Finnish Country Fiche on Pensions

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Ministry of Finance
Finnish Centre for Pensions
The Social Insurance Institution of Finland

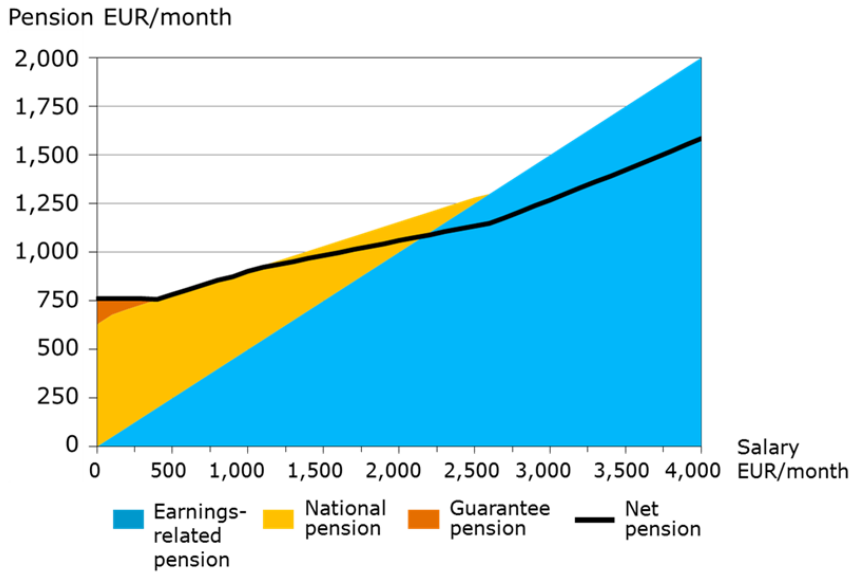
1. Overview of the pension system

1.1. Description

The Finnish public pension scheme (1st pillar) is made up of two statutory pension schemes: one is the national pension scheme guaranteeing a minimum pension to all residents whereas the other is an employment-based, earnings-related pension scheme.

The statutory schemes are closely linked together, with the amount of national pension depending on the size of the earnings-related pension benefits. Increases in the earnings-related pension reduce the national pension by 50 per cent. If the earnings-related pension is above a defined level[1], the national pension is not paid at all. In addition, a guarantee pension is paid if the total pension benefit would otherwise remain below certain threshold. These characteristics of the system are illustrated in Graph 1. Almost 40% of pensioners who get earnings-related pension get also national pension. At the same time, in 2016, there were around 80 000 pensioners getting only national pension and around 100 000 pensioners getting guarantee pension. Taking all pension types into account, the total number of pensioners in 2016 was roughly 1.45 million.

Graph 1: Total pension in 2017



The *earnings-related pension system* is based on a tripartite arrangement, consisting of employees, employers and the government. Private employees belong to four different sector-related schemes run by private pension providers. There are little short of 30 pension funds and companies of different sizes. The pension companies compete with each other and it is employer's decision to choose among the pension providers. However, there is a shared liability among the funds in the event of bankruptcy. The Finnish Centre for Pensions is the statutory central body of the private sector pension schemes. The Ministry of Social Affairs and Health is in charge of the general supervision of the earnings-related schemes. Employees in central and local government as well as employees of the Finnish Evangelical-Lutheran

[1] In 2017 this level is EUR 1299.88 per month for people living single and EUR 1157.71 for people who live in a relationship; full national pension is EUR 628.85 and EUR 557.79 respectively.

Church have their own earnings-related scheme, which is managed by the public sector pension provider Keva. Today the benefits in the different earnings-related pension schemes are harmonised but these schemes are separate mainly due to considerable differences in their financing. The retirement age for the earnings-related old-age pension was 63 years for those born in 1954, and it is increasing by 3 months per birth year, until it reaches 65 years for those born in 1962. After 2030, the retirement age is linked to life expectancy.

Pension-tested national pensions are administered by the Social Insurance Institution and supervised by the Parliament. National pensions are intended to provide a basic retirement income for those whose earnings related pensions are small or non-existent. All residents of Finland are eligible for the national pension if they have lived in Finland for at least 3 years after having reached the age of 16 years. The retirement age for the old age pension is the same as in the earnings-related scheme. However, if the pension is taken before the age of 65, this is considered early retirement, and the amount of pension is permanently reduced by 0.4% for each month before the age 65. For those born in 1962 and later, early retirement is no longer possible, as the retirement age rises to 65 years.

The national pension is also payable as disability and survivors' pension. The supplementary means-tested social assistant components for pensioners are: pensioners' housing allowance, pensioners' care allowance, front veterans' supplements and increase for children. National pensions are financed by the state. The purchasing power of national pensions is kept intact by indexation to the consumer price index. The full level of national pension has also been occasionally raised and in the recent years also reduced. It was reduced by 0.85 % in 2017 and the government has stated that it will freeze the index for 2018 and 2019.

The purpose of the guarantee pension is to provide residents of Finland with a minimum pension if their total pension income before taxes is not more than EUR 760.26 per month (in 2017). The amount of the guarantee pension is affected by any other pension income one may have from Finland or abroad. A full guarantee pension is payable only to those with no other pension income. Other pension income is deducted in full from the full amount of the guarantee pension. The care allowance for pensioners, the front-veterans' supplements or the child increase supplementing a pension do not reduce the amount of guarantee pension payable. The guarantee pension is also not reduced by earnings, capital income or assets, or by the informal care allowance. Just as other pensions, the guarantee pension affects both the amount of housing allowance payable and the amount of social assistance being paid to a family. Guarantee pension is indexed to prices and financed by the state.

The *earnings-related pension* is accumulated according to the following rules as of 2017. Pensions accrue at the rate of 1.5 per cent of wages a year. However, there is a higher accrual rate of 1.7 per cent for people aged 53-62 during the years 2017-2025 as a transition arrangement related to old pension rules. There is no ceiling for the pension benefit or contributions. Upon retirement, the pension is multiplied by a life expectancy coefficient. This coefficient is calculated for each birth cohort during the year they turn 62, and its function is to eliminate the increases in the capital value of pensions due to increases in life expectancy after 2009.

There are two indices in the earnings-related pension system. The first (pre-retirement index) valorise past earnings to the present level when computing the pension at the time of retirement. This "*wage coefficient*" puts a weight of 80 per cent on wages and 20 per cent on prices. The second (post-retirement index) aims at keeping the purchasing power of earnings-

related pensions ahead of inflation. This *"earnings-related pension index"* has a weight of 80 per cent on consumer prices and 20 per cent on wages.

The financing of earnings-related pensions is a combination of a funded and a pay-as-you-go system (PAYG from here on). Pension contributions come from both employers and employees. A fraction of earnings-related pensions are financed from the state budget; the central government contributes to farmers' and self-employed persons' pension funding to the degree that the contributions are not sufficient. It also finances seafarers' pensions by a fixed percentage. In the private sector, the pre-funded scheme covers approximately one quarter of earnings-related pension outlays. The rest (3/4) is financed through a PAYG system. Despite the partially funded system in pensions, Finland's earnings-related pension scheme is entirely of the defined-benefit type. The pre-funding is collective in the sense that it has no direct effect on the size of the pension. The main purpose of the pre-funding is to cushion the increase in pension contributions in the coming years when pension expenditure are increasing due to the retirement of large age cohorts.

Voluntary pension schemes (the second and third pillar) have played only a minor role in Finland due to the relatively high net replacement ratio of public pensions, the lack of pension ceilings and full coverage of the systems. From the perspective of pension contribution, the total pension provision consists to 94 per cent of statutory pension provision and to 6 per cent of supplementary pension provision. Thus, in international comparison, the share of supplementary pension provision of the total pension provision is small.

Table 1 – Qualifying condition for retiring

			2016	2020	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Minimum requirements	Contributory period - men	:	:	:	:	:	:	:
		Retirement age - men	63	63.5	65.1	65.8	66.4	67.1	67.6
		Contributory period - women	:	:	:	:	:	:	:
		Retirement age - women	63	63.5	65.1	65.8	66.4	67.1	67.6
	Statutory retirement age - men		68	68	70	70	70	70	70
	Statutory retirement age - women		68	68	70	70	70	70	70
Qualifying condition for retirement WITHOUT a full pension	Early retirement age - men		61	61	62.1	62.8	63.4	64.1	64.6
	Early retirement age - women		61	61	62.1	62.8	63.4	64.1	64.6
	Penalty in case of earliest retirement age		0.6% per month	0.4% per month, i.e. 4.8% per year					
	Bonus in case of late retirement		4.5% accrual rate	0.4% per month, i.e. 4.8% per year					
	Minimum contributory period - men		:	:	:	:	:	:	:
	Minimum contributory period - women		:	:	:	:	:	:	:
	Minimum residence period - men		:	:	:	:	:	:	:
	Minimum residence period - women		:	:	:	:	:	:	:

Source: Member States

(Explanatory note: In the table, the ceiling for old-age retirement age is interpreted as 'statutory retirement age'. The partial early old-age pension is interpreted as 'early retirement age'.)

Table 2a – Number of new pensioners by age group - administrative data (MEN)

Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	3 775	14	3 761	0	0
50 - 54	1 810	335	1 475	0	0
55 - 59	3 102	326	2 776	0	0
60 - 64	22 355	20 121	2 234	0	0
65 - 69	5 442	5 441	1	0	0
70 - 74	30	30	0	0	0

Source: Commission services

Table 2b – Number of new pensioners by age group - administrative data (WOMEN)

Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	3 948	10	3 938	0	0
50 - 54	1 577	7	1 570	0	0
55 - 59	3 013	76	2 937	0	0
60 - 64	22 665	20 378	2 287	0	0
65 - 69	6 328	6 327	1	0	0
70 - 74	53	53	0	0	0

Source: Commission services

Table 2c – Number of new pensioners by age group - administrative data (TOTAL)

Age group	All	Old age	Disability	Survivor	Other (including minimum)
15 - 49	7 723	24	7 699	0	0
50 - 54	3 387	342	3 045	0	0
55 - 59	6 115	402	5 713	0	0
60 - 64	45 020	40 499	4 521	0	0
65 - 69	11 770	11 768	2	0	0
70 - 74	83	83	0	0	0

Source: Commission services

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

A major pension reform came into force in Finland as of 2017. The reform makes provision for an increase in life expectancy and its aim is to promote employment and secure the funding of earnings-related pensions, an adequate level of pensions and equality between the generations and genders. The Parliament passed the laws concerning the reform on 20 November 2015. Legislative preparation was based on an agreement on the main lines of the reform negotiation agreement by social partners in September 2014.

The lowest old-age retirement age of the earnings-related pension system will initially be increased gradually by two years. From 2018, the lowest old-age retirement age will rise from the present 63 years by three months for each age cohort, until it reaches 65 years in 2027. The upper age limit of the old-age pension is currently 68 and it will be raised to 69 for those born in 1958–1961 and to 70 for those born in 1962 or later.

The lowest old-age retirement age will be linked to life expectancy as of 2030 so that the time spent working in relation to the time spent in retirement will remain at the 2025 level[2]. The annual increase of the retirement age is limited to two months. To maintain the time spent working in relation to the time spent in retirement, the development of working careers as well as the economic and social sustainability of the entire earnings-related pension system

[2] This ratio, which is kept constant by adjusting the lowest old-age retirement age, is calculated as follow: the difference between the lowest old-age retirement age and 18 years is divided by the life expectancy at the lowest old-age retirement age. The life expectancy at a given time is calculated with the mortality statistics for the latest 5 years.

will be regularly analysed. Development will be monitored on a tripartite basis, led by the Ministry of Social Affairs and Health, at five-year intervals from 2026.

The life expectancy coefficient is retained in the system, but it will be calculated in a more lenient manner than currently as of 2027, at which time the retirement age for all age cohorts will be 65 years[3].

Alongside the disability pension there is a new form of pension, a years-of-service pension, which can be applied for at the age of 63. From 2030, the age limit for the years-of-service pension will be adjusted so that it is two years lower than the old-age pension. The requirement for receiving the pension is a 38-year working career which, with a few minor expectations, has been in work that is physically or mentally wearing. A further requirement of the years-of-service pension is an impairment of the individual's working capacity due to illness, handicap or disability as well as an impairment of opportunities to continue in work. The amount of the years-of-service pension is smaller than the disability pension, because the pension is not projected to retirement age[4]. The projected period of the disability pension, on the other hand, is linked to the lower limit of the old-age pension, which increases these pensions as the retirement age rises.

The part-time pension was abolished and replaced by a partial early old-age pension. An individual can draw part of the accrued old-age pension at the age of 61 years; after 2025 the age limit will rise to 62 years. From 2030, the age limit will always be three years lower than the lowest old-age retirement age. Either 25% or 50% of the accrued pension can be drawn. Drawing the pension early reduces the drawn part of the pension permanently by 0.4% per month, i.e. 4.8% per year. The requirement relating to part-time work was abolished, i.e. no pay or working hours monitoring is associated with the new form of pension. The partial early old-age pension does not prevent an individual from receiving unemployment benefit nor reduces unemployment benefit.

The higher accrual rates for 53-62 year-olds (1.9%) and for 63-68 year-olds (4.5%) were abolished so that the annual pension accrual rate is 1.5% of wages for all. With respect to pension accrual rates, however, there will be a transition period for 53–62 year-olds. During the transition period, pension will accrue at 1.7% per year until the end of 2025, but the employee's pension contributions (for 53–62 year-olds) will be correspondingly 1.5 percentage points higher than they otherwise would be. In addition, accrual of pension begun to be calculated for higher earnings than before, because the earnings-related pension insurance contribution will no longer be deducted from pensionable earnings.

The 4.5% accrual for work done after reaching the lowest old-age retirement age was replaced by an increment for deferred retirement. If an individual does not draw the old-age pension

[3] Currently, the life expectancy coefficient for a given year i is defined by the formula E(2009,62)/E(i,62) where E(i,62) is the longevity indicator, defined as the capital value of a unit pension beginning at age 62 using the mortality of the 5 previous years. This way the effect that changes in longevity have on the capital values of pensions is neutralized in the long run. As of 2027, the life expectancy coefficient is defined by (E(2009,62)/E(2026,62))*(E(2026,65)/E(i,x)) where x is current general retirement age. This results in a mitigation of the life expectancy coefficient so the rise in life expectancy is not taken into account twice as the retirement age will be linked to life expectancy.

[4] By projected period is meant the period between retirement on disability pension (pension event) and the lowest old-age retirement age. The projected period increases, on certain conditions, the disability pension, because it was not possible to accrue a full pension for the curtailed working career.

immediately on reaching the earliest old-age retirement age, the accrued pension will be adjusted by a 0.4% increment for each month of deferred retirement.

From 2023, the minimum age of eligibility for the right to additional days of unemployment security (so-called unemployment pipeline to retirement) will be raised by one year to 62 years if social partners consider in 2019 that the measures agreed in the 2012 working careers agreement have been effective as intended. The reform also includes development measures that promote continuing and coping in work.

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

The projection is based on the current pension legislation and other guiding regulations with one exception.

The indexation rules applied to the national pension and guarantee pension differ from the current legislation. According to law, national pensions are adjusted by the consumer price index. National pensions have been, however, adjusted discretionarily every now and then to increase their purchasing power. In the projection, from 2022 onwards, it is assumed that national pensions are adjusted by a wage index in line with the common methodology agreed by the AWG for the AR2018 projections. Hence, increases are made to the real value of national and guarantee pensions so that the increases do not lag behind the general earnings growth. This reflects better the ‘no-policy-change’ assumption that the 'safety net' role of minimum pension is assumed to remain in place (in the previous AR2015 projections it was assumed that national pensions are adjusted by an index where the weight of consumer price index is 50 % and that of wage index 50%).

2. Overview of the Demographic and labour forces projections

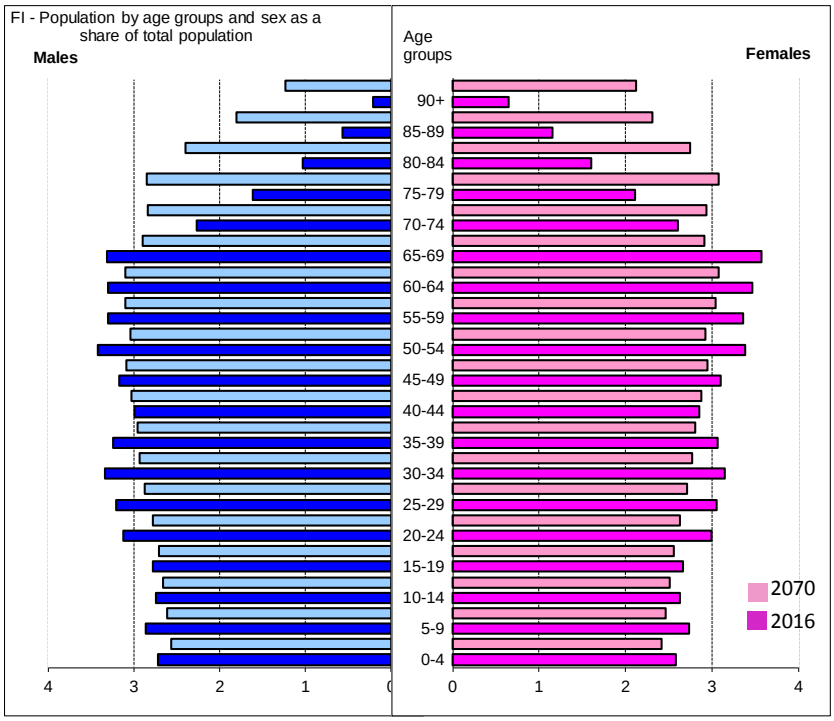
2.1. Demographic development

The age pyramid (Graph 2) and Table 3 provide an overview of the demographic developments until 2070. According to demographic projection, total population is expected to increase until the late 2030s by some 4%. Thereafter the total population starts to slowly decrease and the cumulative growth is only some 2% over the entire projection period.

The old-age dependency ratio (the ratio of persons aged 65 and above to 15–64-year-olds) will continue to grow during the whole projection period, the growth being fastest during the current and the next decade. In 2016, the old-age dependency ratio was 32.8%, and it is projected to rise to 52.0% in 2070. The weakening of the old-age dependency ratio in the near future is a consequence of the current age structure in Finland. However, the steadily rising life expectancy implies that the old-age dependency ratio will continue to increase even after the impact of the baby-boom generations has faded.

In 2016, life expectancy at birth was 78.5 years for men and 84.1 years for women. It is projected to rise to 85.9 and 90.2 years, respectively, by 2070. Thus, the life expectancy at birth increases by some 6 years for women and some 7½ years for men by 2070. Life expectancy at 65, which approximates the time spent in retirement, rises by some 5 years for both genders.

Graph 2: Age pyramid comparison: 2016 vs 2070



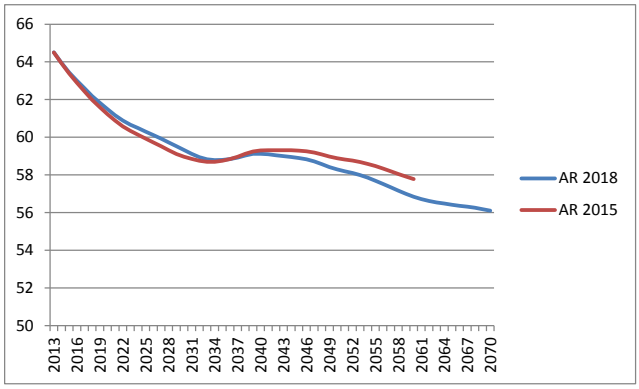
It seems that the population projection is now to some extent less favourable to Finland than in the previous AR2015 projection round (Graph 3 and Graph 4). This is mainly due to lower net migration assumption (Graph 5).

Table 3 – Main demographic variables evolution

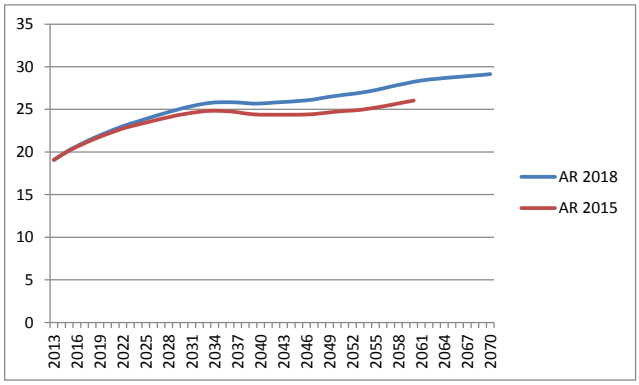
	2016	2020	2030	2040	2050	2060	2070	Peak year*
Population (thousand)	5 495	5 571	5 702	5 721	5 685	5 653	5 624	2037
Population growth rate	0.3	0.3	0.1	0.0	-0.1	0.0	-0.1	2018
Old-age dependency ratio (pop65/pop15-64)	32.8	36.3	42.4	43.5	45.7	49.7	52.0	2070
Ageing of the aged (pop80+/pop65+)	25.2	25.2	32.4	38.4	39.3	37.9	41.8	2070
Men - Life expectancy at birth	78.5	79.1	80.6	82.1	83.4	84.7	85.9	2070
Men - Life expectancy at 65	18.2	18.6	19.6	20.6	21.5	22.4	23.3	2070
Women - Life expectancy at birth	84.1	84.6	85.8	87.0	88.1	89.2	90.2	2070
Women - Life expectancy at 65	21.7	22.0	23.0	23.9	24.8	25.7	26.5	2070
Men - Survivor rate at 65+	85.6	86.4	88.4	90.1	91.6	92.8	93.8	2070
Men - Survivor rate at 80+	56.9	58.9	63.9	68.5	72.6	76.2	79.4	2070
Women - Survivor rate at 65+	92.9	93.3	94.2	95.0	95.7	96.3	96.8	2070
Women - Survivor rate at 80+	75.0	76.3	79.6	82.5	85.0	87.2	89.1	2070
Net migration	15.9	15.8	13.7	10.7	8.5	7.8	6.8	2017
Net migration over population change	1.0	0.9	1.6	-5.2	-2.1	-3.1	-2.0	2037

Source: EUROSTAT and Commission Services

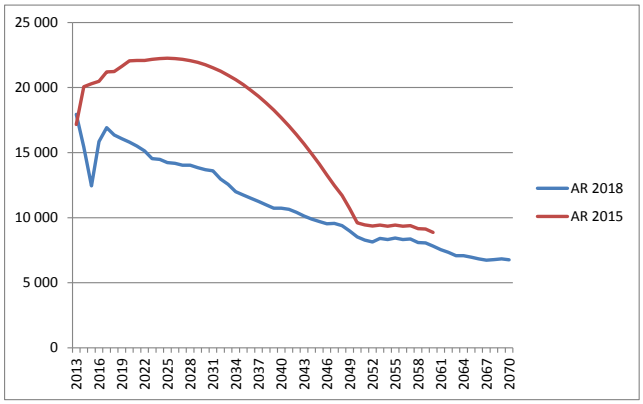
Graph 3: Share of 15-64 year-olds to total population in AR2018 and AR2015



Graph 4: Share of 65 year-olds to total population in AR2018 and AR2015



Graph 5: Net migration in AR2018 and AR2015



2.2. Labour force

Labour force participation rates (LFPR) are projected to increase for older workers. This will be mostly due to the fact that the retirement age is linked to the increasing life expectancy. This effect is taken into account by the Cohort Simulation Model (CSM). In addition, people also live longer and healthier lives, and as a consequence, they will also have to prolong their careers in order to finance the longer lifespan.

For people aged 55-64, the LFPR will increase quite steadily from 66.2% in 2016 to 79.6% in 2070, cf. table 4. At the same time, the LFPR will almost triple for people aged 65-74 (from 10.7% in 2016 to 28.1% in 2070).

Table 4 – Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74

	2016	2020	2030	2040	2050	2060	2070	Peak year*
Labour force participation rate 55-64	66.2	67.3	68.3	71.0	74.0	77.1	79.6	2070
Employment rate for workers aged 55-64	61.2	63.2	64.1	66.6	69.4	72.3	74.7	2070
Share of workers aged 55-64 on the labour force 55-64	92.5	93.9	93.9	93.8	93.8	93.9	93.9	2021
Labour force participation rate 65-74	10.7	10.0	11.4	14.2	18.9	24.1	28.1	2070
Employment rate for workers aged 65-74	10.6	10.0	11.3	14.0	18.7	23.9	27.8	2070
Share of workers aged 65-74 on the labour force 65-74	98.8	99.1	98.8	98.8	98.8	98.8	98.9	2020
Median age of the labour force	41.0	40.0	40.0	41.0	42.0	42.0	43.0	2066

Source: Commission Services

*(Explanatory note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070.)*

The average effective exit age is projected to increase by 4.0 years for men from 2017 to 2070 and by 4.4 years for women (Tables 5a and 5b). The duration of retirement is projected to increase 1.7 and 0.2 years by 2070 for men and women, respectively. The average contributory period is projected to increase 2.3 years for men and 2.7 years for women. The increase in the average contributory period levels off after 2040s. This is because it is assumed that the increase of the retirement age is not fully transferred to longer work careers.

The reason for this is that fewer people are willing or able to continue in work beyond the lowest old-age retirement age and the use of disability pension and unemployment increase among the older cohorts at the last decades of the projection. In addition, according to the current legislation, the upper limit of flexible statutory retirement age remains in 70 years after 2030 and is not increased although the lower limit is increased. This ceiling for the retirement age also limits the length of careers in comparison a policy that would increase the ceiling for retirement with the same pace as the lower limit is increased. Hence, the assumptions on average exit ages (which are based on national projections) are slightly more prudent than those produced by the CSM although the CSM assumptions for total employment are used.

This phenomenon is also visible in the Graph 6 which depicts how the average effective retirement age is evolving in relation to old-age retirement age.

Table 5a – Labour market entry age, exit age, contributory period and expected duration of life spent at retirement - MEN

	2017	2020	2030	2040	2050	2060	2070	Peak year*
Average effective exit age (CSM) (II)	63.9	63.9	64.4	65.2	66.1	67.2	67.9	2070
Contributory period	34.0	34.7	35.8	35.8	36.6	36.5	36.3	2052
Duration of retirement	19.0	19.3	20.4	20.6	20.7	20.7	20.7	2064
Duration of retirement/contributory period	0.6	0.6	0.6	0.6	0.6	0.6	0.6	:
Percentage of adult life spent at retirement	29.3	29.6	30.5	30.4	30.1	29.6	29.3	2031
Early/late exit	3.4	2.6	2.7	2.8	2.9	3.3	5.1	2070

Source: Commission Services

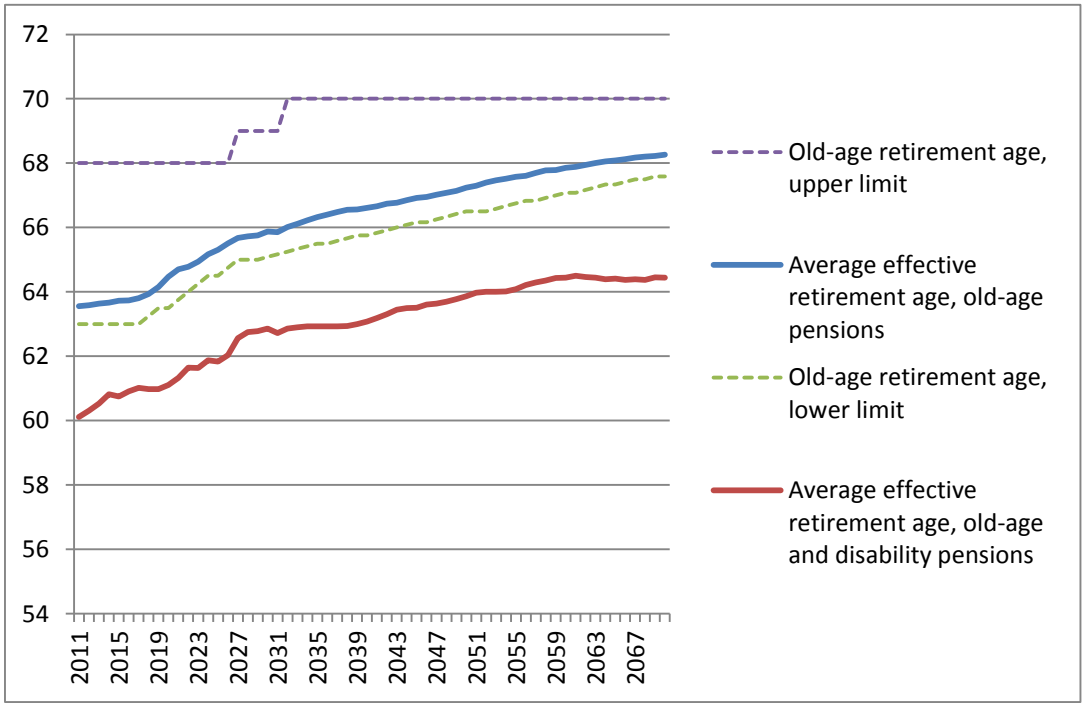
Table 5b – Labour market entry age, exit age, contributory period and expected duration of life spent at retirement - WOMEN

	2017	2020	2030	2040	2050	2060	2070	Peak year*
Average effective exit age (CSM) (II)	63.2	63.4	64.1	65.0	65.9	67.1	67.6	2070
Contributory period	33.2	33.9	34.8	34.9	35.9	35.9	35.9	2064
Duration of retirement	23.5	23.8	23.9	23.9	23.9	23.8	23.7	2045
Duration of retirement/contributory period	0.7	0.7	0.7	0.7	0.7	0.7	0.7	:
Percentage of adult life spent at retirement	34.2	34.4	34.1	33.7	33.3	32.7	32.3	2022
Early/late exit	5.5	3.9	3.8	4.4	4.6	4.6	5.8	2043

Source: Commission Services

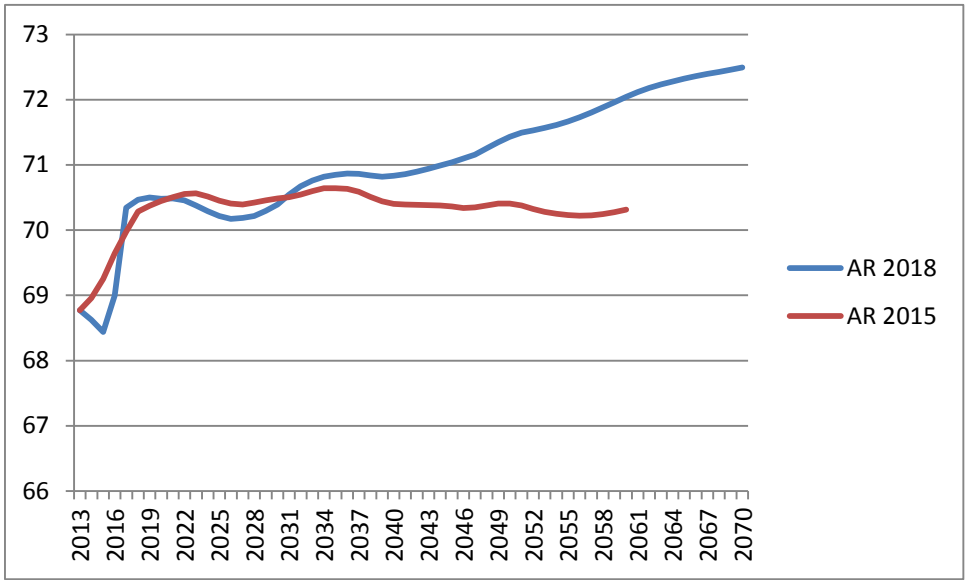
*(Explanatory note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070. ** Duration of retirement is calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself. *** The percentage of adult life spent at retirement is calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years. **** Early/late exit, in the specific year, is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.)*

Graph 6: Employment rate (15-64 year-olds) in AR2018 and AR2015



The employment rate projection for Finland is now clearly more favourable than in the previous AR2015 projection round (Graph 7) mainly due to a significantly increases of the retirement age in the 2017 pension reform.

Graph 7: Employment rate (15-64 year-olds) in AR2018 and AR2015



3. Pension projection results

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

The long-term projection model consists of several interconnected modules, presented in the graphs in section 4.5. In the model, the calculation of pension expenditure covers the earnings-related pension acts of the private and the public sectors, as well as the national pension and SOLITA pensions. SOLITA pensions include the pension provision from military injuries insurance, motor liability insurance and workers' compensation insurance. National pensions, including guarantee pensions, are simulated separately from the earnings-related pensions with a model developed in the Social Insurance Institution of Finland.

There are only very small differences between the ESSPROSS and AWG definitions of pension expenditure (Table 6). There have been some visible differences only in 2009 and 2010.

Table 6 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)

	2007	2008	2009	2010	2011	2012	2013	2014
1 Eurostat total pension expenditure	10.4	10.4	12.0	12.2	12.0	12.5	13.0	13.4
2 Eurostat public pension expenditure	10.1	10.1	11.8	12.0	11.8	12.3	12.8	13.2
3 Public pension expenditure (AWG)	10.1	10.1	11.7	11.8	11.8	12.3	12.8	13.2
4 Difference (2) - (3)	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0
5 Expenditure categories not considered in the AWG definition, please specify:	:	:	:	:	:	:	:	:
5.1 …	:	:	:	:	:	:	:	:
5.2 …	:	:	:	:	:	:	:	:
5.3 …	:	:	:	:	:	:	:	:

Source: EUROSTAT and Member States

3.2. Overview of projection results

The growth of public pension expenditure is particularly fast during the current and the next decade, as the baby boom generations reach old age. After that, the GDP share of public pensions declines somewhat in the 2030s and 2040s, but starts again to grow from the 2050s onwards (Table 7 and Graph 8). As for net total pension expenditure, an assumption of a constant tax rate of 21.5% has been used based on tax revenues from pension income in 2016.

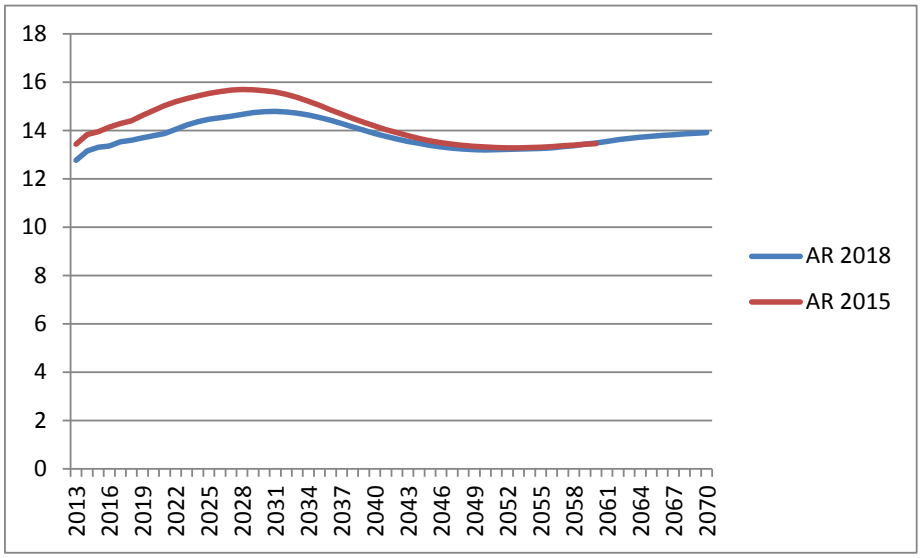
Table 7 - Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2016	2020	2030	2040	2050	2060	2070	Peak year*
Gross public pension expenditure	13.4	13.8	14.8	13.9	13.2	13.5	13.9	2031
Private occupational pensions	:	:	:	:	:	:	:	:
Private individual pensions	:	:	:	:	:	:	:	:
Mandatory private	:	:	:	:	:	:	:	:
Non-mandatory private	:	:	:	:	:	:	:	:
Gross total pension expenditure	13.4	13.8	14.8	13.9	13.2	13.5	13.9	2031
Net public pension expenditure	10.5	10.8	11.6	10.9	10.4	10.6	10.9	2031
Net total pension expenditure	10.5	10.8	11.6	10.9	10.4	10.6	10.9	2031
Contributions	2016	2020	2030	2040	2050	2060	:	Peak year*
Public pension contributions	17.6	16.3	17.9	17.4	17.3	17.8	18.8	2070
Total pension contributions	17.6	16.3	17.9	17.4	17.3	17.8	18.8	2070

Source: Commission Services

*(Explanatory note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2010 to 2070.)*

Graph 8: Projected public pension expenditure in AR2018 and AR2015 (% of GDP)



Total pension contributions are projected to remain quite stable around 17% relative to GDP but they start to grow in the late years of the projection. This is because the pension expenditure starts to grow and the private sector contribution rate is assumed to be adjusted according to current legislation. This means that contribution rate is determined so that it covers the funded part of pension liabilities and in addition keeps the buffer funds at their target level. Revenues from pension assets are also included in total contributions (read more form section 3.4.). Occupational and non-mandatory private pensions play a minor role in Finland, and they have not been included in the projections.

Table 8 shows a breakdown of gross pension expenditure projections by type of pension.

Table 8 - Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2016	2020	2030	2040	2050	2060	2070	Peak year *
Total public pensions	13.4	13.8	14.8	13.9	13.2	13.5	13.9	2031
of which								
Old age and early pensions:	11.2	11.8	12.7	11.8	11.2	11.5	11.9	2031
Flat component	:	:	:	:	:	:	:	:
Earnings related	10.5	11.1	12.1	11.2	10.5	10.8	11.2	2031
Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65	0.7	0.6	0.6	0.6	0.6	0.7	0.7	2016
Disability pensions	1.4	1.2	1.3	1.3	1.4	1.4	1.5	2070
Survivor pensions	0.8	0.8	0.8	0.7	0.7	0.6	0.6	2016
Other pensions	:	:	:	:	:	:	:	:
of which								
Private sector employees (TyEL)	6.7	7.1	7.9	7.7	7.6	8.0	8.4	:
Self-employed persons (YEL)	0.5	0.6	0.7	0.7	0.7	0.7	0.7	
Farmers (MYEL)	0.4	0.4	0.3	0.3	0.2	0.1	0.1	
Seafarers (MEL)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Local government employees	2.2	2.4	2.8	2.7	2.5	2.5	2.6	
State employees	2.1	2.1	1.9	1.4	1.0	0.7	0.6	
Child-care and studying (VEKL)	0.0	0.0	0.0	0.1	0.1	0.2	0.3	
Other employees (mainly church)	0.2	0.2	0.2	0.2	0.1	0.1	0.1	
National and guarantee pensions	1.1	1.0	0.9	0.9	0.9	1.0	1.0	:

Source: Commission Services

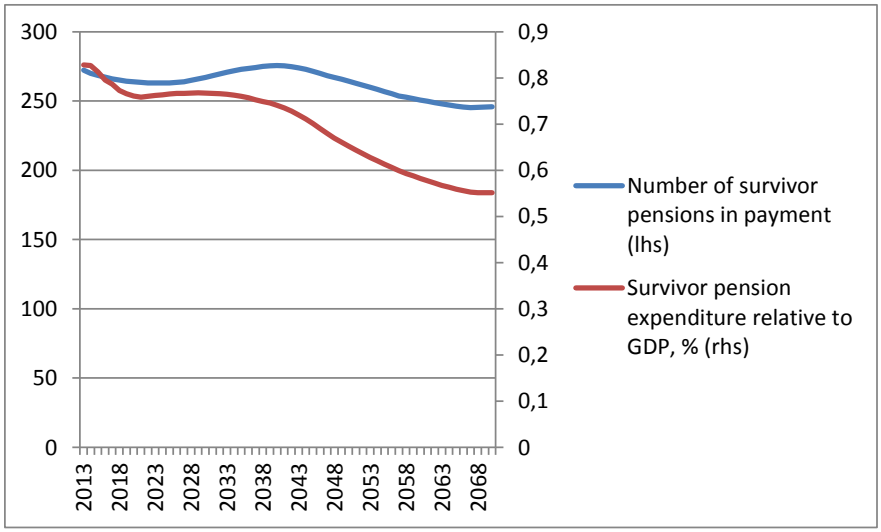
Disability pension expenditure relative to GDP is projected to decrease somewhat at the beginning of the projection as the number of old workers, who are more likely to end up on

disability pension, decline after the baby boom generation is retired (disability pension is transformed into old age pension when the statutory retirement age is reached). Another factor that reduces disability pensions is the assumption of improving health status among the working age population. However, the development is reversed later in the projection as the statutory retirement age starts to increase and more old workers remain in the workforce.

Minimum or non-earnings related pensions (i.e. guarantee and national pensions) expenditure is projected to decrease relative to GDP until the early 2020s as those pensions are indexed to prices and each year, more and more individuals are entitled to earnings-related pension schemes, which, in turn, reduces the non-earnings related pension expenditure. From the early 2020s onwards it is assumed that these pensions are indexed to wages and therefore their share relative to GDP remains broadly stable but starts to increase a bit in the late projection.

Survivor pension expenditure relative to GDP stays somewhat constant until the 2030s after which it starts to slowly decline (Graph 9). This is because, as the pension system matures, the survivors' average earnings-related pensions increase which in turn lower the survivors' pensions (survivors' pension is income-tested). The number of survivors increases until the beginning of 2040s after which it starts to decline. This is mostly due to demographic factors; the baby boom generations first start to get survivors pension and then this effect fades away. In addition, the survivors will spend less time being a widow or widower as the deaths of both genders will be concentrated to a narrower age interval according to the population projection.

Graph 9: Survivor pension expenditure relative to GDP and number of survivor pensions in payment



In Finland, there are several harmonised earnings-related pension schemes (private sector, central government, local government, entrepreneurs and farmers; these schemes are separate mainly due to considerable differences in their financing). Expenditure in the Farmers' Pension Act (MYEL) is slowly decreasing relative to GDP as the sector has become relatively small in Finland and the trend is projected to continue. The same is true with the state employees' pensions system as the employed covered by this system has declined considerably since the beginning of 1990s due to corporatization, privatization and changes in the legislation. Basically the Employees' Pension Act (TyEL), Self-Employed Persons' Pensions Act (YEL) and the local government pensions system are growing and, at the same time, substituting the declining pension acts.

3.3. Description of main driving forces behind the projection results and their implications for main items from a pension questionnaire

This part provides more details about the development of public pension expenditures. It uses a standard arithmetic decomposition of a ratio of pension expenditures to GDP into the dependency, coverage, benefit ratio, employment rate and labour intensity. The decomposition is calculated using both data on pensions (Table 9a) and pensioners (Table 9b).

$$\frac{\text{Pension Exp}}{\text{GDP}} = \overbrace{\frac{\text{Population } 65+}{\text{Population } 20-64}}^{\text{DependencyRatio}} \times \overbrace{\frac{\text{Number of Pensioners (Pensions)}}{\text{Population } 65+}}^{\text{CoverageRatio}} \times \overbrace{\frac{\text{Average income from pensions (Average Pension)}}{\frac{\text{GDP}}{\text{Hours Worked } 20-74}}}^{\text{Benefit Ratio}} \times \overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / LabourIntensity}} \quad [1]$$

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

$$\overbrace{\frac{\text{Number of Pensioners}}{\text{Population } 65+}}^{\text{CoverageRatio}} = \quad [2]$$

$$= \overbrace{\frac{\text{Number of Pensioners } 65+}{\text{Population } 65+}}^{\text{CoverrageRatio Old-Age}} + \left(\overbrace{\frac{\text{Number of Pensioners} \le 65}{\text{Population } 50-64}}^{\text{CoverageRatio Early-Age}} \times \overbrace{\frac{\text{Population } 50-64}{\text{Population } 65+}}^{\text{Cohorteffect}} \right)$$

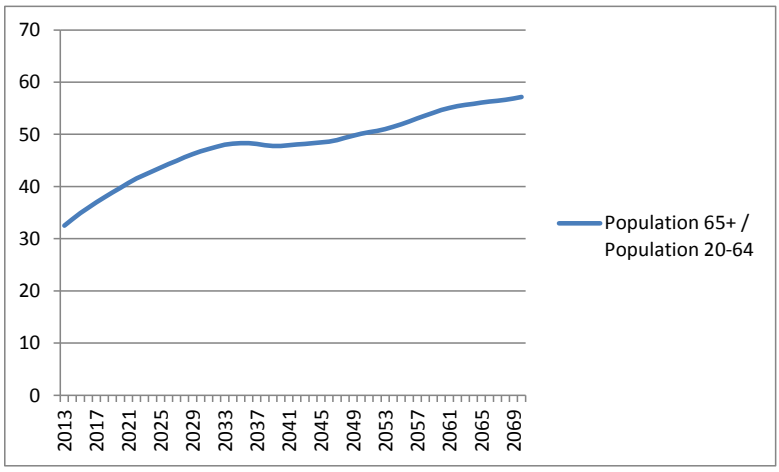
The labour market indicator is further decomposed according to the following:

$$\overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / LabourIntensity}} = \quad [3]$$

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

The only positive and by far the largest factor behind the change in public pension expenditure is the dependency ratio effect (Table 9a and Table 9b). In the current and the next decade, the increase in the old-age dependency ratio in Finland is one of the fastest in the EU (Graph 10).

Graph 10: Old-age dependency ratio in Finland, %



The coverage ratio effect is also substantial and it will lower public pension expenditure in the future. A plausible interpretation for this phenomenon is that people continue more often at work after the age of 65 due to two years increase in the old-age retirement age in 2018-2027, its linkage to life expectancy thereafter and the economic incentives to continue at work beyond the lowest old-age retirement age.

The benefit ratio effect reflects mostly the life expectancy coefficient (the Finnish sustainability/adjustment factor) which started to cut new earnings-related pension benefits increasingly from year 2010 onwards. The life expectancy coefficient is defined so that the capital value of the pension adjusted with the coefficient is the same as the unadjusted capital value of the pension in the base year 2009. However, the coefficient will be calculated in a more lenient manner as of 2027 to take into account the increases in statutory retirement age thereafter (Graph 11). Life expectancy coefficient, which is taken into account in all calculations, cuts the new pensions permanently. In practice, for an individual, it is possible to counteract the effect of the life expectancy coefficient by postponing retirement, but it is not taken into account in the employment scenarios of the CSM.

Graph 11: Life expectancy coefficient (Finnish sustainability/adjustment factor)

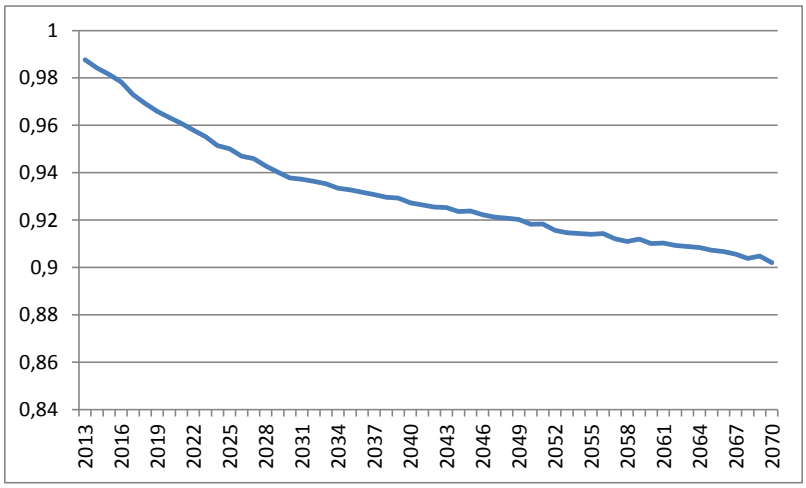


Table 9a - Factors behind the change in public pension expenditures between 2013 and 2070 (in percentage points of GDP) - pensions

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	0.4	1.0	-0.9	-0.7	0.3	0.4	0.6	1.1%
Dependency ratio effect	1.4	2.4	0.3	0.6	1.2	0.6	6.6	12.4%
Coverage ratio effect	-0.7	-1.3	-0.2	-0.2	-0.3	0.0	-2.6	-5.3%
*Coverage ratio old-age**	*-0.3*	*-0.3*	*0.0*	*0.0*	*0.0*	*0.2*	*-0.3*	*-0.8%*
*Coverage ratio early-age**	*-0.3*	*-2.8*	*-2.2*	*-0.9*	*-0.6*	*-0.3*	*-7.1*	*-13.8%*
*Cohort effect**	*-1.5*	*-2.9*	*0.5*	*-0.4*	*-1.4*	*-0.4*	*-6.1*	*-12.5%*
Benefit ratio effect	0.0	0.1	-0.9	-0.8	-0.2	-0.1	-1.9	-3.4%
Labour Market/Labour intensity effect	-0.3	-0.1	-0.1	-0.3	-0.4	-0.2	-1.3	-2.6%
Employment ratio effect	*-0.3*	*0.0*	*-0.1*	*-0.1*	*-0.1*	*-0.1*	*-0.7*	*-1.5%*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0%*
Career shift effect	*0.0*	*0.0*	*-0.1*	*-0.2*	*-0.2*	*-0.1*	*-0.6*	*-1.1%*
Residual	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.2	-0.1%

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

Source: Commission Services

Table 9b - Factors behind the change in public pension expenditures between 2013 and 2070 (in percentage points of GDP) - pensioners

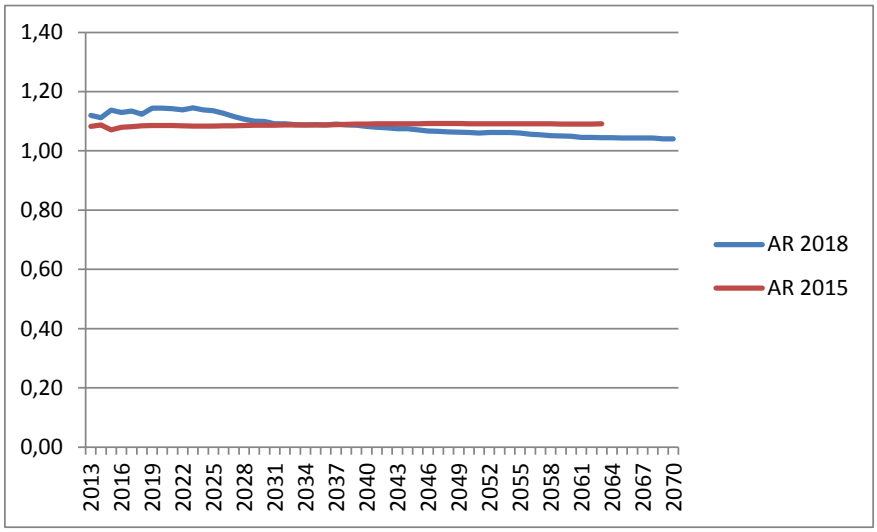
	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	0.4	1.0	-0.9	-0.7	0.3	0.4	0.6	1.1%
Dependency ratio effect	1.4	2.4	0.3	0.6	1.2	0.6	6.6	12.4%
Coverage ratio effect	-0.3	-1.0	-0.3	-0.4	-0.4	-0.1	-2.5	-4.9%
*Coverage ratio old-age**	*0.1*	*-0.1*	*-0.1*	*-0.2*	*-0.2*	*0.0*	*-0.5*	*-1.1%*
*Coverage ratio early-age**	*-0.6*	*-3.1*	*-2.1*	*-0.9*	*-0.5*	*-0.1*	*-7.2*	*-14.0%*
*Cohort effect**	*-1.5*	*-2.9*	*0.5*	*-0.4*	*-1.4*	*-0.4*	*-6.1*	*-12.5%*
Benefit ratio effect	-0.3	-0.2	-0.8	-0.7	-0.1	0.1	-2.0	-3.8%
Labour Market/Labour intensity effect	-0.3	-0.1	-0.1	-0.3	-0.4	-0.2	-1.3	-2.6%
Employment ratio effect	*-0.3*	*0.0*	*-0.1*	*-0.1*	*-0.1*	*-0.1*	*-0.7*	*-1.5%*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0%*
Career shift effect	*0.0*	*0.0*	*-0.1*	*-0.2*	*-0.2*	*-0.1*	*-0.6*	*-1.1%*
Residual	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.2	-0.1%

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

Source: Commission Services

The replacement rate is decreasing in the first decades of the projection (Table 10). However, it increases visibly in the 2040s and remains at that level from 2050s onwards. This phenomenon reflects the several aspects of the 2017 pension reform which enhances both the sustainability of the pension system and also to some extent the pension adequacy for the age cohorts retiring from 2040s onwards. First of all, the accrual of pension begins to be calculated for higher earnings as of 2017 as the earnings-related pension insurance contribution of employees will no longer be deducted from pensionable earnings. The employees' contribution rate was in 2016 on average a bit over 6% of earnings. In addition, the life expectancy coefficient (sustainability/adjustment factor) will be calculated in a more lenient manner than currently as of 2027 and the contributory period increasing considerably due to increases in the retirement. One thing more is that the average wage at retirement is to some extent falling relative to economy wide average wage (Graph 12). This may be, among other things, because the people are doing more part time work near retirement age due to the introduction of partial early old-age pension as of 2017. All these changes increase the replacement rate compared to the AR2015 projection.

Graph 12: Average gross wage at retirement divided by average gross wage in AR2018 and AR2015 projections



The total replacement rate[5] is quite low compared to replacement rate in the old-age earnings-related scheme. This is because the average national pension is quite low as pensioners can get a small national pension although they get almost median old-age earnings-related pension (see Graph 1). Total replacement rate is 32.6% in 2016 but it would be 38.8% if we exclude the minimum pensions from the calculation). The coverage of the public pension schemes is 100%, as all pensioners in Finland benefit from at least one public pension scheme.

Table 10 - Replacement rate at retirement (RR) and coverage by pension scheme (in %)

	2016	2020	2030	2040	2050	2060	2070
Public scheme (BR)	53.49	53.10	52.36	49.70	47.05	46.13	46.13
Public scheme (RR)	32.61	30.64	30.24	29.10	30.94	31.36	31.17
Coverage	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Public scheme old-age earnings related (BR)	49.65	49.83	49.15	46.17	43.38	42.69	42.87
Public scheme old-age earnings related (RR)	41.32	40.46	39.25	38.38	41.67	41.94	42.05
Coverage	84.40	86.16	87.41	87.05	86.73	86.52	86.31
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual scheme (BR)	:	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Total (BR)	53.49	53.10	52.36	49.70	47.05	46.13	46.13
Total (RR)	32.61	30.64	30.24	29.10	30.94	31.36	31.17

Source: Commission Services

(Explanatory note: 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. When data on pensioners are not available calculation based on number of pensions is allowed.)

[5] The public scheme total replacement rate is calculated by adding up new pension expenditure of old-age and early, disability and survivor pensions (incl. national and guarantee pensions). This sum is divided by the number of new pensions (not pensioners) in these schemes. This result, in turn, is divided by the average wage at retirement.

The number of pensioners increases rapidly in the current and the next decade as the baby boom generations retire (Table 11). The same pertains for number of people aged 65 and older. Employment remains around the current level during the whole projection period thanks to increasing retirement age although the working age population is decreasing 9% at the same time. The increasing system dependency ratio reflects the shrinking working-age population and increase in pensioners during the decades to come. However, the system efficiency ratio decreases to some extent as the old-age dependency ratio increases more than the pension system dependency ratio.

Table 11 – System Dependency Ratio and Old-age Dependency Ratio

	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (thousand) (I)	1448.6	1543.9	1655.7	1659.8	1662.4	1707.7	1743.7
Employment (thousand) (II)	2457.7	2484.8	2456.2	2481.1	2489.7	2477.4	2462.8
Pension System Dependency Ratio (SDR) (I)/(II)	58.9	62.1	67.4	66.9	66.8	68.9	70.8
Number of people aged 65+ (thousand) (III)	1137.2	1244.1	1435.3	1470.4	1513.0	1596.2	1639.7
Working age population 15 - 64 (thousand) (IV)	3462.6	3425.3	3382.3	3382.6	3314.1	3213.3	3155.3
Old-age Dependency Ratio (ODR) (III)/(IV)	32.8	36.3	42.4	43.5	45.7	49.7	52.0
System efficiency (SDR/ODR)	1.8	1.7	1.6	1.5	1.5	1.4	1.4

Source: Commission Services

The noteworthy phenomenon apparent in Table 12a is the decrease in the share of pensioners to inactive population in the age groups 55–59 and 60–64 until 2050s. When we examine the share of pensioner to total population (Table 12b), the phenomenon is extended also to the age group 65–70 and to entire projection period. These figures reflect the increases in the statutory retirement age and to some extent also the tightened access to the so-called unemployment pipeline to retirement. However, pensioners to inactive population is increasing from the 2050s onwards in the older age groups as the increasing retirement age decreases the inactive population and on the other hand, the use of disability pensions and early pathways to retirement slow down the increase of effective retirement age. The reason for the higher than 100 % shares in the tables below is that the pensioners' figures include those living abroad. The same observations can be made also when the exercise is repeated exclusively for women (Table 13a and Table 13b).

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

	2016	2020	2030	2040	2050	2060	2070
Age group -54	6.2	5.6	5.1	4.9	4.7	4.8	4.8
Age group 55-59	78.2	66.1	53.3	47.7	50.2	54.2	60.8
Age group 60-64	88.6	91.9	69.2	65.1	64.4	69.0	75.1
Age group 65-69	111.8	113.6	111.5	108.5	107.1	110.9	117.9
Age group 70-74	109.5	109.3	108.2	109.0	111.8	114.5	115.6
Age group 75+	102.5	102.6	103.8	104.6	105.2	105.0	104.5

Source: Commission Services

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

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.5	2.3	2.1	2.0	1.9	2.0	2.0
Age group 55-59	14.1	12.3	10.3	9.5	9.1	9.0	9.0
Age group 60-64	43.8	43.4	29.8	25.2	22.1	20.2	19.4
Age group 65-69	96.0	96.6	91.5	83.3	75.9	69.7	65.5
Age group 70-74	102.9	103.8	103.5	102.8	103.2	102.9	102.0
Age group 75+	102.5	102.6	103.8	104.6	105.2	105.0	104.5

Source: Commission Services

Table 13a – Female pensioners (public schemes) to inactive population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	5.7	5.2	4.9	4.8	4.6	4.7	4.7
Age group 55-59	80.5	68.7	58.5	52.9	54.9	57.8	63.0
Age group 60-64	87.6	91.7	70.8	69.2	69.8	75.3	80.9
Age group 65-69	108.0	108.7	106.2	104.3	104.3	110.3	116.6
Age group 70-74	106.7	107.2	105.1	105.3	107.8	111.1	111.5
Age group 75+	101.4	101.8	103.1	103.5	103.6	103.3	102.9

Source: Commission Services

Table 13b – female pensioners (public schemes) to population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	2.4	2.2	2.1	2.0	2.0	2.0	2.0
Age group 55-59	13.3	12.2	10.7	9.9	9.5	9.5	9.6
Age group 60-64	42.7	43.7	31.1	26.3	23.2	21.1	20.3
Age group 65-69	95.9	96.4	91.0	83.1	76.0	70.1	66.0
Age group 70-74	102.6	103.1	102.4	101.5	101.6	101.7	100.5
Age group 75+	101.4	101.8	103.1	103.5	103.6	103.3	102.9

Source: Commission Services

The projected new old-age and early earnings-related pension expenditure and its decomposition is reported in Table 14a (and separately to males and females in Table 14b and Table 14c, respectively). The average contributory period is increasing but not after 2040s; the explanations for this can be found in section 2.2.

The average accrual rate at the beginning of the period is only 1.6%, even though the normal accrual rate is 1.5% and the accrual rate for 53-63-year-olds was 1.9% and for 63-68-year-olds 4.5% until 2016. The reason for this phenomenon is that until 2016 the earnings-related pension insurance contribution of employees was deducted from pensionable earnings before the accrual rate in law was applied (the employees' contribution rate was in 2016 on average a bit over 6% of earnings). Hence, the average accrual rate has been lower than the accrual rates in law. The average accrual rate is decreasing first as the higher accrual rates for older workers were abolished as of 2017 without one exception for the transition period. The accrual rate is 1.5% as of 2017 for all other workers but it is 1.7% for 53–62 year-olds until the end of 2025. This higher accrual rate is not enough to compensate for the lower accruals before the reform and that is why the average accrual rate goes temporarily below 1.5% as some generations do not get either the higher accrual rates at the end of their careers according to the old system nor the better accruals at their early careers according to the new system.

The average accrual rate starts to increase in 2040s because as of 2017 the accrual of pension begins to be calculated for higher earnings than before as the earnings-related pension insurance contribution of employees will no longer be deducted from pensionable earnings and so the 1.5% accrual rate in law will become gradually effective. However, the accrual rate increases to a bit over 1.5% in the long term because the increase of the statutory retirement age increases the level disability pension benefits as the projected period (the period between retirement on disability pension and the lowest old-age retirement age) lengthens. The higher level of disability benefits is reflected in new old-age pensions because disability pension is transformed into old age pension when the statutory retirement age is reached.

Table 14a - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Total

New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	674.9	628.0	930.1	1082.3	1792.9	2622.5	3336.5
II. Average contributory period	33.9	34.3	35.3	35.3	36.2	36.2	36.1
III. Monthly average pensionable earnings	2.6	2.9	3.8	5.4	7.6	10.6	15.1
IV. Average accrual rates (%)	1.6	1.6	1.5	1.4	1.5	1.6	1.6
V. Sustainability/Adjustment factor	1.0	1.0	0.9	0.9	0.9	0.9	0.9
VI. Number of new pensions ('000)	78.4	68.3	81.1	71.4	78.0	80.0	71.8
VII Average number of months paid the first year	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Monthly average pensionable earnings / Monthly economy-wide average wage	0.8	0.9	0.8	0.9	0.9	0.8	0.8

Source: Commission Services

Table 14b - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Male

New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	376.6	342.1	513.1	605.4	990.9	1440.3	1835.7
II. Average contributory period	34.2	34.7	35.8	35.8	36.6	36.5	36.3
III. Monthly average pensionable earnings	3.0	3.3	4.3	6.1	8.5	11.9	16.9
IV. Average accrual rates (%)	1.6	1.6	1.5	1.4	1.5	1.5	1.6
V. Sustainability/Adjustment factor	1.0	1.0	0.9	0.9	0.9	0.9	0.9
VI. Number of new pensions ('000)	38.5	32.3	39.0	35.0	38.5	39.2	35.4
VII Average number of months paid the first year	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Monthly average pensionable earnings / Monthly economy-wide average wage	0.9	1.0	1.0	1.0	1.0	0.9	0.9

Source: Commission Services

Table 14c - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Female

New pension	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	298.3	285.9	417.0	476.9	802.0	1182.2	1500.8
II. Average contributory period	33.5	33.9	34.8	34.9	35.9	35.9	35.9
III. Monthly average pensionable earnings	2.3	2.6	3.4	4.7	6.7	9.3	13.4
IV. Average accrual rates (%)	1.7	1.6	1.5	1.4	1.5	1.6	1.6
V. Sustainability/Adjustment factor	1.0	1.0	0.9	0.9	0.9	0.9	0.9
VI. Number of new pensions ('000)	39.9	36.0	42.1	36.4	39.5	40.7	36.4
VII Average number of months paid the first year	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Monthly average pensionable earnings / Monthly economy-wide average wage	0.7	0.8	0.7	0.8	0.8	0.7	0.8

Source: Commission Services

3.4. Financing of the pension system

In Finland, the financing of earnings-related pensions vary considerably between the different earnings-related pensions schemes (private sector, local government and state employees, self-employed persons and farmers) although the benefits are today harmonised. The Employees' Pension Act (TyEL) is a partially funded system, whereas Self-Employed Persons' Pensions Act (YEL) and Farmers' Pensions Act (MYEL) are financed from the PAYG system so that the State pays the share of the expenditure that the contribution income does not cover. The local government and state employees' pension schemes are PAYG schemes with significant buffer funds. The Seafarer's Pensions Act (MEL) is partially funded scheme of which the state finances one third of expenditures.

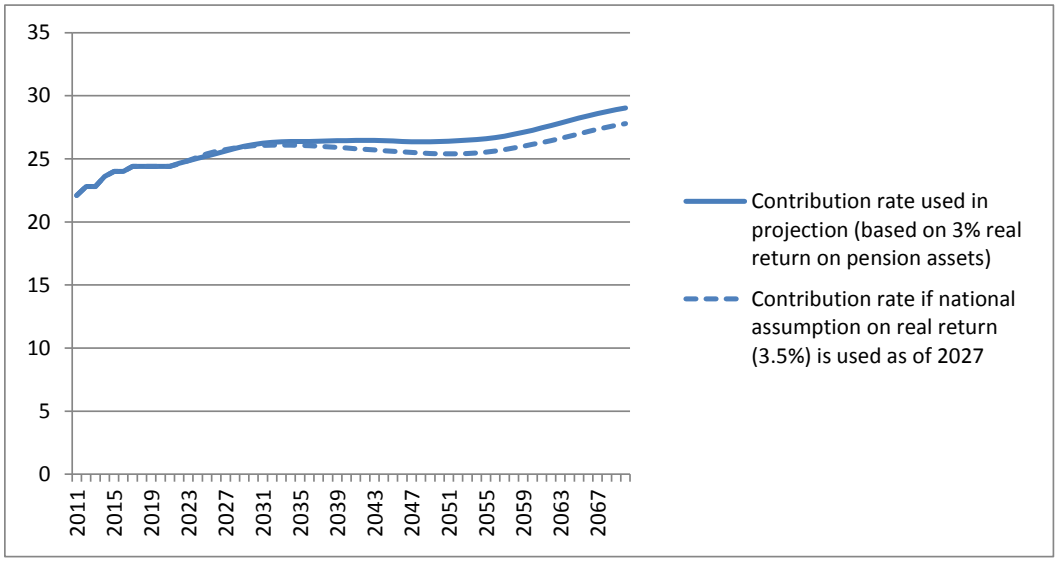
Table 15 – Financing of the system (in 2017)

	Public employees	Private employees	Self-employed
Contribution base	Wages and salaries	Wages and salaries	Pensionable income
Contribution rate/contribution			
Employer	Earnings-related pensions: 21.95% for local government 16.95% for state employers	Earnings-related pensions: 17.95%	.
Employee	Earnings-related pensions: 6.15% (17-52 and 63-68) & 7.65% (53-62 year-olds)	Earnings-related pensions: 6.15% (17-52 and 63-68) & 7.65% (53-62 year-olds)	Earnings-related pensions: 24.1% (17-52 and 63-68) & 25.6% (53-62 year-olds) (if pensionable income is above a certain threshold)
State	State employees: 60% (State pension fund receives contribution income and finances the rest 40%). National pensions: 100%. Pensions accrued during child-care and studying: 100%	Seafarers: 1/3 of expenditure National pensions: 100%. Pensions accrued during child-care and studying: 100%	Share of the expenditure that the contribution income does not cover. National pensions: 100%. Pensions accrued during child-care and studying: 100%
Other revenues	Earnings-related pensions: Property income form considerable buffer funds	Earnings-related pensions: 25% of private sector pension are prefunded.	.
Maximum contribution	.	.	.
Minimum contribution	.	.	.

Source: Commission Services

Contribution rates for private sector employees' pension scheme (TyEL) are determined so that they cover the funded part of pension liabilities and in addition keep the buffer funds at their target level. In the projection, the contribution rate for the private sector employees' scheme (TyEL) is evolving according to the current legislation. The contribution rate is projected to increase considerably form the current level of 24.4% of wage sum (Graph 13). The contribution rate of entrepreneurs is the same as the average contribution rate for private sector employees' pension scheme as is the contribution rate for farmers, if their pensionable income is above a certain threshold. The sum of employee and employer contribution rate for local government and state employees' pension schemes is fixed in the future.

Graph 13: Contribution rate of the private sector employees' pension scheme (TyEL)



In Table 16 the pension contributions paid by local government and state employers are classified as employer contributions. State contribution includes only direct transfers form state budged to pension system: 100% funding of the national pension scheme; 60% funding of the state employees' pension scheme[6] and the shares of the expenditure in self-employed persons' and farmers' pensions schemes that the contribution income does not cover, one third of expenditures in seafarer's pensions scheme and 100% of pensions accrued during child-care and studying (VEKL).

Table 16 – Revenue from contribution (million), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)

	2016	2020	2030	2040	2050	2060	2070
Public contribution	*37583,7*	*39431,1*	*54039,9*	*72793,1*	*101451,8*	*145713,2*	*212630,5*
Employer contribution	*14913,7*	*15434,2*	*21109,3*	*29563,3*	*41992,9*	*60053,1*	*86677,3*
Employee contribution	*5951,2*	*7737,8*	*11134,8*	*15770,5*	*22347,6*	*33302,2*	*51548,2*
State contribution	*6001,0*	*6303,7*	*7944,0*	*9462,0*	*11887,9*	*16424,9*	*23232,3*
Other revenues	*10717,8*	*9955,5*	*13851,8*	*17997,2*	*25223,3*	*35933,1*	*51172,8*
Number of contributors (I)	2273,2	2301,3	2288,2	2320,4	2318,7	2289,3	2268,4
Employment (II)	2457,7	2484,8	2456,2	2481,1	2489,7	2477,4	2462,8
Ratio of (I)/(II)	0,9	0,9	0,9	0,9	0,9	0,9	0,9

Source: Commission Services

Property income from pension assets is an important element of the pension system financing. In the baseline projection, the common assumption agreed by AWG that the real return on pension assets will follow long term interest rate on government bonds i.e. 3.0% is used. In the national projection made by the Finnish Centre for Pensions (Tikanmäki et al. 2017), it is assumed that real return on pension assets will be 3.0% in 2017-2026 and 3.5% from 2027 onwards[7]. The surplus of earnings-related pension schemes accumulates pension assets. It is assumed that the surplus of earnings-related pension schemes is calculated by adding up the property income and employer, employee and state contributions and subtracting the earnings-related pension expenditure and the administrative costs[8].

From the founding of the earnings-related pension schemes until the 2010s, the pension contributions have nearly always exceeded the pension expenditure. Recently, the expenditure surpassed the contribution income and the difference is financed with returns on pension assets. In 2016 (31 Dec.), the pension assets added up to around 90% relative to GDP. They are projected to decline gradually until 2040s and stay thereafter roughly at 85% relative to GDP. If the national assumption (3.5% real return as of 2027) is used, the pension assets would increase to slightly over 100% relative to GDP in 2070. At the end of 2016 private sector (TyEL) pension assets were roughly 60% of all pension assets and were 215% of private sector annual wage sum. The funding ratio[9] of the entire earnings-related pension

[6] State pension fund receives all central government pension contributions. The fund pays 40 % of yearly pension expenditure to the State budget and rest of contributions and interest revenues after expenses are funded.
[7] This assumption can be seen as more realistic as the majority of pension funds are invested in risker assets than government bonds. Indicatively, the historic annual real return of pension fund assets in 1997–2016 (4.1%) has exceeded the implicit real interest rate on government securities (2.6%).
[8] Consumption expenditure of earnings-related pension schemes in national accounts.
[9] The funding ratio is the earnings-related pension funds divided by the capital value of accrued pensions (the value of accrued pensions has been calculated using a 2.5% real discount rate).

scheme was at the end of 2015 roughly 25% and that of the private sector employees' pension scheme (TyEL) slightly higher.

3.5. Sensitivity analysis

Table 17 presents the results of the sensitivity scenarios as deviations from the baseline.

Table 17 - Public and total pension expenditures under different scenarios (deviation from the baseline)

	2016	2020	2030	2040	2050	2060	2070
Public Pension Expenditure							
Baseline	13.4	13.8	14.8	13.9	13.2	13.5	13.9
Higher life expectancy (2 extra years)	0.0	0.0	0.1	0.1	0.0	0.1	0.2
Higher lab. productivity (+0.25 pp.)	0.0	0.0	0.0	-0.3	-0.6	-0.9	-1.0
Lower lab. productivity (-0.25 pp.)	0.0	0.0	0.0	0.3	0.7	0.9	1.1
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.4	-0.3	-0.3	-0.2	-0.2
Lower emp. rate (-2 pp.)	0.0	0.1	0.4	0.4	0.3	0.2	0.2
Higher emp. of older workers (+10 pp.)	0.0	-0.3	-2.1	-1.5	-1.3	-1.2	-1.1
Higher migration (+20%)	0.0	-0.1	-0.3	-0.4	-0.4	-0.4	-0.4
Lower migration (-20%)	0.0	0.1	0.3	0.4	0.5	0.5	0.5
Lower fertility	0.0	0.0	0.0	0.3	0.7	1.2	1.9
Risk scenario	0.0	0.1	0.5	0.7	0.6	0.6	0.6
Policy scenario: linking retirement age to increases in life expectancy							
Total Pension Expenditure							
Baseline	13.4	13.8	14.8	13.9	13.2	13.5	13.9
Higher life expectancy (2 extra years)	0.0	0.0	0.1	0.1	0.0	0.1	0.2
Higher lab. productivity (+0.25 pp.)	0.0	0.0	0.0	-0.3	-0.6	-0.9	-1.0
Lower lab. productivity (-0.25 pp.)	0.0	0.0	0.0	0.3	0.7	0.9	1.1
Higher emp. rate (+2 pp.)	0.0	-0.1	-0.4	-0.3	-0.3	-0.2	-0.2
Lower emp. rate (-2 pp.)	0.0	0.1	0.4	0.4	0.3	0.2	0.2
Higher emp. of older workers (+10 pp.)	0.0	-0.3	-2.1	-1.5	-1.3	-1.2	-1.1
Higher migration (+20%)	0.0	-0.1	-0.3	-0.4	-0.4	-0.4	-0.4
Lower migration (-20%)	0.0	0.1	0.3	0.4	0.5	0.5	0.5
Lower fertility	0.0	0.0	0.0	0.3	0.7	1.2	1.9
Risk scenario	0.0	0.1	0.5	0.7	0.6	0.6	0.6
Policy scenario: linking retirement age to increases in life expectancy							

Source: Commission Services

The increasing effect of higher life expectancy on public pension expenditure is dampened by the linkage in retirement age to life expectancy and the life expectancy coefficient (sustainability/adjustment factor which decreases the benefit levels) that are in place. However, these policies do not remove all the effects of the rising life expectancy on expenditure. First, the old-age retirement age does not increase as much as life expectancy as the linkage is such that the time spent working in relation to the time spent in retirement will remain constant. Secondly, the life expectancy coefficient does not adjust the pension levels of those who have already retired. Furthermore, the life expectancy coefficient does not apply to pensions paid by the Social Insurance Institution of Finland (KELA).

The effect of higher labour productivity is in line with the resulting higher GDP and its denominator effect leading to a decrease the pension expenditure relative to GDP over the long-term. The purchasing power of the pensions in payment would increase to some extent

due to partial (20%) indexation to wages while relative to average earnings their level would decrease for the same reason. However, level of new pensions will increase due to higher pensionable earnings. In the long term, the contribution rate for private sector employees' pension scheme (TyEL) would be below that of the baseline projection. The effect of the lower labour productivity is similar but opposite in direction.

The effect of the higher employment rate is rather limited in the long run although it is stronger at the beginning. This is mostly because the higher employment rate increases GDP which decreases the pension expenditure relative to GDP. However, the higher employment rate means also higher accrued pension benefits and this phenomenon will increase pension expenditure in the long term offsetting some of the positive effects. The effect of the lower employment rate is similar but in the opposite direction.

The scenario with a 10% higher employment rate of older workers has a large downward impact on public pension expenditure relative to GDP as it results in both higher GDP as well as fewer inactive persons and pensioners in the older age groups and thus lower pension expenditure. The downward effect gradually diminishes over time (i.e. after 2030) due to the higher accrued benefits. The effect is so large because the probabilities to retire on old-age and disability pensions have to decrease by some 80% in certain age groups in order to achieve the assumed remarkable change in employment of older workers. Especially the disability pension expenditure decreases as the decrease in old-age pension expenditure is limited due to the increment for deferred retirement.

Lower migration would increase pension expenditure relative to GDP to some extent. This is mostly due to the decrease in the denominator (GDP). The change in the numerator (pension expenditure) is far smaller. This is because a large part of the immigrants, who typically enter the country at a young age, have not yet reached the eligibility age for the old age pension before 2070. The higher migration scenario has similar effects, though with the opposite sign. It should be noted that the assumption on the employment rate of the migrants has an important effect on these results.

The impact of lower fertility rates is similar to lower migration but even more pronounced. The lower fertility scenario leads to a substantial increase in public pension expenditure relative to GDP, largely due to the drop in GDP (the denominator). This is only partially offset by a small negative effect on pension expenditure (the numerator) via disability and survivor schemes, none of new-borns reaches the eligibility age for the old age pension before 2070.

The policy scenario is similar to baseline scenario as the retirement will be linked to increases in the life expectancy as of 2030. Hence, this scenario is not presented in Table 17.

In addition to these sensitivity scenarios, it is worth mentioning that the rate of return on pension funds' assets has a strong impact on the financial sustainability of the Finnish pension system as the pension assets and their returns are important share of the revenues of the system (dividend and interest income of pension funds was 1.6% relative to GDP in 2016 despite the low interest rates).

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

The increase of public pension expenditure relative to GDP is somewhat higher in the AR2018 projection than in the AR2015 projection (Table 18). There are several reasons behind this phenomenon but one important aspect is the prolonging of the projection period from 2060 to 2070 as pension expenditure relative to GDP is projected to rise during the decade in question by 0.43 percentage points (Graph 8 in section 3.2.).

Table 18 - Average annual change in public pension expenditure to GDP during the projection period under the 2001, 2006, 2009 and 2012 projection exercises

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	3,33	8,76	-3,07	-0,89	-0,85	:	-0,61
2009 **	3,33	8,69	-3,14	-0,61	-0,86	:	-0,74
2012 ***	3,19	8,57	-3,20	-0,54	-0,90	-0,01	-0,73
2015****	0,06	6,29	-2,61	-0,35	-2,85	0,00	-0,43
2018*****	0,56	6,57	-2,57	-0,71	-1,87	0,01	-0,88

* 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060; *****2016-2070

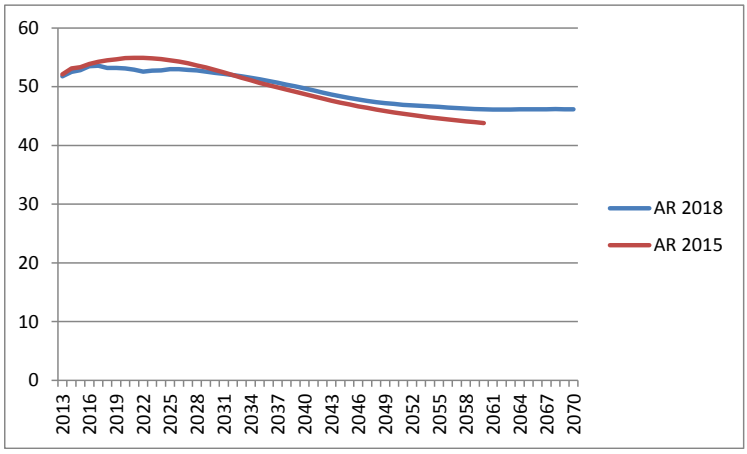
Source: Commission Services

(Explanatory note: The Table presents the average annual change of pension expenditure and the contributions of the underlying component to that change, whereas Table shows, for different intervals of time, the decomposition, in percentage points, of the factors behind the change in public pension expenditures. Please note that the four components do not add up because of a residual component.)

When analysing the subcomponents in Table 18 the effect of dependency ratio is evident. Compared to AR 2015 the large positive dependency ratio rate effect is even larger as the projection period is prolonged and the population projection is less favourable. The considerable negative coverage ratio effect has remained stable since the last projection round and the same pertains for negligible labour intensity effect.

The benefit ratio effect is now less negative compared to the previous projection round. At the beginning of projection period, the benefit ratio is lower in AR2018 than in AR2015 but in the 2030s the situation turns around (Graph 14). At the end of the projection the benefit ratio is clearly higher than in the previous projection. One reason for this is the change in interpretation of constant policy increases benefit levels as the national and guarantee pensions are indexed fully to wages (previously they were indexed 50% to prices and 50% to wages also known as the Swiss rule). In addition, the 2017 pension reform increases the benefit levels by encouraging longer careers. Despite this, the reform overall lowers pension expenditure relative to GDP significantly as reflected in the larger negative employment and residual effects (vis-à-vis the AR 2015 projection). The latter is caused by the career shift effect (see table 9a).

Graph 14: Total benefit ratio in AR 2018 and AR 2015 projections



The decomposition of the difference between 2015 and the new public pension projection is reported in Table 19 and in Graph 15. The main reason for the difference is naturally the 2017 pension reform. The effect of the reform is interpreted as the difference between the AR 2015 policy scenario, which was calculated according to the reform proposal, and the AR 2015 baseline scenario. There were some shortcomings in the modelling of the pension reform in the AR 2015 policy scenario as the increase in the retirement age had to be done in whole years which caused bumps to the projection. In this projection round the pension reform is modelled more properly so the component "improvement in the modeling" includes minor effects of the pension reform in some years.

Table 19 - Decomposition of the difference between 2015 and the new public pension projection (% of GDP)

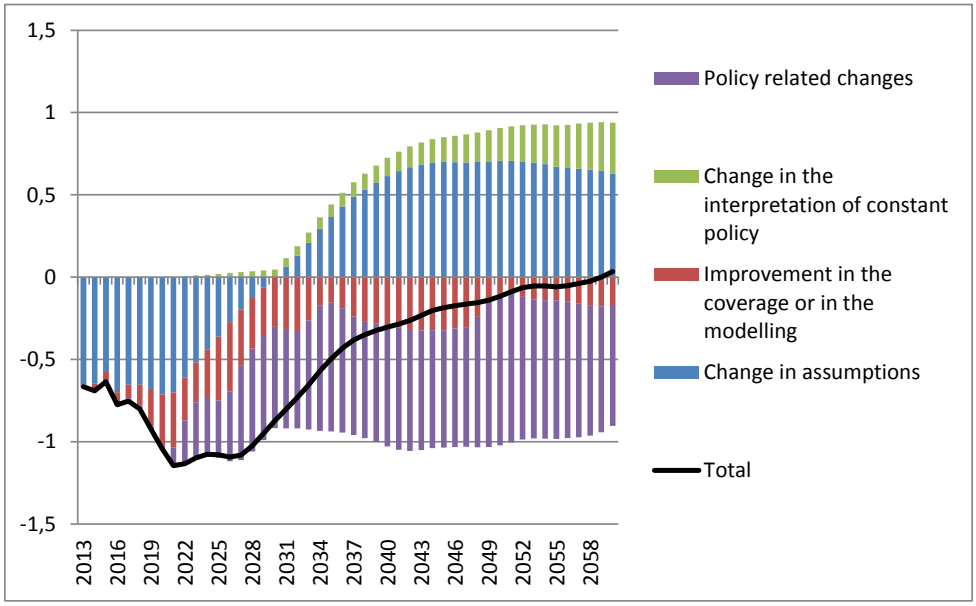
	2016	2020	2030	2040	2050	2060
Ageing report 2015	14.1	14.8	15.6	14.2	13.3	13.5
Change in assumptions	-0.7	-0.7	0.0	0.6	0.7	0.6
Improvement in the coverage or in the modelling	-0.1	-0.3	-0.3	-0.3	-0.1	-0.2
Change in the interpretation of constant policy	0.0	0.0	0.0	0.1	0.2	0.3
Policy related changes	0.0	0.0	-0.6	-0.7	-0.9	-0.7
New projection	13.4	13.8	14.8	13.9	13.2	13.5

Source: Member State

The change in assumptions (i.e. labour productivity, demographic development and employment) is also important reason for the difference. In the AR 2015 projections the level of GDP in current prices was underestimated for the near future so the pension expenditure relative to GDP is lower until the early 2020s. However, the pension expenditure relative to GDP will increase considerably in the long term due to slower labour productivity growth and more unfavorable development of old-age dependency ratio compared to the AR 2015 projection.

The interpretation of constant policy has changed as the minimum or non-contributory pensions (i.e. national and guarantee pensions) are in this projection indexed fully to wages as of 2022 but in the previous AR2015 projections these pensions are adjusted by an index where the weight of consumer prices is 50% and that of wages 50%.

Graph 15: Decomposition of the difference between 2015 and the new public pension projection (% of GDP)



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

4.1. Institutional context in which those projections are made

The Finnish Centre for Pensions runs the earnings-related model, and the Social Insurance Institution of Finland runs the national pension model. There is no formal national peer review of the projections other than review experts in the Ministry of Finance, Finnish Centre for Pensions and the Social Insurance Institution of Finland.

4.2. Assumptions and methodologies applied

The results of this fiche have been calculated using the long-term projection model of the Finnish Centre for Pensions. The model simulates the functioning of the Finnish pension system and can be used to make projections for the purposes of planning and forecasting.

4.3. Data used to run the model

The earnings-related projection model requires the following data to describe the initial situation, specified by pension act as well as by the age and gender of the insured:

1. population distribution over different acts and different states under the acts
2. salaries of the insured
3. amounts of pension accrued
4. technical provisions and the amount of pension assets
5. amounts of the pensions payable
6. transition probabilities between different states

Figures describing the initial values for the projection (2015) come from the Finnish Centre for Pension's employment and pension registers, the joint statistics of the Social Insurance Institution and the Finnish Centre for Pensions, the Local Government Pension Institution and the State Treasury.

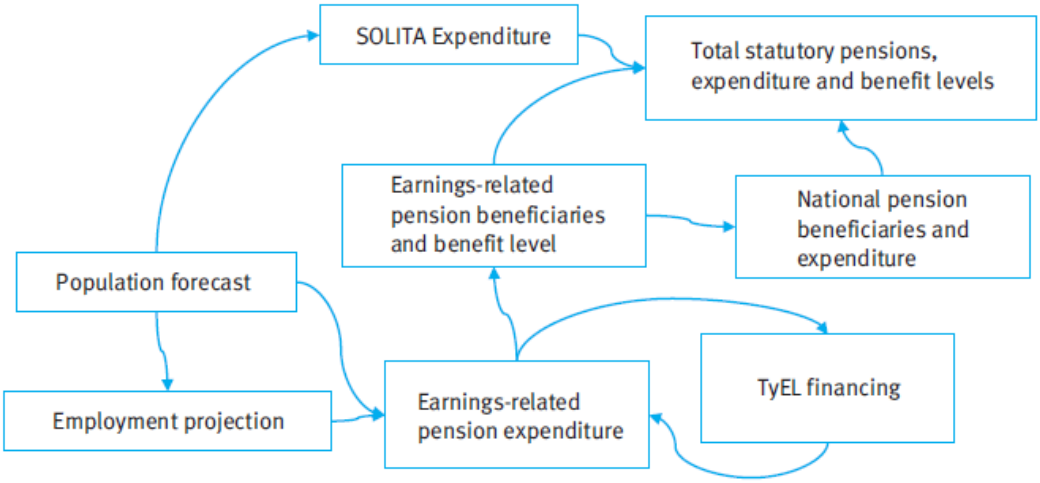
4.4. Reforms incorporated in the model

Please see above (section 1.2.) the reference to the reforms made into the earnings-related model and to the national pension scheme.

4.5. General description of the model(s)

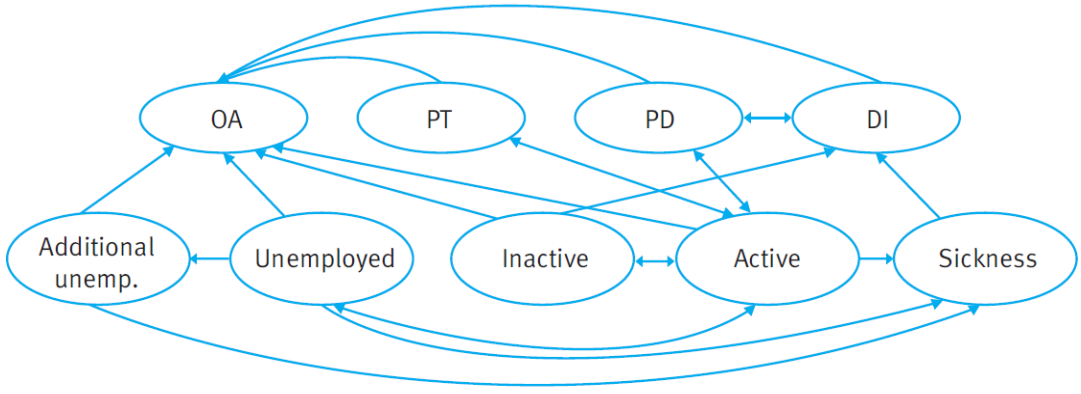
The results concerning the earnings-related pensions have been calculated using the long-term planning model of the Finnish Centre for Pensions. The model is deterministic and replicates the functioning of the earnings-related pension scheme. The model consists of several interconnected modules (Graph 16).

Graph 16: Modules of the projection model.



The earnings-related pension expenditure module. Earnings-related pension expenditure is projected separately for each earnings-related pension act. Pensions are paid out to pensioners on an annual basis, insured persons accrue future pensions, and persons move between different states (employed, unemployed, pensioner etc.) according to given probabilities. The model's states and transitions between these states are presented in Graph 17. Unemployment pensions were eliminated in 2011. In the future, the transition from unemployment will be made directly to old-age pension.

Graph 17: Modules of the projection model.



OA = old-age pension PT = part-time pension PD = partial disability pension DI = disability pension

Those active in the model are in gainful employment, their earnings accrue a pension, and their contributions are levied on the basis of the earnings. The unemployed are divided into three different states in the model. Persons aged less than 61 who receive an earnings-related unemployment allowance are categorized as unemployed. Long-term unemployed persons aged over the age of 61 are entitled to an earnings-related unemployment allowance for additional days until their pension starts. These two groups of unemployed accrue an earnings-related pension during their periods of unemployment.

Other unemployed persons do not accrue a pension (currently about half of the unemployed) and they are categorized as inactive. Persons transferred to the category of inactive also

include those who exit the labour force, and those who transfer from work covered by the act under observation to work covered by some other act. The inactive are those persons who have accrued a pension under the act under observation, but who no longer work in a job covered by this act, and who are not drawing a pension.

In addition to the transitions presented in Graph 17, new employees are added, on an annual basis, to the active category in accordance with population and employment forecasts. Persons in each state also die over the course of a year, and some of these deaths result in the award of a survivor's pension to living family member(s).

Within the model's states, people are grouped by the age and gender. An average technique is applied in these groups. For example, all 50-year-old men working in employment contracts covered by TyEL are assumed to be identical to each other. It is easier to use an average modelling technique as opposed to an individual-level projection, but at the same time it produces less information. For example, a distribution of pensions by size cannot be calculated.

The average technique used by the model does not prevent capturing the selectiveness of transitions between different states. The following phenomena have been included to the model:

1) Accrued pension and salary for projected pensionable service for those transferring to disability pension are typically lower than for those continuing in gainful employment.

2) The mortality for persons drawing a disability pension is higher than the average for the population in general, while the mortality for non-disabled persons is correspondingly lower.

3) Among old-age pensioners, a large pension is associated with low mortality when age and gender are taken in the account.

4) Pension accruals for those dying while still within the active age range are lower than average for the insured.

The private sector employees' act (TyEL) financing module is used to calculate the development of TyEL's contribution rate, technical provisions and assets. It contains a detailed description of the legislation and the bases of calculation pertaining to TyEL financing.

The financing module is joined to the TyEL expenditure module via a two-way connection: TyEL expenditure and wage sums affect the contribution level, and also affect the formation and dissolution of technical provisions. Conversely, the size of the employee's pension contribution affects pension accrual and therefore pension expenditure. Premium income is composed of a pooled component, a funded component and a remaining component which contains operating expenses and client bonuses. The pooled component is used to finance pay-as-you-go pensions, and the funded premium income is accumulated into technical provisions for the pension providers. Technical provisions are also dissolved to finance annually paid pensions. Since the required amounts of technical provisions are calculated per age group for each calendar year, the age-specific allocation of old-age pension liability supplements can be investigated with the help of the model.

The number of earnings-related pension recipients and the average earnings-related pension are calculated once the pension expenditure of all earnings-related pension acts is

known. The number of insured persons and earnings-related pension recipients is calculated by pooling all the earnings related pension schemes together. This projection is analogous to the scheme specific projections, but it encompasses all the insured persons and all pensioners in Finnish earnings related pension schemes.

In the national pension module, the number and the size of national pensions is calculated. The earnings-related pension projection serves as a basis for determining the national pensions. However, the model does not provide information on the size distribution of earnings-related pensions. Therefore, in order to calculate national pensions, it is assumed that the shape of the commencing earnings-related pension distribution remains unchanged across time.

The model allows the national pension index to be a pure price index, a pure earnings level index or a weighted average of these indexes. Since the 2008 increase, no decisions have yet been made regarding the next general increase in the national pension scheme. Historically, however, the practice has been to occasionally increase the real value of national pensions. In the baseline projection, increases have been taken into account by assuming that the national pension index is equal to half of price growth plus half of average earnings growth.

The SOLITA[10] module is a simple description of the development of SOLITA expenditure based on a population forecasts. The starting point for the projection is current SOLITA expenditure, by age and gender. For those of active age (18-62-year olds), SOLITA pensions grow at the same rate as the general wage level. For those who are 63 or older, SOLITA pensions grow at the same rate as the earnings-related pension index.

The national pension model

The national pension model that The Social Insurance Institution of Finland runs, estimates the total national pension expenditure and the number of recipients of the national pension. Old-age, disability, survival and guarantee pensions are treated separately. The model is deterministic and uses the population and employment forecasts as well as the information of changes in consumer prices and average earnings growth.

In order to determine the number of recipients of the national pension and guarantee pension, the total number of pensioners is first estimated. The number of the new national pensioners is calculated from the total number of the new pensioners using the distribution of earnings-related pension income. The shape of the distribution is not assumed to change over the time. The level of average earnings-related pensions is assumed to change in the future like in the near past considering the changes in average income and employment rates.

In the average level of the national pension in different age groups, the long-term changes in the employment level and the changes of the average wages is taken into account. In the model the level of the national pension is indexed to the one half of the price growth plus one half of the average earnings growth. Using the earnings growth in the indexation simulates the occasional increases of the real level of the national pension.

[10] SOLITA-pensions refer to military accident and injury, traffic insurance and accident insurance laws.

4.6. Additional features of the projection model

- Number of different persons modelled per generation.

The model is an average aggregate model, in which people are divided into two genders and ca. 20 population states corresponding to workers, unemployed persons, retirees etc. Persons are not simulated on an individual level.

- How is the replacement rate of new retirees calculated?

Total gross replacement rate is calculated by dividing the amount of new pensions (earnings-related old age pensions, earnings-related disability pensions and national pensions) by the number of new pensioners (pensioners who get earnings related pension and those who get only national pension). This number is divided by the economy-wide average wage at retirement to old age pension. It is assumed that persons, who do not get earnings-related pension, do not work before retirement which lowers the average wage at retirement.

Replacement rates of the earnings-related pension scheme are calculated by dividing the amount of new pensions by the number of new earnings-related pensioners. This number is divided by the economy-wide average wage at retirement.

- How are careers being modelled?

The employment projection is based on the population forecast, the assumed long-term equilibrium unemployment rate, and estimated entry and exit rates that depict changing labour force participation.

- How are survivors pension being calculated?

The average size and number of new earnings-related survivors' pensions is calculated based on pensioners and people with pension entitlements dying during the same year. The age of the surviving spouse depends on the age and gender of the deceased. Survivors' pensions are indexed to the earnings-related pension index and the mortality difference of survivors and the whole population is assumed to stay unchanged.

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

The statutory retirement age is raised from 63 to 65 during the years 2018–2027. After 2030, the statutory retirement age is linked to life expectancy as described in section 1.2. The expected effective retirement age for a given year is calculated as the age at which people would retire on average, if the age-specific retirement and mortality rates would remain unchanged. Hence, it is not affected by changes in demography.

References

Tikanmäki, H., Appelqvist, J., Reipas, K., Sankala, M. & Sihvonen, H. (2017), *Statutory pensions in Finland – Long-term projections 2016,* Finnish Centre for Pernsions, Reports 2/2017. http://www.etk.fi/wp-content/uploads/Statutory_pensions_in_Finland_Long_term_projections_2016.pdf

Methodological annex

Economy-wide average wage at retirement

The evolution of economy-wide average wage at retirement is discussed in the section 3.3 in the same breath as the evolution of replacement rate is analysed.

Table A1 – Economy wide average wage at retirement evolution (in thousands euro)

	2016	2020	2030	2040	2050	2060	2070
Economy-wide average wage	37.8	40.2	54.4	74.9	105.9	150.4	213.6
Economy-wide average wage used in pension model	36.9	39.7	53.1	73.0	103.9	148.9	212.4
Economy-wide average wage at retirement	41.7	45.5	58.4	79.0	110.4	156.4	221.0

Source: Commission Services

Pensioners vs Pensions

Total number of pensioners sums up from the subcategories so that people getting some sort of minimum pension are calculated only once. Hence, the number of pensioner receiving minimum pensions is the number of people receiving *only* guarantee pension or national pension. These pensioners do not receive earnings-related pension at all and those who receive also earnings-related pension are included only in the category of earnings-related pensioners. The same logic is used also with disability pensioners.

For the numbers of pensions it is done on the contrary: If the pensioner gets at the same time earnings-related pension and national or guarantee pension he/she is calculated twice. However, if the pensioner gets at the same time guarantee pension and national pension (the two types of minimum pension) he/she is calculated only once.

Pension taxation

As for net total pension expenditure, an assumption of a constant tax ratio of 21.5% has been used based on tax revenues from pension income in 2016.

Disability pension

Age-specific incidence rates for disability pensions have decreased steadily since the 1990s. This trend is assumed to continue into the future. However, as the retirement age rises, more people face the risk of having to retire on a disability pension. Consequently, the average age and the number of people retiring on a disability pension increases. Disability pensions are transformed into old-age pensions at the statutory retirement age or at most two years later for public sector pensions.

Table A2 – Disability rates by age groups (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	1.4	1.2	1.1	1.1	1.0	1.0	1.0
Age group 55-59	11.9	10.6	9.2	8.5	8.3	8.2	8.4
Age group 60-64	14.5	15.1	19.0	18.0	17.3	17.2	17.4
Age group 65-69	0.0	0.0	0.5	4.3	6.7	11.6	14.9
Age group 70-74	0.0	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	0.0

Source: Member State

Survivor pensions

See section 4.6.

Non-earnings related minimum pension

After the maturation of the earnings-related pension scheme, the level and coverage of the earnings-related pensions have increased. The share of the minimum pensions provided by the Social Insurance Institution of Finland in total pension expenditure has dropped to less than 10 percent, and the ratio of its pension expenditure to GDP has nearly halved since 1990. Despite the fact that a new minimum pension scheme, the guarantee pension, was introduced in 2011.

Mortality among persons receiving a national old-age pension is, standardised for age and sex, higher than in the general population. Mortality is assumed to follow the same rate of decline as estimated in the population projection. The relative difference to mortality in the general population is retained. Furthermore, particularly among men, mortality is more pronounced in those receiving a higher-than-average national pension.

The main factors that influence the expenditures of the minimum pensions are indexation and the pension reform 2017. The projection assumes that the minimum pensions are increased by real wage growth starting from 2022. The higher level of minimum pensions leads to higher number of recipients and higher total expenditures. On the other hand the pension reform affects the other direction with the higher level of the earnings-related pensions and the rising age limits decreasing the number of minimum pension recipients.

With indexation assumption used in projection the ratio of minimum pension expenditure to GDP will remain roughly at its current level in projection period.

Contribution

See section 3.4.

Alternative pension spending decomposition

TableA3 and Table A4 are equivalent to Table 9a and Table 9b.

Table A3 - Factors behind the change in public pension expenditures between 2013 and 2070 (in percentage points of GDP) - pensions

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	0.4	1.0	-0.9	-0.7	0.3	0.4	0.6
Dependency ratio effect	1.4	2.6	0.4	0.9	1.7	0.9	7.9
Coverage ratio effect	-0.7	-1.1	-0.1	-0.2	-0.2	0.0	-2.3
*Coverage ratio old-age**	*-0.3*	*-0.3*	*0.0*	*0.0*	*0.0*	*0.2*	*-0.3*
*Coverage ratio early-age**	*-0.3*	*-2.4*	*-1.5*	*-0.6*	*-0.4*	*-0.2*	*-5.4*
*Cohort effect**	*-1.5*	*-2.4*	*0.3*	*-0.3*	*-1.0*	*-0.3*	*-5.1*
Benefit ratio effect	0.0	0.1	-0.8	-0.7	-0.2	-0.1	-1.7
Labour Market/Labour intensity effect	-0.3	-0.1	-0.1	-0.3	-0.4	-0.1	-1.2
Employment ratio effect	*-0.3*	*0.0*	*-0.1*	*-0.1*	*-0.1*	*-0.1*	*-0.7*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Career shift effect	*0.0*	*0.0*	*-0.1*	*-0.2*	*-0.2*	*-0.1*	*-0.6*
Residual	-0.1	-0.5	-0.2	-0.3	-0.6	-0.3	-2.1

Source: Commission Services

Table A4 - Factors behind the change in public pension expenditures between 2013 and 2070 (in percentage points of GDP) - pensioners

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	0.4	1.0	-0.9	-0.7	0.3	0.4	0.6
Dependency ratio effect	1.4	2.6	0.4	0.9	1.7	0.9	7.9
Coverage ratio effect	-0.3	-0.9	-0.3	-0.3	-0.3	-0.1	-2.2
*Coverage ratio old-age**	*0.1*	*-0.1*	*-0.1*	*-0.2*	*-0.2*	*0.0*	*-0.5*
*Coverage ratio early-age**	*-0.6*	*-2.6*	*-1.4*	*-0.6*	*-0.3*	*0.0*	*-5.5*
*Cohort effect**	*-1.5*	*-2.4*	*0.3*	*-0.3*	*-1.0*	*-0.3*	*-5.1*
Benefit ratio effect	-0.3	-0.2	-0.7	-0.6	-0.1	0.1	-1.8
Labour Market/Labour intensity effect	-0.3	-0.1	-0.1	-0.3	-0.4	-0.1	-1.2
Employment ratio effect	*-0.3*	*0.0*	*-0.1*	*-0.1*	*-0.1*	*-0.1*	*-0.7*
Labour intensity effect	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Career shift effect	*0.0*	*0.0*	*-0.1*	*-0.2*	*-0.2*	*-0.1*	*-0.6*
Residual	-0.1	-0.4	-0.2	-0.4	-0.6	-0.3	-2.1

Source: Commission Services