5	96.7	96.7	97.8	2019	-1.1
Median age of the labour force	42.0	43.0	44.0	44.0	44.0	45.0	45.0	2065	3.0

Source: European Commission

Tables 4A and 4B summarise the estimated evolution of working career duration (contributory period) and life spent at retirement. It also provides evidence of the effectiveness of active labour market policies and penalties on early retirement on prolonging working career. The average effective retirement age for both men and women is close to the statutory pension age (63 years and 6 months in 2019). The average labour market exit age is projected to rise by about 4 years for both men and women over the projection horizon. Considering recent reforms raising the pension age and life expectancy outlook, this seems plausible. In AR2018, before the link to life expectancy was adopted, the average effective exit age estimated by the Cohort Simulation Model was almost constant. Both men and women will see an increase in years spent in retirement, but men's increase is almost double that of women's. This is in line with life expectancy outlook – Estonian men are catching up with women. Also men will see a larger share of life spent in retirement while women's ratio will stay roughly the same. Changes to the statutory retirement age will increase the ratio of early to late labour market exit.

TABLE 4A – LABOUR MARKET EXIT AGE, EFFECTIVE RETIREMENT AGE AND EXPECTED DURATION OF LIFE SPENT IN RETIREMENT – MEN

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	63.1								
Average labour market exit age (CSM)**	65.2	66.1	67.0	67.9	68.8	69.4	69.4	2069	4.2
Contributory period	40.0	40.0	40.0	40.0	40.0	40.0	40.0	2020	0.0
Duration of retirement***	16.2	16.9	17.5	18.0	18.3	19.3	19.3	2070	3.1
Duration of retirement/contributory period	0.4	0.4	0.4	0.5	0.5	0.5	0.5	2070	0.1
Percentage of adult life spent in retirement****	25.6	26.0	26.3	26.5	26.5	27.3	27.3	2070	1.7
Early/late exit*****	0.6	1.1	1.2	1.3	0.9	2.0	2.0	2069	1.4

Source: European Commission

TABLE 4B – LABOUR MARKET EXIT AGE, EFFECTIVE RETIREMENT AGE AND EXPECTED DURATION OF LIFE SPENT IN RETIREMENT – WOMEN

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	63.5								
Average labour market exit age (CSM)**	65.0	65.9	66.7	67.6	68.7	69.3	69.3	2069	4.4
Contributory period	40.0	40.0	40.0	40.0	40.0	40.0	40.0	2020	0.0
Duration of retirement***	21.3	21.6	21.8	21.9	22.0	22.9	22.9	2070	1.6
Duration of retirement/contributory period	0.5	0.5	0.5	0.5	0.6	0.6	0.6	2070	0.0
Percentage of adult life spent in retirement****	31.2	31.1	30.9	30.6	30.3	30.8	31.6	2037	-0.4
Early/late exit*****	0.6	0.7	1.0	1.1	0.8	1.7	1.7	2069	1.1

Source: European Commission

** The effective retirement age shows the age at which people on average start receiving a pension benefit. It is calculated on the basis of the administrative data for 2019 (see Annex Tables A4a and A4b); ** The labour market exit age as calculated based on Labour Force Survey data for the base year and estimated by the Cohort Simulation Model thereafter; *** 'Duration of retirement' is calculated as the difference between the life expectancy at the average labour market exit age and that exit age itself; **** The 'percentage of adult life spent in retirement' is calculated as the ratio between the duration of retirement and the life expectancy minus 18 years; ***** Early/late exit is the ratio between those who retire and are below the statutory retirement age and those who retire at the statutory retirement age or above.*

3. Pension projection results

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

There are no large differences in Eurostat pension expenditure statistics and reported AWG pension expenditure. The most recent year (2017) has the same figure for both data sources. This implies that small methodological differences between the datasets that were present in the past might have been reconciled.

Estonian AWG projections include old-age pension, deferred old-age pension, early retirement pension, old-age pension under favourable conditions; survivor's pension; pension for incapacity for work (disappears from the system[5]), national pension (minimum pension), Pension under Favourable Conditions for Different Professions (Police Officer's Pension, Prosecutor's Working Ability Benefit, Military Service Pension, Judge's Pension, National Audit Pension and Chancellor of Justice's Pension) - only the part financed from social tax, superannuated pension.

TABLE 5 – EUROSTAT (ESSPROS) VS. AGEING WORKING GROUP DEFINITION OF PENSION EXPENDITURE (% GDP)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	change 2009-2017
Eurostat total pension expenditure	8.8	8.6	7.7	7.5	7.5	7.5	8.0	7.9	7.7	-1.1
Eurostat public pension expenditure (A)	8.8	8.6	7.7	7.5	7.5	7.5	8.0	7.9	7.7	-1.1
Public pension expenditure (AWG: outcome) (B)	8.9	8.8	8.2	7.7	7.6	7.6	7.9	8.1	7.7	-1.2
Difference Eurostat/AWG: (A)-(B)	-0.1	-0.2	-0.5	-0.2	-0.1	-0.1	0.1	-0.2	0.0	0.1

Source: EUROSTAT

3.2. Overview of projection results

Gross public pension expenditure is expected to decrease over the projection horizon by more than 2 percentage points by 2070, from 7.8% of GDP in 2019 to 5.4% of GDP in 2070. This has several reasons. Firstly, there is a gradual shift towards the second pillar. This is the main driving force behind the ratio of public spending between 2019 and 2070 (along with the demographic one). As the first payments from the funded pillar started in 2009, the impact on the benefit ratio will magnify with time (resulting in more and more of the retired persons receiving pension from both pillars). Secondly, the disability pension system has been reformed with the expected outcome of curbing some costs (and also boosting labour market participation). The reformed disability pension (the new work ability benefit paid by the unemployment office, see section 1.2) is included in these projections. Thirdly, the legal pension age will be linked to life expectancy increases so that people are projected to leave the labour market at a later age.

[5] The new work ability benefit which replaces the disability pension is added to projections but is not fully incorporated into the pension projection models.

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

Expenditure	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Gross public pension expenditure	7.8	6.9	6.5	6.1	5.8	5.4	8.7	2020	-2.3
Private occupational pensions	:	:	:	:	:	:	:	:	:
Private individual mandatory pensions	0.1	0.3	0.6	1.0	1.5	1.9	1.9	2070	1.8
Private individual non-mandatory pensions	:	:	:	:	:	:	:	:	:
Gross total pension expenditure	7.8	7.2	7.0	7.1	7.3	7.3	8.8	2020	-0.5
Net public pension expenditure*	7.5	6.9	6.5	6.1	5.8	5.4	8.7	2020	-2.0
Net total pension expenditure*	7.5	7.2	7.0	7.1	7.3	7.3	8.8	2020	-0.2
Contributions	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Public pension contributions	6.5	5.8	5.7	5.6	5.5	5.5	7.4	2020	-1.0
Total pension contributions	8.2	7.6	7.5	7.5	7.4	7.4	8.6	2020	-0.8

Source: European Commission

** net pension expenditure excludes taxes on pensions and compulsory social security contributions paid by beneficiaries.*

Taxes on pensions are not included in the model and neither in the projections. The reason behind this is the high level of tax-exempted income for the retired and the political commitment to keep the average pension tax free. However, there has been a change in pension taxation. Starting from 2018, the supplementary income tax allowance for pensions was abolished as the basic income tax allowance was being raised above the average pensions. The assumption is that the previous political commitment of keeping the average pension tax free is honoured in the future as well by raising the basic allowance in step with the wages and thus with pensions (pensions are mostly indexed to social contributions which are a tax on wage).

Peak values in spending in 2020 are influenced by the coronavirus pandemic. There was a slump in output in 2020 while pension spending remained rigid. This will be partially offset in 2021 and 2022 when the pension index is projected to be near zero and will have little impact on the long-term outlook.

Compared to AR2018, the overall gross public pension expenditure has a slightly different dynamic. While in the last projection, the spending was projected to remain relatively flat in 2030-2070 (see section 3.6), the new projections show a clearer downward trend. This is due to recent reforms, which are outlined in section 1.2. Linking the pension age to life expectancy increases and overhauling the early retirement system both decrease the expenditure outlook, while changing the formula will change the breakdown of pension expenditures. Also, compared to AR2018, the overall public spending is projected to decrease by more. It was projected to fall to 6.4% of GDP by 2070 while in this projection, the value is 5.4% of GDP.

We stated in the AR2018 pension fiche that the future distribution of first pillar pension remains an issue and that there have been proposals to change the pension formula. This was done since, as outlined in section 1.2. The projections show that the flat component of old-age pensions remains at a steady level while the earnings-related portion is declining, mitigating some of the unequal distributional effects of the old formula and also the increasing inequality from projected second pillar payouts.

Disability pensions (work ability benefits) are projected to decrease as a share of GDP since the working-age population is decreasing and the benefit uses an index (the same as old-age pensions) which is projected to be smaller than wage growth. Survivor pensions and other pensions (which include the minimum pension and occupational schemes, see section 3.1) have little effect on the overall picture.

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

Pension scheme	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Total public pensions	7.8	6.9	6.5	6.1	5.8	5.4	8.7	2020	-2.3
Old-age and early pensions	6.2	5.6	5.4	5.1	4.8	4.6	7.1	2020	-1.7
Flat component	2.5	2.5	2.5	2.5	2.5	2.5	2.9	2020	0.0
Earnings-related	3.7	3.2	2.8	2.5	2.3	2.1	4.2	2020	-1.7
Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2020	0.0
Disability pensions*	1.3	1.0	0.9	0.8	0.8	0.7	1.3	2020	-0.5
Survivors' pensions	0.1	0.0	0.0	0.0	0.0	0.0	0.1	2020	0.0
Other pensions	0.2	0.2	0.2	0.1	0.1	0.1	0.2	2020	-0.1

* From 2016 onwards work ability benefits are included in this series

Source: European Commission

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

This section goes into more detail about the development of public pension expenditures. It uses a standard arithmetic disaggregation of the pension expenditures-to-GDP ratio into the dependency ratio, coverage ratio, benefit ratio and a labour market effect (Figure 2, first equation). Two further sub-decompositions are presented. First, the coverage ratio can be further split to look into the take-up ratios for old-age pensions and early pensions (second equation in Figure 2). Second, the labour market indicator is further disaggregated according to the third equation in Figure 2.

FIGURE 2 – DISAGGREGATION OF PUBLIC PENSION EXPENDITURE

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

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

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

Source: European Commission

The decompositions of pension expenditure evolution is shown in Table 8. The dependency ratio effect is positive – i.e. increasing pension expenditure, by 4.1 pps of GDP by 2070 – and in line with demographic projections which show a large increase in old-age dependancy ratios. Only in the last decade of the projection horizon is this effect negative, which is also in line with demographic projections.

The coverage ratio effect is negative, especially in the first decade. This is due to three reasons. Firstly, there is an ongoing increase of the statutory retirement age until 2026 and continues with the link to life expectancy gains. Secondly, changes in the early retirement rules, which will make the penalty for early retirement larger and will therefore decrease spending. And thirdly, which affects the early-age coverage ratio, is the disability pension reform. As they are moved out of the pension system and our pension projection model, they have an effect on coverage numbers. The new work ability benefits are not included in the projections in such detail and hence distort this ratio.

The benefit ratio effect is negative and is explained by the pension index which is consistently lower than average wage growth. This is partly offset by benefits from private pension schemes (see Table 9). The labour market effect is small.

TABLE 8 – FACTORS BEHIND THE CHANGE IN PUBLIC PENSION EXPENDITURE BETWEEN 2019 AND 2070 (PERCENTAGE POINTS OF GDP) – PENSIONERS

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	-0.9	-0.4	-0.4	-0.3	-0.3	-2.3
Dependency ratio effect	1.6	0.8	1.0	0.8	-0.2	4.1
Coverage ratio effect*	-1.0	-0.5	-0.6	-0.4	0.1	-2.4
Coverage ratio old-age	-0.4	-0.3	-0.4	-0.3	0.1	-1.3
Coverage ratio early-age	-5.1	-1.8	-1.2	-0.1	-0.4	-8.7
Cohort effect	-1.1	-0.1	-1.2	-1.0	0.6	-2.9
Benefit ratio effect	-1.5	-0.6	-0.6	-0.5	-0.2	-3.4
Labour market effect	0.1	-0.1	-0.2	-0.2	0.0	-0.4
Employment ratio effect	0.0	-0.1	-0.1	-0.1	0.0	-0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.1	-0.1	-0.1	-0.1	0.0	-0.2
Residual	-0.1	0.0	-0.1	-0.1	0.0	-0.2

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

Source: European Commission

Table 9 illustrates the gradual shift from mainly first pillar spending to increasing second pillar spending. Accordingly, replacement rates from the PAYG scheme will fall and payments from private schemes will increase.

The overall public benefit ratio is low and coverage above 100% because the work ability benefits (disability pensions) are included in these projections. Work ability benefits are smaller than old-age pensions. A more representative picture of public pension spending is in the old-age section. Here we see a larger benefit ratio. However, the overall level of the ratio is still low. One of the reasons for this is that younger people tend to earn more than older people in Estonia, driving up the economy-wide gross wage. This is also reflected in slightly larger replacement rates, which show that compared to their last wages, the drop in income after retiring is not that steep. Still, at-risk-of-poverty rate for pensioners has been one of the highest in EU for the past decade and is an ongoing policy issue in Estonia.

Private individual schemes are projected to boost both the benefit ratio and the replacement rate, keeping the latter above 40%, which has been one of the stated goals of pension policy. Almost full coverage of private schemes is expected by 2070.

TABLE 9 – BENEFIT RATIO (BR), REPLACEMENT RATE AT RETIREMENT (RR) AND COVERAGE BY PENSION SCHEME (IN %)

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public scheme (BR)	29%	24%	22%	20%	18%	18%	-11%
Coverage	122.7	126.2	124.5	123.4	122.5	122.9	0.2
Public scheme: old-age earnings related (BR)	31%	26%	24%	22%	20%	19%	-12%
Public scheme: old-age earnings related (RR)	40%	34%	31%	28%	26%	26%	-14%
Coverage	90.8	94.6	95.0	95.3	95.4	95.4	4.6
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual schemes (BR)	2%	3%	4%	5%	7%	8%	6.1%
Private individual schemes (RR)	1%	6%	8%	13%	17%	18%	17%
Coverage	13.2	42.9	63.4	78.1	89.3	94.8	81.6
Total benefit ratio	36%	32%	30%	29%	29%	29%	-6%
Total replacement rate	41%	40%	39%	41%	43%	44%	2%

Source: European Commission

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.

Table 10 shows some key factors describing the sustainability of the pension system. The number of pensioners projected is very stable, changing only by about 4% from peak to bottom. This is the result of life expectancy gains, rising statutory pension ages, and increasing old-age employment rates. Employment for all age groups is projected to decrease by about 16%.

Compared to AR2018, employment figures are more favourable and thus the pension system dependancy ratio increases more slowly, indicating that the sustainability has slightly improved.

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

	2019	2030	2040	2050	2060	2070	change 2019-2070
Number of pensioners (thousand) (I)	418	422	423	418	413	406	-12
Employment (thousand) (II)	674	632	619	591	566	563	-111
Pension system dependency ratio (SDR) (I)/(II)	62.0	66.7	68.4	70.8	73.0	72.1	10.1
Number of people aged 65+ (thousand) (III)	264	304	330	356	378	363	99
Working age population 20-64 (thousand) (IV)	783	744	717	662	616	612	-171
Old-age dependency ratio (OADR) (III)/(IV)	33.8	40.9	46.1	53.8	61.5	59.4	25.6
System efficiency (SDR/OADR)	1.8	1.6	1.5	1.3	1.2	1.2	-0.6

Source: European Commission

The ratios presented in tables 11A, 11B, 12A and 12B are slightly distorted by the disability reform. Disability pensions are included in these projections but not the new work ability benefits which we do not have the age groups for a more detailed projection and do not model ourselves. Therefore, figures from 2030 onwards cover only old-age (and survivor and other) pension schemes.

For age groups 60-64 and 65-69 (and somewhat for age group 70-74), we see a quite dramatic decrease in the ratio of pensioners to inactive and to the whole population indicating increasing labour activity due to increasing retirement ages. Differences between men and women are not substantial.

TABLE 11A – PENSIONERS (PUBLIC SCHEMES) TO INACTIVE POPULATION RATIO BY AGE GROUP (%)

	2019	2030	2040	2050	2060	2070
Age group -54	4.9	3.5	3.5	3.4	3.5	3.5
Age group 55-59	37.5	14.2	16.4	20.5	23.9	22.5
Age group 60-64	139.9	64.2	51.3	26.2	28.7	30.3
Age group 65-69	161.8	133.9	119.0	91.8	55.0	63.1
Age group 70-74	135.0	113.1	111.8	114.3	110.0	116.9
Age group 75+	103.5	103.1	102.8	102.9	102.8	102.8

Source: European Commission

TABLE 11B – PENSIONERS (PUBLIC SCHEMES) TO POPULATION RATIO BY AGE GROUP (%)

	2019	2030	2040	2050	2060	2070
Age group -54	2.0	1.3	1.3	1.3	1.3	1.4
Age group 55-59	6.0	2.3	2.3	2.3	2.5	2.3
Age group 60-64	46.0	19.8	13.1	5.7	4.7	4.4
Age group 65-69	106.0	90.5	74.9	50.8	25.5	24.5
Age group 70-74	107.9	104.8	102.8	102.6	94.1	94.3
Age group 75+	103.5	103.1	102.8	102.9	102.8	102.8

Source: European Commission

TABLE 12A – FEMALE PENSIONERS (PUBLIC SCHEMES) TO INACTIVE POPULATION RATIO BY AGE GROUP (%)

	2019	2030	2040	2050	2060	2070
Age group -54	4.1	3.5	3.5	3.3	3.5	3.5
Age group 55-59	36.9	12.4	14.9	19.1	22.5	21.0
Age group 60-64	143.9	58.1	50.7	20.1	27.3	28.4
Age group 65-69	161.2	137.6	122.9	100.0	54.5	62.2
Age group 70-74	132.6	113.6	111.2	113.1	108.8	116.5
Age group 75+	103.1	102.8	102.5	102.6	102.5	102.4

Source: European Commission

TABLE 12B – FEMALE PENSIONERS (PUBLIC SCHEMES) TO POPULATION RATIO BY AGE GROUP (%)

	2019	2030	2040	2050	2060	2070
Age group -54	1.8	1.4	1.4	1.4	1.4	1.4
Age group 55-59	4.9	2.4	2.4	2.5	2.6	2.4
Age group 60-64	45.2	18.4	13.8	4.8	4.8	4.4
Age group 65-69	105.4	91.5	79.2	57.2	25.6	24.5
Age group 70-74	107.6	105.0	103.0	102.8	94.5	94.7
Age group 75+	103.1	102.8	102.5	102.6	102.5	102.4

Source: European Commission

Tables 13A, 13B and 13C show a more detailed picture of new pension expenditure. The accrual rate is decreasing due to the fact that the pension insurance coefficient value is indexed with regular pension index, the value of which is lower than the increase in wages. Low value stems from the fact that the basic pension is not included in the calculation of accrual rates and that a share of pension rights in the first pillar is decreasing due to the implementation of the funded pillar. The difference in terms of wages of men and women is over time transferred to the pension system and will result in lower pensions for women.

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

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	25.2	30.7	40.4	49.3	61.4	79.9
I. Number of new pensions (1000)	17.6	16.1	16.1	15.5	14.5	13.7
II. Point value (EUR/month)	6.6	9.5	13.2	17.4	22.7	30.3
III. Average accrual rate (points/year) (IV/V)	0.90	0.84	0.79	0.76	0.77	0.80
IV. Total pension points at retirement	36.0	33.6	31.8	30.4	31.0	32.0
V. Average contributory period (years)	40.0	40.0	40.0	40.0	40.0	40.0
VI. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VII. Correction coefficient	1.0	1.0	1.0	1.0	1.0	1.0
VIII. Average number of months paid the first year	6.0	6.0	6.0	6.0	6.0	6.0

**New pension expenditure equals the product of I, II, IV, VI, VII & VIII*

Source: European Commission

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

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	9.6	15.0	21.5	29.1	38.0	47.4
I. Number of new pensions (1000)	6.8	7.5	7.4	7.8	7.7	7.0
II. Point value (EUR/month)	6.6	9.5	13.2	17.4	22.7	30.3
III. Average accrual rate (points/year) (IV/V)	0.89	0.88	0.92	0.90	0.91	0.94
IV. Total pension points at retirement	35.7	35.2	36.9	36.0	36.3	37.4
V. Average contributory period (years)	40.0	40.0	40.0	40.0	40.0	40.0
VI. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VII. Correction coefficient	1.0	1.0	1.0	1.0	1.0	1.0
VIII. Average number of months paid the first year	6.0	6.0	6.0	6.0	6.0	6.0

**New pension expenditure equals the product of I, II, IV, VI, VII & VIII*

Source: European Commission

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

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	15.6	15.8	19.2	20.4	23.4	32.5
I. Number of new pensions (1000)	10.8	8.6	8.7	7.8	6.8	6.8
II. Point value (EUR/month)	6.6	9.5	13.2	17.4	22.7	30.3
III. Average accrual rate (points/year) (IV/V)	0.90	0.81	0.70	0.63	0.63	0.66
IV. Total pension points at retirement	36.1	32.3	27.9	25.1	25.0	26.4
V. Average contributory period (years)	40.0	40.0	40.0	40.0	40.0	40.0
VI. Sustainability/adjustment factors	1.0	1.0	1.0	1.0	1.0	1.0
VII. Correction coefficient	1.0	1.0	1.0	1.0	1.0	1.0
VIII. Average number of months paid the first year	6.0	6.0	6.0	6.0	6.0	6.0

**New pension expenditure equals the product of I, II, IV, VI, VII & VIII*

Source: European Commission

3.4. Financing of the pension system

Public pensions are financed mainly from the social tax, which is 33% of gross wage. This is paid by the employer; in case of self-employed, themselves; or in some special cases, by the state. 13% of social tax goes to health insurance and 20% is allocated purely for pension insurance. The full 20% is collected through the taxation system from all workers, but for those, who have joined the second pillar, 4% is transferred back to their private pension fund. So, the public pension contribution rate is, in effect, 16% for those that have joined the second pillar.

There is no hard link between public pension expenditure and social tax revenue. With the State Pension Insurance Act, the state has taken on the explicit obligation to pay out pensions in the amount to which the people have the right to. There is no rule that the pension system can not be in a current deficit. The state budget will automatically cover any current deficit of the pension insurance budget, i.e. any difference between social tax revenues and expenditures on public pensions. Surplus can not be used for other purposes than public pensions. Expenditure on national pensions, pension supplements and work ability benefits (disability pensions) are covered from other state budget revenues. The main link

between contributions and pension expenditure, which keeps the two in a long-term balance, is indexation (see section 1.1 for details).

TABLE 14 – FINANCING OF THE PUBLIC PENSION SYSTEM

	Public employees	Private employees	Self-employed
Contribution base	Wage	Wage	Business income
Contribution rate/contribution			
Employer	20% (if not participating to 2nd pillar); 16% (if participating to 2nd pillar)	20% (if not participating to 2nd pillar); 16% (if participating to 2nd pillar)	20%
Employee	-	-	
*State**	-	-	-
*Other revenues**	-	-	-
Maximum contribution	No limit	No limit	No limit
Minimum contribution	Minimum wage (previous year)	Minimum wage (previous year)	Minimum wage (previous year)

*only legislated contributions are reported

Source: European Commission, Ministry of Finance of Estonia

Public pension contributions are projected to decline by 1pp of GDP over the projection horizon. This does not however indicate a sustainability issue, since public pension expenditure is in a faster decline (see Table 6 in section 3.2). The public contributions and expenditure are projected to be about equal by 2070.

TABLE 15 – REVENUE FROM CONTRIBUTIONS, NUMBER OF CONTRIBUTORS IN THE PUBLIC SCHEME, TOTAL EMPLOYMENT

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public pension contributions (%GDP)	6.5	5.8	5.7	5.6	5.5	5.5	-1.0
Employer contributions	*6.1*	*5.5*	*5.3*	*5.3*	*5.2*	*5.3*	*-0.9*
Employee contributions	*:*	*:*	*:*	*:*	*:*	*:*	*:*
*State contribution**	*0.4*	*0.4*	*0.3*	*0.3*	*0.3*	*0.3*	*-0.2*
*Other revenues**	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Number of contributors (I) (1000)	661	632	619	591	566	563	-98
Employment (II) (1000)	674	632	619	591	566	563	-111
(I) / (II)	1.0	1.0	1.0	1.0	1.0	1.0	0.0

Source: European Commission

3.5. Sensitivity analysis

Table 16 presents 12 alternative pension expenditure scenarios, each with its own different economic assumptions.

Higher life expectancy scenario would increase the part of life spent in retirement, thus resulting in higher spending in both the public and private part of the pension system. Although the retirement age will be linked to life expectancy increases, there is a cap. There is no built-in mechanism in the pension system to compensate for the increase in the number of pensioners.

Higher/lower total factor productivity scenarios would affect the payments from the 2nd pillar more than those from the PAYG scheme, as the 2nd pillar pensions are linked directly to contributions and PAYG pensions have also the flat rate component and the part related to number of years worked. Since pensions are indexed to both social tax contributions and prices, the index is usually smaller than nominal GDP growth. Hence, higher productivity will lower pension expenditure and lower productivity will increase expenditure (in relative terms).

Higher employment rate of older workers scenario would increase pension expenditure slightly because they earn more pension points. We assume that they still take out the pension at the same age as in the baseline, because except for raising the statutory pension age, from our experience, very little behavioural effect can be expected in this regard.

Higher/lower migration scenarios have little effect on pension expenditure. The first will increase pension expenditure slightly in the long run, since more people work and earn pension rights. The lower migration scenario also has a similar effect, but from the output side.

Unchanged retirement age policy scenario would have a strong effect on pension expenditure, since the baseline projection includes a gradual retirement age increase from 65 to almost 70 years. This is what was reformed recently and is the main change in expenditure outlook in this round of projection compared to previous.

Offset declining benefit ratio policy scenario would have the strongest effect on pension expenditure. Only the first pillar pensions are affected by this scenario, which are projected to otherwise have a declining benefit ratio because of the gradual shift to 2nd pillar pensions.

Lagged recovery and adverse structural scenarios initially have a similar effect in terms of effect size and direction as a share of GDP since they have a similar effect on indexation. In absolute terms, pension expenditure would be a bit different. The structural scenario will have on larger impact in the long term, especially on private pension expenditure similarly to TFP scenarios - lower TFP growth in the long run will increase expenditure in relative terms.

TABLE 16 – PUBLIC AND TOTAL PENSION EXPENDITURES UNDER DIFFERENT SCENARIOS (PPS DEVIATION FROM THE BASELINE)

Public pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	7.8	6.9	6.5	6.1	5.8	5.4	-2.3
Higher life expectancy at birth (+2y)	0.0	0.1	0.2	0.3	0.4	0.4	0.4
Higher migration (+33%)	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Lower migration (-33%)	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Lower fertility (-20%)	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Higher employment rate of older workers (+10 pps)	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Higher TFP growth (convergence to 1.2%)	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
TFP risk scenario (convergence to 0.8%)	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Policy scenario: linking retirement age to change in life expectancy	:	:	:	:	:	:	:
Policy scenario: unchanged retirement age	0.0	0.0	0.4	0.7	1.0	0.8	0.8
Policy scenario: offset declining pension benefit ratio	0.0	0.5	1.2	1.9	2.5	2.7	2.7
Lagged recovery scenario	0.0	0.3	0.4	0.3	0.3	0.3	0.3
Adverse structural scenario	0.0	0.3	0.4	0.4	0.4	0.5	0.5

Total pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	7.8	7.2	7.0	7.1	7.3	7.3	-0.5
Higher life expectancy at birth (+2y)	0.0	0.1	0.2	0.3	0.3	0.4	0.4
Higher migration (+33%)	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Lower migration (-33%)	0.0	0.0	0.1	0.1	0.1	0.0	0.0
Lower fertility (-20%)	0.0	0.0	0.1	0.1	0.2	0.3	0.3
Higher employment rate of older workers (+10 pps)	0.0	0.0	0.1	0.0	0.0	0.1	0.1
Higher TFP growth (convergence to 1.2%)	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.3
TFP risk scenario (convergence to 0.8%)	0.0	0.0	0.1	0.2	0.2	0.3	0.3
Policy scenario: linking retirement age to change in life expectancy	:	:	:	:	:	:	:
Policy scenario: unchanged retirement age	0.0	0.0	0.4	1.0	1.4	1.1	1.1
Policy scenario: offset declining pension benefit ratio	0.0	0.5	1.2	1.9	2.5	2.7	2.7
Lagged recovery scenario	0.0	0.3	0.4	0.4	0.4	0.4	0.4
Adverse structural scenario	0.0	0.3	0.5	0.6	0.7	0.8	0.8

Source: European Commission

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

Table 17 shows the evolution of Estonian pension projections for AWG and Ageing Reports over the last 15 years.

Some trends emerge. Starting from 2009, each projection shows a larger decline in public pension expenditure. This is in line with raising the statutory pension age.

Dependancy ratio effects are in a slight decline. This is in line with slightly improving population projections resulting from a more favourable migration outlook. Coverage and benefit ratios both have a considerable downward effect on pension expenditure but there is no clear trend over time. The labour market effect and the residual have less impact.

TABLE 17 – CHANGE IN THE PUBLIC PENSION EXPENDITURE-TO-GDP RATIO AND DISAGGREGATION FOR CONSECUTIVE PROJECTION EXERCISES (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)	**-3.0**	*3.1*	*-1.5*	*-3.8*	*-0.6*	*-0.2*
2009 Ageing Report (2007-2060)	**-0.7**	*4.6*	*-1.6*	*-3.1*	*-0.2*	*-0.4*
2012 Ageing Report (2010-2060)	**-1.1**	*6.7*	*-2.7*	*-3.3*	*-1.1*	*-0.6*
2015 Ageing Report (2013-2060)	**-1.3**	*5.4*	*-2.0*	*-3.8*	*-0.5*	*-0.4*
2018 Ageing Report (2016-2070)	**-1.8**	*4.6*	*-3.0*	*-3.0*	*0.2*	*-0.7*
2021 Ageing Report (2019-2070)	**-2.3**	*4.1*	*-2.4*	*-3.4*	*-0.4*	*-0.2*

Source: European Commission

The table presents the total change in public pension expenditure during the consecutive projection horizons and the contribution of the different components to that overall change.

Table 18A compares the projections of the 2018 Ageing Report with actual pension expenditure between 2016 (the previous base year) and 2019 (the new base year). There have been no policy changes in the years under comparison. Also, all pensions were covered in AR2018 projections. The differences between projected and actual outcomes are small and come mostly from the fact that actual nominal GDP was higher (e.g in 2019 the projection was 24.8 billion euro and actual was 28.1 billion euro). Pension expenditure was also larger than predicted, but to a lesser extent.

TABLE 18A – DISAGGREGATION OF THE DIFFERENCE BETWEEN THE 2018 PROJECTIONS AND ACTUAL PUBLIC PENSION EXPENDITURE IN 2016-2019 (% GDP)

	2016	2017	2018	2019
Ageing Report 2018 projections	8.1	8.1	8.2	8.0
Assumptions (pps of GDP)	0	-0.4	-0.3	-0.2
Coverage of projections (pps of GDP)	0	0	0	0
Constant policy impact (pps of GDP)	0	0	0	0
Policy-related impact (pps of GDP)	0	0	0	0
Actual public pension expenditure	8.1	7.7	7.9	7.8

Source: Ministry of Finance of Estonia

Table 18B compares and disaggregates AR2021 projections to AR2018 projections. We assume that the projection error from 2019 carries over and everything else is policy related since we have made no changes to projection coverage or constant policy assumptions. Most of the change is attributed to rising statutory pension age while changing the formula and early retirement rules have little impact.

TABLE 18B – DISAGGREGATION OF THE DIFFERENCE BETWEEN THE 2018 AND THE NEW PUBLIC PENSION PROJECTIONS (% GDP)

	2019	2030	2040	2050	2060	2070
Ageing Report 2018 projections	8.0	7.2	7.1	7.1	6.9	6.4
Change in assumptions (pps of GDP)	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Improvement in the coverage or in the modelling (pps of GDP)						
Change in the interpretation of constant policy (pps of GDP)						
Policy-related changes (pps of GDP)	0	-0.1	-0.4	-0.8	-0.9	-0.8
New projections	7.8	6.9	6.5	6.1	5.8	5.4

Source: Ministry of Finance of Estonia

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

4.1. Institutional context in which the projections are made

The pension projections model is managed by the Insurance Policy Department of the Ministry of Finance of Estonia. There is no formal review process for these projections inside the ministry. but the projections are open for scrutiny both within the ministry and outside. The projections are regularly used for budgeting and policy discussions.

4.2. Assumptions and methodologies applied

The model contains basic macroeconomic assumptions as inputs (on GDP. labour productivity and wage growth. future inflation etc). These assumptions have automatic links and also feedback in the model.

Future productivity increases and average (un)employment rates (for men and women) are exogenous inputs (assumptions). These two assumptions allow seeing the impact of less or more to GDP development. Future inflation rates (GDP deflator and CPI) are also exogenous. GDP growth rate for each year results from the change of employees and change of labour productivity.

Real GDP growth = (1+labour productivity growth)*(1+change of employees) – 1

Labour force by age and sex is calculated by multiplying population by labour force participation rates for single ages up to the age of 100. In projections it is possible to change the level and the structure of participation rates. Unemployment is calculated by using general trend of unemployment rates and change in unemployment age structure. Employed persons are the difference between the labour force and the unemployment.

In general the model calculates the number of insured who are actually contributing (for the I and II pillar) by applying compliance rates to the employed. by individual age and sex and also their actual wage. from which they pay taxes (this differs from national average wages). Numbers of pensioners for 1st and 2nd pillar old-age pensioners are calculated by applying retirement rate to the population. Difference between the number of pensioners of age x in year t and the surviving pensioners of age x-1 of year t-1 is taken as the number of new pensioners. Other pensioners (disability. survivor) are calculated by initial data and change vector as follows:

Disability pensioners = population * disability structure base year * disability change

Average pension amounts for all ages for old age pensioners are calculated on the basis of actual pension formula:

$$P = B + V \cdot s + V \cdot \sum A + V \cdot \sum C$$

See description above.

Base and V values are indexed. which results from macroeconomic and labour force projections. S value is real data and this has remained unchanged from 1999. The values are taken from wage statistics. Averages for all age cohorts are used.

To calculate mandatory funded pillar pensions. contribution rate is applied to the wage and these contributions will be accumulated with return rate. Finally it will be turned into annuities. using annuity return rate and unisex life expectancy.

Main assumptions used in the model for projecting II pillar pensions (in addition to the ones agreed by the AWG) are:

- keeping the current rate in terms of contributions (4%+2%), except in 2020-2021 when II pillar contributions are partially suspended;
- real interest rate of 2% on assets;
- 2% nominal interest rate on annuity;
- profile of switchers to the II pillar according to actual data.

4.3. Data used to run the model

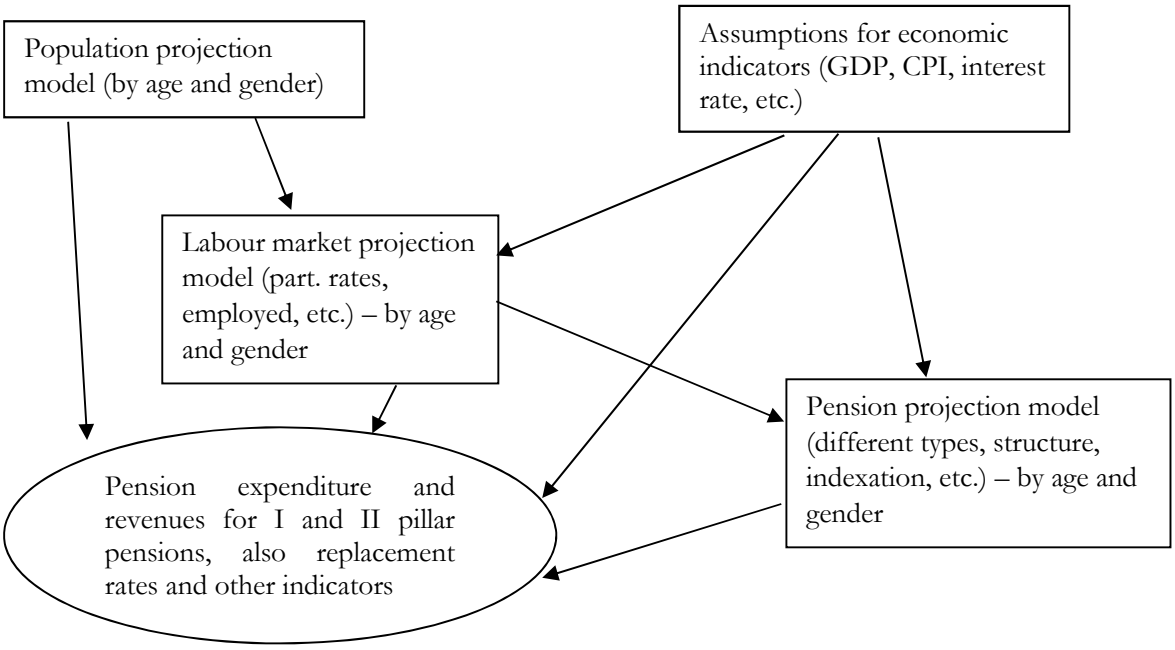
In addition to the macroeconomic assumptions, the model uses pension and pensioner data from the Social Insurance Board and the national Pension Centre (Pensionikeskus).

4.4. Reforms incorporated in the model

- Cf section 1.2 supra.

4.5. General description of the model(s)

The basic models structure is presented in the following graph:



4.6. Additional features of the projection model

In order to better understand the projection results some additional model characteristics are presented here:

- Number of different persons modelled per generation.

The model differentiates men and women and different types of pensions. No differentiation is done by other socio-demographic variables.

- How is the replacement rate of new retirees calculated?

Full age cohorts of early and on-time pensionable age people are first looked at. In these cohorts, the ratio of new pensioners is determined, and their pensions and wages are used to project and calculate replacement rates.

- How are careers modelled?

For each age (and sex) cohort and for each year, an average pension right is calculated using the pension formula, labour statistics, wage statistics, second pillar participation etc.

- How are survivors' pension calculated?

Each age cohort is given a ratio of survivors from base year statistics. The number of pensioners then adjusts over time by population changes. Pensions change by indexation.

- How is the retirement age and its development over the projection period computed?

Pension age is projected according to the law (see section 1.2). Early and late retirement ratios are assumed to be constant over time, eg. when 10% of people retire 3 years before SRA, this is assumed fixed relative to the new SRA.

No other specific features of the model that deserve to be mentioned.

Methodological annex

Economy-wide average wage at retirement

Table A1 shows the economy wide gross wage at retirement and the economy-wide average wage. These are in line with productivity assumptions since they are largely evolving together. We have no different productivity assumptions for different age groups. What we observe is that younger workers earn considerably more than older and this has remained largely unchanged over the past few decades. Although, everyones' wages still rise.

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

	2019	2030	2040	2050	2060	2070	% change 2019-2070
Economy-wide average gross wage at retirement	12.7	21.8	33.3	48.8	70.6	100.8	692.0
Economy-wide average gross wage	18.1	30.3	46.3	67.9	98.2	140.1	675.3

Source: European Commission. Ministry of Finance of Estonia

Pensioners vs. pensions

The pension projections are broadly in line with the commonly agreed labour force projections but are not precisely derived from them. For the baseline projections of the number of pensioners and working pensioners, a constant ratio is assumed (except for the sensitivity tests). In our model, the number of pensions are exactly equal to the number of pensioners times 12.

Pension taxation

Since there is a broad political commitment to keep the average pension tax free, the overall pension taxation is negligible and not accounted in our pension model at all.

Disability pensions

As stated in the body text, the disability part of the pension system is being phased out and replaced with a different system which is not part of the pension system. Although we have included the main aggregate projections of the new work ability benefit into the questionnaires. The projection was done by the Ministry of Finance and does not include disability rate by age groups, i.e the rates are assumed to be the same for all ages. The benefit ends at the statutory retirement age.

Survivors' pensions

The assumptions regarding the survivor pension projections are relatively straight-forward since the overall cost is quite small. A constant ratio of beneficiaries is assumed for each age group. No additional assumptions are made regarding household structure, different survival rates or reforms.

Non-earnings related minimum pension

In the nearer term, the take-up and expenditure will not grow considerably since most new pensioners have the minimum rights for a full pension met. However, in the longer term, the take-up will grow,

with the expenditure, since more people will not be able to meet the minimum requirements for full pension. This will also skew the pension distribution towards the lower end.

Contributions

Implicit contribution rate is assumed to be constant over the projection horizon.

Alternative pension spending disaggregation

Table A2 is similar in structure to Table 8. but provides a disaggregation based on pension data as compared to pensioners in Table 8.

TABLE A2 – FACTORS BEHIND THE CHANGE IN PUBLIC PENSION EXPENDITURE BETWEEN 2019 AND 2070 (PERCENTAGE POINTS OF GDP) – PENSIONS

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	-0.9	-0.4	-0.4	-0.3	-0.3	-2.3
Dependency ratio effect	1.6	1.2	1.8	1.8	-0.5	5.9
Coverage ratio effect*	-1.2	-0.4	-0.5	-0.4	0.1	-2.3
Coverage ratio old-age	-0.4	-0.3	-0.4	-0.4	0.1	-1.3
Coverage ratio early-age	-4.1	-0.9	-0.5	-0.1	-0.1	-5.7
Cohort effect	-1.0	-0.1	-1.2	-0.9	0.5	-2.8
Benefit ratio effect	-1.2	-0.6	-0.6	-0.5	-0.2	-3.0
Labour market effect	0.1	-0.2	-0.2	-0.2	0.0	-0.5
Employment ratio effect	0.0	-0.1	-0.1	-0.1	0.0	-0.2
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0
Career shift effect	0.1	-0.1	-0.2	-0.1	0.0	-0.3
Residual	-0.3	-0.4	-0.8	-1.0	0.3	-2.3

Source: European Commission

Administrative data on new pensioners

Tables A3a/A3b/A3c show the administrative data reported for the base year (or the most recent year). The old-age figures are used to calculate the average effective retirement ages in Tables 4a and 4b.

TABLE A3A – NUMBER OF NEW PENSIONERS BY AGE GROUP IN 2019 (ADMINISTRATIVE DATA) – MEN

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	320	0	6	127	187
50 - 54	314	0	10	0	304
55 - 59	385	289	19	0	77
60 - 64	5367	5337	13	0	17
65 - 69	260	256	0	0	4
70 - 74	63	60	0	1	2
75+	32	30	0	0	2

Source: European Commission

TABLE A3B – NUMBER OF NEW PENSIONERS BY AGE GROUP IN 2019 (ADMINISTRATIVE DATA) – WOMEN

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	186	0	4	131	51
50 - 54	92	0	11	0	81
55 - 59	247	184	14	1	48
60 - 64	7014	6980	5	2	27
65 - 69	334	329	0	2	3
70 - 74	123	121	0	2	0
75+	120	118	0	1	1

Source: European Commission

TABLE A3C – NUMBER OF NEW PENSIONERS BY AGE GROUP IN 2019 (ADMINISTRATIVE DATA) – TOTAL

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	506	0	10	258	238
50 - 54	406	0	21	0	385
55 - 59	632	473	33	1	125
60 - 64	12381	12317	18	2	44
65 - 69	594	585	0	2	7
70 - 74	186	181	0	3	2
75+	152	148	0	1	3

Source: European Commission