

Part 1 Overview of the pension system

Elements in the Norwegian public old age pension system

The Norwegian old age pension system consists of the following elements:

- A universal public old age pensions system
- Mandatory government occupational pension schemes
- Mandatory (as from 2006) private sector occupational pension schemes
- Private individual pension schemes.

Public (social security) old age pensions include a minimum income guarantee and an earnings-based benefit. It is financed on a pay-as-you-go basis. With retirement at age 67, before-tax replacement rate for pensioners with average income amounts to 51 pct. in the reformed old age pension system. After tax replacement rate, including supplementary pensions, amounts to 72 pct.

The present public old age pension system was approved by the Norwegian Parliament in 2009, following settlements in the Parliament 2005 and 2007. One part of the reformed system is a new model for accumulating pension entitlements which will be introduced gradually for cohorts born after 1953 and fully for cohorts born after 1962. Accumulated entitlements, the pension wealth, is given by (1) below.

$$(1) \quad W_A = \alpha \cdot \sum_{i=0}^{A-1} I_i \cdot (1+r)^{A-i}$$

W_A pension wealth by time of retirement A

α rate of earning of pension entitlements (18,1 per cent of pensionable income up to a ceiling of 7,1 times the basic amount (ceiling corresponds to approximately 115 per cent of average wage for full time employee in 2010)

I_i pensionable income by age i (pension entitlements can be earned from age of 13 till age of 75)

r nominal interest rate (set equal to nominal wage growth) for adjustment of pension entitlements

Linking benefits to entitlements, the present public old age pension system introduces life expectancy adjustment of pensions, flexible retirement from the age of 62 (provided the pension level exceed the level of the guarantee pension at the age of 67), and rules for indexation of pensions coming into effect from 2011. At the time of retirement, the annual pension benefit ($B_{K,A}$) is calculated by dividing the accumulated pension entitlements by an annuity divisor ($\Phi_{K,A}$) mainly reflecting remaining life expectancy, see (2) below.

$$(2) \quad B_{K,A} = \frac{W_A}{\Phi_{K,A}} = \frac{W_A}{\sum_{x=A}^{\infty} p_{K,A,x} \cdot \frac{(1+w)^{x-A} \cdot (1-u)^{x-A}}{(1+r)^{x-A}}} = \frac{W_A}{\sum_{x=A}^{\infty} p_{K,A,x} \cdot (1-u)^{x-A}}$$

$p_{k,A,x}$ average of the probabilities of person from cohort K surviving to respectively x and $x+1$ years from age of retirement A

r nominal interest rate (set equal to nominal wage growth) for calculating present values of pension benefits

w nominal wage growth applied for regulation of pension benefits

u fixed adjustment factor (0,75 per cent per year) subtracted from nominal wage growth in regulating pension benefits

The new system converts the implicit pension wealth of accumulated entitlements into an annuity over the average expected remaining lifetime. An increase in life expectancy reduces the annual benefit so that the present value of total expected pension benefits is nearly invariant to changes in the cohort's remaining life expectancy and the individual's retirement age.¹ Thus, in the present system, the expenditure risk associated with increases in longevity is shifted from tax payers to each cohort of pensioners.

Life expectancy for a cohort is calculated on the basis of period mortality in the decade preceding the cohort reaching 60 years of age. This rule is also applied in the projections.

Taking into account the annuity divisor and the fixed annual adjustment factor subtracted from nominal wage growth, annual pension benefits may be expressed by

$$(3) \quad B_{K,A,x} = \frac{W_A}{\Phi_{K,A}} = \frac{W_A}{\sum_{x=A}^{\infty} p_{K,A,x} \cdot (1-u)^{x-A}} \cdot [(1+w) \cdot (1-u)]^{x-A}$$

The reformed system also introduces increased flexibility by allowing continued employment for old age pensioners, without reductions in the pensions.

Other old age pensions

The **government occupational pension schemes** supplement public old age pension system by guaranteeing government sector employees gross pension benefits of at least 2/3 of final gross wages from the age of 67, given at least 30 years of service.

The central government occupational pension scheme is financed by employee contributions (2 per cent of wages) and transfers from the state budget. Local government occupational pension schemes are funded systems, with premiums from employees at 2 per cent of wages and additional funding provided by employers. The pension funds may be administered by insurance companies or locally.

Government occupational pensions are not included in the projections. The expenditures currently amounts to approximately 1 per cent of Mainland GDP in 2013

Mandatory private sector occupational pension were introduced in 2006, but non-mandatory defined benefit schemes (and since 2001 also defined contribution schemes) have existed for a long time. The introduction was a part of the pension reform process. As the system matures, the private sector occupational pension schemes ensure supplementary pensions also to private sector employees. The legislation on mandatory private sector occupational schemes covers the entire private sector. Under the legislation, it is possible to choose between three occupational schemes; defined benefits (DB) scheme, a defined contribution scheme and a mixed system (DC when employed, DB after retirement).

In the old age public (social security) pension system, statutory retirement age and earliest retirement age, are both 67 years. The new system, which came into effect 1. January 2011, introduces flexible retirement from the age of 62. The information on statutory age under the new system in table 1 reflects limitations to the flexibility. Guarantee pension alone can be drawn only from the age of 67 and disability pensioners will not become old age pensioners before the age of 67. 67 years also functions as a reference age for calculation of annuity divisors, compared to the old system retiring earlier than 67 years in 2010 implies a reduction in annual pension payments.

¹ Reduced mortality for persons below 62 years will, through the associated reduction in the distribution of pension entitlements to survivors, contribute marginally to an increase in the annuity divisor towards 2060.

Table 1 Statutory retirement age, earliest retirement age and penalties/ bonuses for early/ late retirement

		2013	2020	2030	2040	2050	2060
Men - with 20 contribution years	statutory retirement age	67	67	67	67	67	67
	earliest retirement age	62	62	62	62	62	62
	penalty in case of earliest retirement age	67 years functions as a reference age for calculation of annuity divisors					
	bonus in case of late retirement	67 years functions as a reference age for calculation of annuity divisors					
Men - with 40 contribution years	statutory retirement age	67	67	67	67	67	67
	earliest retirement age	62	62	62	62	62	62
	penalty in case of earliest retirement age	67 years functions as a reference age for calculation of annuity divisors					
	bonus in case of late retirement	67 years functions as a reference age for calculation of annuity divisors					
Women - with 20 contribution years	statutory retirement age	67	67	67	67	67	67
	earliest retirement age	62	62	62	62	62	62
	penalty in case of earliest retirement age	67 years functions as a reference age for calculation of annuity divisors					
	bonus in case of late retirement	67 years functions as a reference age for calculation of annuity divisors					
Women - with 40 contribution years	statutory retirement age	67	67	67	67	67	67
	earliest retirement age	62	62	62	62	62	62
	penalty in case of earliest retirement age	67 years functions as a reference age for calculation of annuity divisors					
	bonus in case of late retirement	67 years functions as a reference age for calculation of annuity divisors					

¹⁾ Statutory retirement age in old system, reference age in the new system

²⁾ Pension reform with flexible age of retirement from 62 years coming into effect in 2011

Source: MoF

Disability pensions

The purpose of disability benefits is to ensure sufficient income for subsistence for people whose earning ability is permanently impaired by at least 50 per cent due to illness, injury or defect. Disability pensions are granted if there are no prospects of an improvement in earning ability. Disability pension is for the most part calculated in the same way as the old-age pension. Disability pension is in principle a permanent benefit, but it can be reassessed if changes take place in the income and health of the recipient. Recipients of disability pension who reach the age of 67 will automatically have their pension converted to an old-age pension.

The number of persons receiving disability pensions (304 000) measures up to 9,7 per cent of population in the age group 20 – 66 (from age 67 disability pensioners become old age pensioners) in 2013. This contributes to a high level of disability pensions expenditures in 2013 (2,8 per cent measured as a share of Mainland GDP) compared to the EU-average.

Part 2 Demographic and labour forces projections

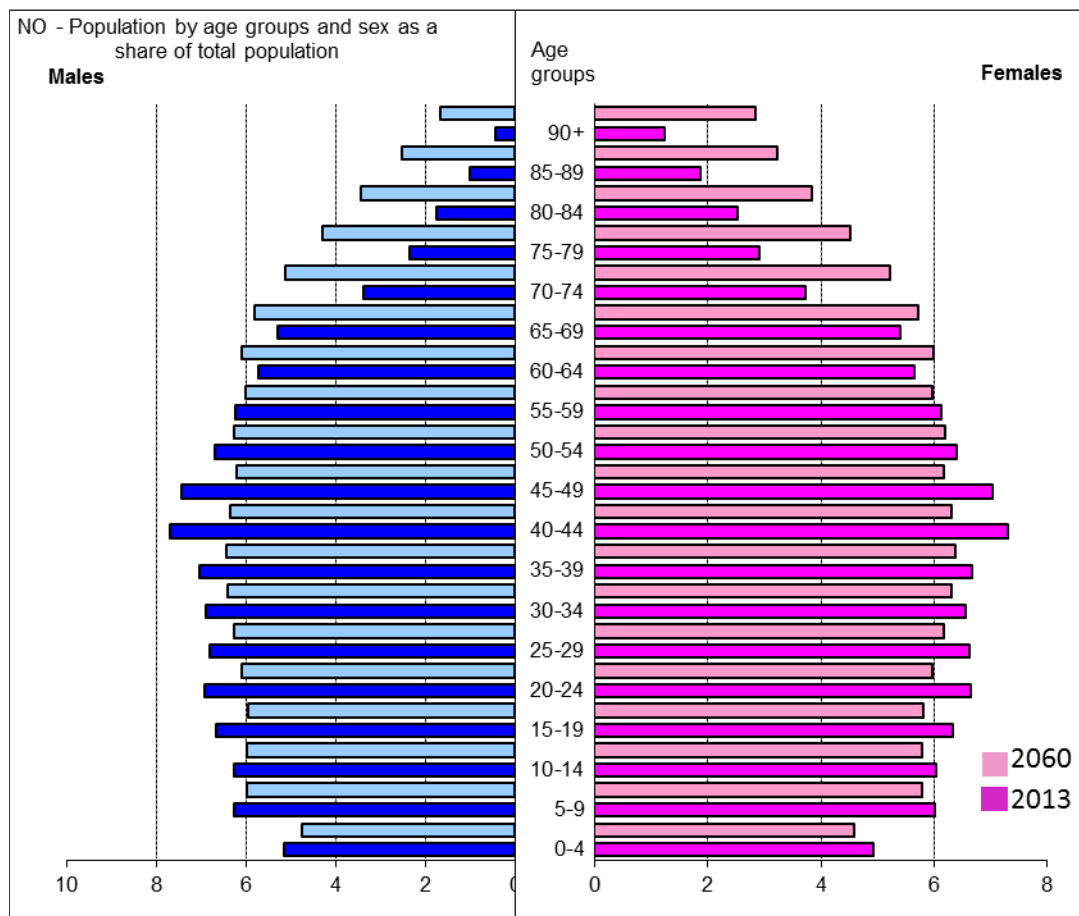
Table 2 gives an overview of the evolution in main demographic variables in line with EUROSTAT 2013 demographic projections (EUROPOP2013). Total population is projected to increase from 5,1 million persons in 2013 to 8,2 million persons in 2060. Higher immigration explains most of the increase in compared to EUROPOP2010, where total population in 2060 was projected to be 6,6 million persons. Higher immigration also seems to contribute to a less pronounced increase (15,1 percentage points from 2013 to 2060)) in the old-age dependency ratio compared to the EUROPOP2010 projections (18,8 percentage points from 2013 to 2060).

Table 2 Main demographic variables evolution

	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	5080	5588	6404	7140	7713	8153	2060
Population growth rate	1,2	1,4	1,3	0,9	0,6	0,5	2021
Old-age dependency ratio (pop65+/pop15-64)	23,9	26,5	30,2	33,7	35,1	39,0	2060
Ageing of the aged (pop85+/pop65+)	27,6	24,0	29,4	31,9	36,2	36,3	2054
Men - Life expectancy at birth	79,6	80,5	81,9	83,1	84,3	85,4	2060
Men - Life expectancy at 65	18,4	19,0	20,0	20,9	21,8	22,6	2060
Women - Life expectancy at birth	83,5	84,5	85,8	87,0	88,1	89,1	2060
Women - Life expectancy at 65	21,1	21,8	22,8	23,8	24,7	25,6	2060
Men - Survivor rate at 65+	80,6	82,8	85,6	87,9	89,9	91,5	2060
Men - Survivor rate at 80+	44,1	49,0	55,5	61,5	66,9	71,7	2060
Women - Survivor rate at 65+	90,7	91,8	93,0	94,1	95,0	95,7	2060
Women - Survivor rate at 80+	65,7	69,3	74,0	78,0	81,5	84,5	2060
Net migration	39,2	53,4	51,8	42,3	24,9	22,4	2023
Net migration over population change	0,6	0,7	0,6	0,6	0,5	0,5	2014

However, graph 1 shows how Norway also with the updated population projections is expected to share challenges related to an ageing population with EU member states.

Graph 1 Age pyramid comparison: 2013 vs 2060



The decrease in participation and employment rates from 2013 to 2060 can be traced back to demographic developments giving rise to compositional effects within the age groups covered by table 3.

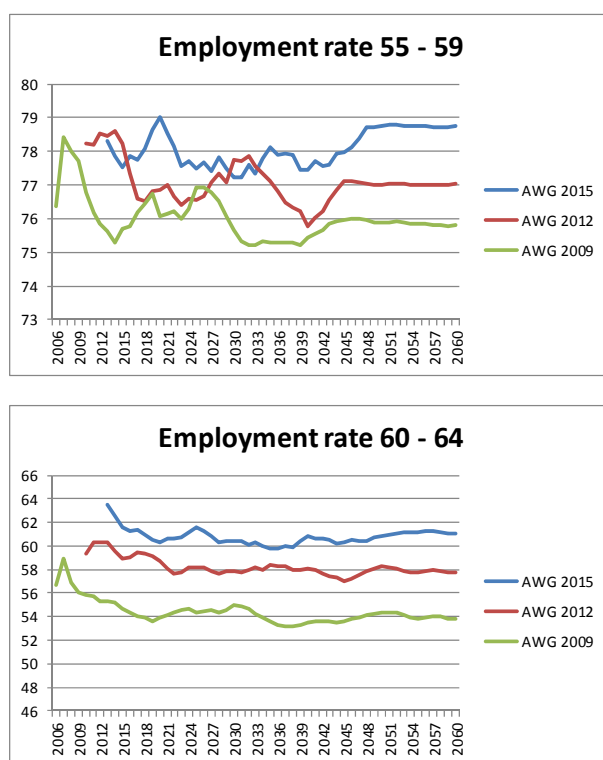
As in earlier projection rounds, no pension reform effects have been incorporated in the projections (this is in line with national projections for Norway). However, the cohort simulation method now produces a more favourable development with respect to labour market participation compared to the AWG 2012 projections. For the age group 55 – 64 the projected labour force participation rate in 2060 is revised upwards from 68,2 per cent in AWG2012 to 70,8 per cent in AWG2015.

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

	2013	2020	2030	2040	2050	2060	Peak year*
Labour force participation rate 55-64	72,1	70,9	69,8	70,4	71,1	70,8	2013
Employment rate for workers aged 55-64	71,2	70,0	68,9	69,5	70,2	69,9	2013
Share of workers aged 55-64 on the total labour force	98,7	98,8	98,7	98,7	98,7	98,7	2018
Labour force participation rate 65-74	18,3	18,2	18,4	17,5	18,0	18,2	2015
Employment rate for workers aged 65-74	18,2	18,1	18,3	17,4	17,9	18,1	2015
Share of workers aged 65-74 on the total labour force	99,3	99,4	99,4	99,4	99,4	99,4	2020
Median age of the labour force	40,0	39,0	39,0	39,0	40,0	40,0	2013

Graph 2 illustrates how projections of employment rates for the age groups 55 – 59 and 60 – 64 have been revised upwards since Norway was included in the AWG-exercise in 2009. While supporting the methodology applied for labour market projections, the uncertainties involved may be illustrated by observing that the 2009-projections implied a substantial decline in employment rates for the 55 – 59 age group from 2007 to 2010 which in retrospect was not materialized. The upward revision of 2060 participation and employment rates for the 55 – 59 years old compared to AWG12 is due to upward revisions of starting levels (60 – 64) and more favourable developments towards 2060 (55 – 59).

Graph 2 AWG-projections of employment rate 55 – 59 and 60 - 64



Source: AWG Baseline assumptions Norway (2014), Baseline Assumptions Norway (2011), Cohort Simulation Results Norway (2008)

Regarding the decrease in contribution period relative to average of effective working career in tables 4a and 4b, the following mechanisms (tentatively in decreasing order of importance) seem to be at work in the pension projections:

- The contributory period (associated with new pensioners) for immigrants (also including those who has repatriated after spending a part of their working life and Norway) will on average be shorter compared to contributory periods for persons devoting 100 per cent of heir working career in Norway. This effect increases in magnitude towards 2050 and is more pronounced for men than for women.
- For persons taking out old age pensions while continuing to work, the contributory period applies for the working career up to the time of taking out pensions.

The main point regarding immigrants is that they will spend fewer years in Norway compared to natives and accordingly obtain fewer years of accumulation of pension entitlements even if they have exact equal age and gender specific participation rates as natives (as assumed in the EU-projections).

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

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	21,5	21,1	21,1	21,1	21,1	21,1	2013
Average effective exit age (CSM) (II)	65,5	65,6	65,6	65,6	65,6	65,6	2021
Average effective working career (CSM) (II) - (I)	44,0	44,5	44,5	44,5	44,5	44,5	2014
Contributory period	38,3	37,6	35,4	32,5	30,5	31,3	2015
Contributory period/Average working career	86,9	84,4	79,6	72,9	68,5	70,4	2013
Duration of retirement **	18,4	18,2	19,1	20,0	20,9	21,7	2060
Duration of retirement/average working career	41,8	40,9	42,9	44,9	47,0	48,8	2060
Percentage of adult life spent at retirement***	27,9	27,7	28,6	29,6	30,5	31,3	2060
Early/late exit****	2,0	2,1	2,2	1,9	1,5	3,5	2059

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

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	21,2	21,5	21,5	21,5	21,5	21,5	2026
Average effective exit age (CSM) (II)	64,2	64,7	64,7	64,7	64,7	64,7	2031
Average effective working career (CSM) (II) - (I)	43,0	43,2	43,2	43,2	43,2	43,2	2014
Contributory period	32,6	36,3	36,4	36,3	34,3	35,0	2036
Contributory period/Average working career	76,0	84,1	84,4	84,0	79,4	81,1	2036
Duration of retirement **	22,0	21,8	22,8	23,8	24,7	25,6	2060
Duration of retirement/average working career	51,2	50,5	52,8	55,1	57,2	59,3	2060
Percentage of adult life spent at retirement***	32,3	31,8	32,8	33,8	34,6	35,4	2060
Early/late exit****	1,5	1,9	2,7	2,0	1,5	3,2	2059

Part 3 Pension projection results

Coverage

The projections illustrate how AWG assumptions on demographic and macroeconomic developments give rise to developments in public pension expenditures between 2013 and 2060. The projections are carried out by means of the dynamic micro simulation model MOSART developed and maintained in Statistics Norway. The model combines a detailed description of the Norwegian old age and disability pension schemes with assumptions on macroeconomic developments for projection purposes. The model

takes into account the phasing in of the reformed old age pension system from 2011, distinguishing between pensioners earning pension entitlements under the old and the reformed old age pension scheme.

The AWG-projections covers public old age, disability and survivors pensions. The results are reported as shares of Mainland GDP (also referred to as GDP in the remainder), which equals total GDP minus value added in petroleum extraction and ocean transport. Comparison between EUROSTAT official figures (ESSPROS) and Ageing Working Group (AWG) data on pension expenditure for the period 2005–2012 show differences between -0,6 and - 1,3 percentage points, se Table 5.

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

	2005	2006	2007	2008	2009	2010	2011	2012
1 Eurostat total pension expenditure	7,9	7,6	7,7	7,6	8,7	8,4	8,5	8,7
2 Eurostat public pension expenditure*	8,0	7,6	7,8	7,6	8,7	8,4	8,5	8,7
3 Public pension expenditure (AWG)	9,2	8,9	8,7	9,0	9,7	9,1	9,1	9,6
4 Difference (2) - (3)	-1,2	-1,3	-0,9	-1,3	-1,0	-0,7	-0,6	-0,9
5 Expenditure categories not considered in the AWG definition, please specify:								
5.1 GDP denominator in 2, Mainland GDP in 3	-2,3	-2,3	-2,1	-2,4	-2,0	-2,0	-2,3	-2,4
5.2 Occupational pensions, public employees	0,9	0,9	0,9	0,9	1,0	1,0	1,0	1,0
5.3 Unexplained	0,2	0,1	0,3	0,2	0,0	0,3	0,7	0,5

*Data till 2007 are those reported in the Ageing Working Group country fiche 2012

Source: Eurostat, Statistics Norway

Differences are due to:

- ESSPROS reporting pension expenditures as shares of total GDP (contributing to ESSPROS figures being 1,9 - 2,4 percentage points below AWG-figures).
- ESSPROS-data including occupational pensions to public employees (contributing to ESSPROS figures being 0,9 – 1,0 percentage points (measured as a share of Mainland GDP) above AWG-figures).

Overview of projection results

In the projections, public pensions increase from 9,9 per cent measured as a share of Mainland GDP in 2010 to 12,4 per cent 2060, see Table 6.

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

Expenditure	2013	2020	2030	2040	2050	2060	Peak year*
Gross public pension expenditure	9,9	10,7	11,3	11,4	11,6	12,4	2060
Private occupational pensions	:	:	:	:	:	:	:
Private individual pensions	:	:	:	:	:	:	:
Mandatory private	:	:	:	:	:	:	:
Non-mandatory private	:	:	:	:	:	:	:
Gross total pension expenditure	:	:	:	:	:	:	:
Net public pension expenditure	8,0	8,7	9,1	9,1	9,3	9,9	2060
Net total pension expenditure	:	:	:	:	:	:	:
Contributions	2010	2020	2030	2040	2050	2060	Peak year*
Public pension contributions	9,9	10,7	11,3	11,4	11,6	12,4	2060
Total pension contributions	:	:	:	:	:	:	:

Source: MoF, DG ECFIN

Table 7 shows that the increase is mainly due to developments in old-age pensions, while disability and survivors pensions remain fairly stable as a share of mainland GDP throughout the projection period. The decline in the share of non-earnings related old age pensions as a share of total (public) old age pensions from 2013 – 2060 is due to phasing-out of basic pensions, which is not a part of the old age public pension system coming into effect as from 1. January 2011. The former old age pension system was

replaced by a new old age pension system January 1. 2011. In the previous system pensions consisted of a basic amount (equal for all) and additional income related pensions calculated from a positive threshold income level. The new system also has a minimum guarantee pension, but income related pensions are calculated from total income (not only from income above a threshold level). Thus, total pensions will on average consist of a substantially larger fraction of income related pensions (with income related pensions covering both the basic pension and income related pensions in the previous system). With the phasing out of the old pension system the proportion of the population receiving pensions calculated as a sum of basic (non-income related) pensions and income related pensions from the previous old age pensions system will decline over time. However, also under the new system there will be a fraction of the pensioners who are just entitled to minimum/guarantee (not income related pensions) pensions. The level of this guarantee pension is comparable to the basic pension under the previous system.

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

Pension scheme	2013	2020	2030	2040	2050	2060	Peak year *
Total public pensions	9,9	10,7	11,3	11,4	11,6	12,4	2060
of which earnings related:							
Old age and early pensions	4,4	5,2	6,5	7,7	8,1	8,7	2060
Disability pensions	2,7	2,8	2,8	2,6	2,8	3,0	2060
Survivors' pensions	0,1	0,1	0,0	0,0	0,0	0,0	2015
Other pensions	:	:	:	:	:	:	:
of which non-earnings related (including minimum pension and minimum income guarantee):							
Old age and early pensions	2,7	2,7	2,0	1,1	0,7	0,7	2015
Disability pensions	:	:	:	:	:	:	:
Other pensions	:	:	:	:	:	:	:
of which							
country-specific scheme 1	:	:	:	:	:	:	:
country-specific scheme 2	:	:	:	:	:	:	:
country-specific scheme 3	:	:	:	:	:	:	:

Source: MoF, DG ECFIN

Driving forces behind the projection results

Helping to identify driving demographic and macroeconomic forces - based on the common AWG methodology - behind the pension projections, the following arithmetic decomposition has been used to link growth of the pension expenditures to developments in the dependency ratio, coverage and benefit ratios as well as the employment rate and labour intensity.

$$\begin{aligned}
 \frac{\text{PensionExp}}{\text{GDP}} &= \overbrace{\frac{\text{Population}_{65+}}{\text{Population}_{20-64}}}^{\text{DependencyRatio}} \times \overbrace{\frac{\text{Numberof Pensioners(Pensions)}}{\text{Population}_{65+}}}^{\text{CoverageRatio}} \\
 &\quad \times \overbrace{\frac{\text{Averageincomefrompensions(AveragePension)}}{\text{GDP}}}^{\text{Benefit Ratio}} \times \overbrace{\frac{\text{Population}_{20-64}}{\text{Hours Worked}_{20-74}}}^{\text{Labour Market /LabourIntensity}}
 \end{aligned}$$

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

$$\begin{aligned} & \frac{\text{Coverage Ratio}}{\text{Number of Pensioners}} = \frac{\text{Population 65+}}{\text{Population 65+}} \\ & = \frac{\text{Coverage Ratio Old-Age}}{\text{Number of Pensioners 65+}} + \left(\frac{\text{Coverage Ratio Early-Age}}{\text{Population 50-64}} \times \frac{\text{Cohort effect}}{\text{Population 65+}} \right) \end{aligned} \quad [2]$$

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

$$\begin{aligned} & \frac{\text{Labour Market / Labour Intensity}}{\text{Population 20-64}} = \frac{\text{Hours Worked 20-74}}{\text{Hours Worked 20-74}} \\ & = \frac{\text{1/ Employment Rate}}{\text{Population 20-64}} \times \frac{\text{1/ Labour intensity}}{\text{Working People 20-64}} \times \frac{\text{1/ Career shift}}{\text{Hours Worked 20-74}} \end{aligned} \quad [3]$$

Applying this decomposition in Table 8, the increase in pensions-to-GDP ratio can mainly be linked to population ageing and the associated increase in the dependency ratio. The effect is however less pronounced compared with national projections. For instance, national demographic projections provided by Statistics Norway from June 2014 imply an increase in the number persons in the age group 65+ as a share the working age population (20 - 64 years of age) from 26,7 per cent in 2013 to 46,4 per cent in 2060, whereas EUROPOP2013 gives an increase to 43,1 per cent in 2060.

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

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	0,8	0,6	0,1	0,2	0,8	2,5	0,058
Dependency ratio effect	1,0	1,5	1,4	0,4	1,3	5,6	0,118
Coverage ratio effect	-0,2	-0,4	-0,4	0,3	0,1	-0,5	-0,010
Coverage ratio old-age*	0,2	0,1	0,1	0,3	0,4	1,1	0,025
Coverage ratio early-age*	-0,5	-0,4	-0,5	0,1	0,2	-1,1	-0,023
Cohort effect*	-0,7	-1,6	-1,5	0,4	-1,1	-4,5	-0,101
Benefit ratio effect	0,1	-0,4	-0,7	-0,7	-0,5	-2,2	-0,046
Labour Market/Labour intensity effect	-0,1	0,0	-0,1	0,0	0,0	-0,2	-0,003
Employment ratio effect	-0,1	0,0	-0,1	0,0	0,0	-0,1	-0,002
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0	0,002
Career shift effect	0,0	0,0	0,0	0,0	-0,1	-0,1	-0,002
Residual	0,0	-0,1	-0,1	0,0	0,0	-0,2	-0,001

Source: MoF, DG ECFIN

The reduced coverage ratio, contributing to a decrease in the public pension to GDP ratio by 0,5 percentage points towards 2060, can be traced back to a reduction in the ratio of disability pensioners to persons 65 years and above (reflecting lower growth in number of persons 20 – 65 age group compared to number of persons 65+ age group). The reduction in the coverage ratio is dampened by including

pensioners living abroad² in the projections as well as taking into account an increased number of persons working while receiving old age pensions.

The reformed pension system, allowing for continued work while receiving old age pensions, have contributed to a relatively substantial increase in the number of old age pensioners from 2010 to 2013 not being reflected in corresponding declines in participation rates for older persons. The increase in number of persons 62 years and above receiving old age pensions while working at the same time contributes to a reducing average replacement rates compared to the replacement rates by retirement at 67 years of age. With pension wealth (pension entitlements) being divided by expected remaining living years in order to determine yearly pension payments, this “work and pension strategy” give rise to a decline in yearly pension payments at the individual level (compared to the case of postponing the take-up of pension benefits).

The decline in the benefit ratio and the replacement rate reported in Table 9 reflects the introduction of life expectancy adjustment of pensions and the subtraction of a fixed factor (0,75 per cent per year) from nominal wage growth in regulating pension benefits, both coming into effect from 2011.

With regard to the subtraction of a fixed factor (0,75 per cent per year) from nominal wage growth in regulating pension benefits, this feature of the pension system contributes to a reduction of pension expenditures compared to the old pension system without under-regulation. However, the subtraction has only minor consequences for changes in old age pensions as a share of GDP once the new system has settled. This reflects that the under-regulated pensions for, say, a 70 year old in 2040 is not accumulated into under-regulation of the pension payments for a 70 year old in 2060.

The increase in pension expenditures in the first part of the projection period (towards 2030 – 40) is not solely a baby-boom effect. It is also due to cohort effects associated with increased labour participation for women during the 1970s and 1980s are involved.

The continued modest increase in pension expenditure as a share of GDP towards 2060 reflects a combination of the following factors:

- Method for life age adjustment (also applied in the projections) – based on observed mortality (averaged over 10 years) at the time of cohorts reaching 60 years instead of assumptions based projections of mortality – may involve lag effects compared to actual development measured ex post.
- Disability pensioners partially exempted from life age adjustments. This is incorporated for the entire projected period by assumption, but reflects provisional arrangements in place for disability pensioners become old age pensioners before 2018.

Cohort effects associated with increased labour participation for women during the 1970s and 1980s contribute to dampen the reduction in the benefit ratio in the first decades of the projection period.

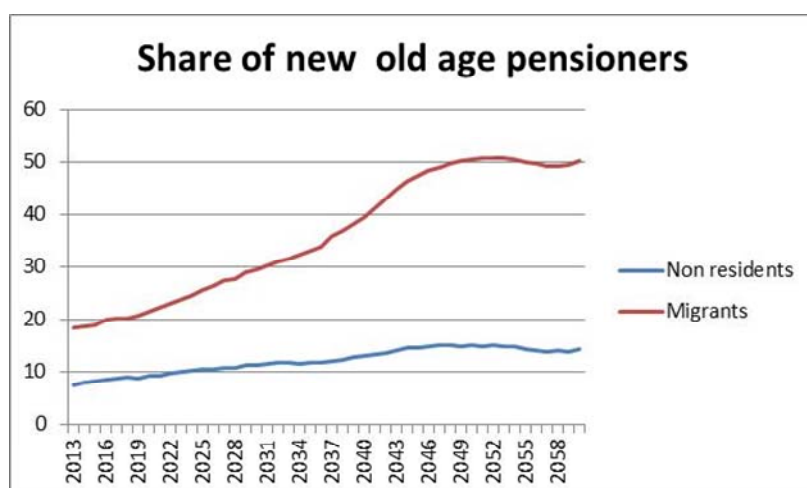
² Repatriated immigrants or expatriated persons born and employed in Norway, neither of which are counted in the population figures.

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

	2013	2020	2030	2040	2050	2060
Public scheme (BR)	47,0	45,8	43,5	40,7	38,4	36,7
Public scheme (RR)	43,7	41,0	38,4	36,7	35,9	36,2
Coverage	100,0	100,0	100,0	100,0	100,0	100,0
Public scheme old-age earnings related (BR)	:	:	:	:	:	:
Public scheme old-age earnings related (RR)	:	:	:	:	:	:
Coverage	71,2	74,3	77,5	80,4	80,2	81,8
Private occupational scheme (BR)	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:
Coverage	:	:	:	:	:	:
Private individual scheme (BR)	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:
Coverage	:	:	:	:	:	:
Total (BR)	:	:	:	:	:	:
Total (RR)	:	:	:	:	:	:

Source: MoF, DG ECFIN

Graph 3 Non-residents and migrants. Share of new old age pensioners



The decline in the benefit ratio and the replacement rate reported in Table 9 is also due to immigration contributing to decreasing benefit ratio and decreasing average replacement ratio through lower average pension entitlements for persons only spending part of their working career in Norway. Migration also contributes to average contribution period differing from length of normal working career, see table 4 above.

In line with the comments on developments in the coverage ratio above, the relative developments in Pension System Dependency Ratio (SDR - pensioners divided by employees) and Old Age Dependency Ratio may somewhat be obscured due to pensioners living abroad and pensioners using the option of continued work both amplifying the growth in number of pensioners in the projections. The effects on pension expenditures are in both cases dampened by the same developments contributing to a reduction in average pension benefits.

Table 10 System dependency ratio and old-age dependency ratio

	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	1124,8	1318,0	1608,8	1894,8	2186,5	2534,4
Employment (thousand) (II)	2609,2	2852,3	3174,1	3475,0	3733,1	3867,8
Pension System Dependency Ratio (SDR) (I)/(II)	43,1	46,2	50,7	54,5	58,6	65,5
Number of people aged 65+ (thousand) (III)	801,6	956,7	1214,6	1477,8	1655,1	1898,6
Working age population 15 - 64 (thousand) (IV)	3349,5	3615,2	4018,5	4382,6	4715,5	4865,5
Old-age Dependency Ratio (ODR) (III)/(IV)	23,9	26,5	30,2	33,7	35,1	39,0
System efficiency (SDR/ODR)	1,8	1,7	1,7	1,6	1,7	1,7

Source: MoF, DG ECFIN

In tables 11 and 12 the number of pensioners by age groups (total and female) is divided by total and inactive population respectively. The inclusion of pensioners living abroad in the projections contributes to ratios above 100 for the older age groups.

TABLE 11a	Pensioners (public scheme) to inactive population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	8,9	7,8	7,1	7,5	7,7	7,8
Age group 55-59	99,2	108,8	90,1	90,0	101,5	100,5
Age group 60-64	132,2	125,7	117,1	108,3	112,2	113,9
Age group 65-69	115,3	125,9	126,5	122,5	127,3	130,4
Age group 70-74	116,5	114,8	114,6	116,3	121,5	125,7
Age group 75+	105,6	105,7	106,7	107,4	108,9	113,0

TABLE 11b	Pensioners (public schemes) to total population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	3,5	3,0	2,7	2,9	3,0	3,0
Age group 55-59	20,3	21,6	19,4	19,2	20,3	20,1
Age group 60-64	47,5	49,3	45,7	41,8	43,3	43,7
Age group 65-69	85,2	90,8	91,1	89,6	92,7	94,4
Age group 70-74	108,7	105,8	105,9	107,4	112,1	116,1
Age group 75+	105,6	105,7	106,7	107,4	108,9	113,0

TABLE 12a	Female pensioners (public scheme) to inactive population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	10,0	9,1	8,0	8,6	9,0	9,0
Age group 55-59	106,4	118,3	101,6	96,0	108,1	108,2
Age group 60-64	99,4	97,7	90,7	78,9	82,5	84,4
Age group 65-69	113,3	108,4	108,3	104,0	105,2	109,5
Age group 70-74	111,1	108,7	107,1	107,7	109,8	113,8
Age group 75+	104,8	103,7	104,5	104,2	104,5	106,1

TABLE 12b	Female pensioners (public scheme) to total population ratio by age group (%)					
	2013	2020	2030	2040	2050	2060
Age group -54	4,1	3,7	3,2	3,4	3,5	3,5
Age group 55-59	25,3	26,5	23,0	21,6	22,6	22,6
Age group 60-64	40,8	41,6	38,2	33,0	33,8	34,4
Age group 65-69	89,1	83,0	82,3	79,6	80,2	83,1
Age group 70-74	107,5	103,7	102,2	102,7	104,7	108,4
Age group 75+	104,8	103,7	104,5	104,2	104,5	106,1

Table 13 reports developments in expenditure on new public pensions (total, men and women respectively) and how they are linked the average contributory period, average pension earnings, average accrual rates and the number of new pensioners.

The decomposition Table 13 attempts a reporting consistent with the phasing in of the reformed old-age pensions system. Thus the figures capture, in line with the pension projections, a weighed effect of accumulation of pension entitlements for persons earning pensions under the old and new system. The accrual rate (adjusted for length of pension period) for 2013 (see item IV in the table) thus mainly reflects accumulation of pension earnings under the old system, which is below a hypothetical accrual rate which would apply for a pensioner (born in 1943) in 2013 with accumulation of pension earnings under the new system. Phasing-in effects thus contributes to a temporary increase in the accrual rate. The temporary increase is stronger for women compared to men. In the projections men to a larger degree than women opt for early take-out of pensions (often in combination with continued work), dampening the increase in accrual rate adjusted for the length of pension period. Regarding the development in the accrual rate towards 2060, it will gradually decrease under the new system due to adjustments embodied in the new old age pension system for increases in expected lifetime towards 2060. A pensioner deciding to retire at a given age in 2015 will enjoy higher yearly pensions (relative to pensionable income) compared to a pensioner retiring at the same age in 2060. The effect of immigration towards declining average contributory periods towards 2060, see graph 3 above, is also less pronounced for women than for men.

TABLE 13a		Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions)					
New pension	2013	2020	2030	2040	2050	2060	
I Projected new pension expenditure (millions EUR)	1186,1	1313,4	2756,4	3890,9	5741,9	9404,5	
II. Average contributory period	35,6	37,0	35,9	34,2	32,2	33,0	
III. Monthly average pensionable earnings	8,8	10,9	16,1	23,2	33,9	47,4	
IV. Average accrual rates (%)	0,9	0,9	1,1	1,0	1,0	1,0	
V. Sustainability/Adjustment factor	:	:	:	:	:	:	
VI. Number of new pensioners ('000)	68,8	62,0	73,9	80,1	91,6	106,2	
VII Average number of months paid the first year	6,0	6,0	6,0	6,0	6,0	6,0	
Monthly average pensionable earnings / Monthly economy-wide average wage	1,8	1,8	1,9	1,9	2,0	1,9	
TABLE 13b		Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - MEN					
New pension	2010	2020	2030	2040	2050	2060	
I Projected new pension expenditure (millions EUR)	741,4	756,1	1454,0	1949,7	2985,8	4766,4	
II. Average contributory period	38,3	37,6	35,4	32,5	30,5	31,3	
III. Monthly average pensionable earnings	10,6	13,4	18,6	26,3	37,5	52,2	
IV. Average accrual rates (%)	0,8	0,8	0,9	0,9	0,9	0,8	
V. Sustainability/Adjustment factor	:	:	:	:	:	:	
VI. Number of new pensioners ('000)	36,4	31,8	39,7	42,7	51,0	57,3	
VII Average number of months paid the first year	6,0	6,0	6,0	6,0	6,0	6,0	
Monthly average pensionable earnings / Monthly economy-wide average wage	2,2	2,2	2,2	2,2	2,2	2,1	
TABLE 13c		Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - WOMEN					
New pension	2010	2020	2030	2040	2050	2060	
I Projected new pension expenditure (millions EUR)	455,5	571,4	1351,3	1998,3	2819,9	4751,8	
II. Average contributory period	32,6	36,3	36,4	36,3	34,3	35,0	
III. Monthly average pensionable earnings	6,3	8,3	13,3	20,0	29,9	42,4	
IV. Average accrual rates (%)	1,1	1,1	1,4	1,2	1,1	1,1	
V. Sustainability/Adjustment factor	:	:	:	:	:	:	
VI. Number of new pensioners ('000)	32,4	30,2	34,3	37,4	40,6	48,9	
VII Average number of months paid the first year	6,0	6,0	6,0	6,0	6,0	6,0	
Monthly average pensionable earnings / Monthly economy-wide average wage	1,3	1,4	1,6	1,6	1,7	1,7	

Source: MoF, DG-ECFIN

Table 14 records projected developments of public pension expenditures together with employer and employee contributions.

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

	2013	2020	2030	2040	2050	2060
Public pensions	29373,0	41943,6	69550,6	109163,5	168494,1	265042,3
Employer contribution	20207,8	27761,1	44305,0	69055,4	105305,9	154906,1
Employee contribution	14192,5	19497,4	31116,6	48499,5	73959,3	108795,0
State contribution	-5027,3	-5315,0	-5871,1	-8391,4	-10771,0	1341,2
Number of contributors (I)	2609,2	2852,3	3174,2	3475,0	3733,1	3867,8
Employment (II)	2609,2	2852,3	3174,1	3475,0	3733,1	3867,8
Ratio of (I)/(II)	1,0	1,0	1,0	1,0	1,0	1,0

Employer and employees public pension contributions are not directly linked to financing of public pension expenditures, but – similar to other taxes - used to finance government expenditures in general. Related to this, the state pension fund (SPF) is not directly linked to financing pension expenditures. Rather SPF is a general vehicle to decouple yearly expenditures from income streams from the petroleum sector. With a budget rule stating that non-oil budget deficits over time shall evolve in line with expected real return (4 %) from SPF, SPF gives a lasting contribution to financing government (pension and other) expenditures.

Sensitivity analysis

Table 15 illustrates the sensitivity of pension schemes to different economic assumptions. Important factors may be summarised as follows:

- Higher life expectancy contributes to an increase in the number of old age pensioners. The effect of pension expenditures is counteracted by the conversion of the implicit pension wealth of accumulated entitlements into an annuity over an increased average expected remaining lifetime. The net effect amounts to an increase in the GDP-ratio of pension expenditures by 0,2 percentage points compared to the baseline towards 2060.
- In the higher labour productivity scenario, wage indexation contributes to higher pension expenditures. However, corresponding increases in private sector income and tax bases leaves the pension to mainland GDP ratio unchanged compared to the baseline projections. The same considerations apply for scenario with lower productivity growth as well as the Risk scenario (which is related to total factor productivity developments)
- The policy scenario linking retirement age to increases in life expectancy produces expected effects through increases in employment and GDP.
- Lower migration reduces pension expenditures, but the associated decrease in mainland GDP produces a net increase in pensions to GDP ratio compared to baseline in 2060. This may be considered a temporary effect, assuming no further shocks to migration are envisaged subsequent to 2060. The scenario with reduced migration also illustrates how increased migration produces a more favourable development in the pension to GDP ratio in the AWG2015 baseline compared to the AWG2012 baseline (which could also be considered to be of a temporary nature within a longer time perspective).

In AR12 the lower migration shock amounted to 0,979 measured by total population in 2060 compared to BASELINE, whereas the present shock amounts to 0,930. However, composition effects seem to be as important as the size of the shock. In particular, in AR12 lower migration gave rise to proportional decline in age group 65+, whereas the decline in the present lower migration alternative is less pronounced than the decline in total population. This gives rise to a more pronounced decline in

employment and Mainland GDP compared to the decline in number of pensioners than in the AR12 low migration alternative. Accordingly the increase in pension expenditure as a share of GDP is more pronounced in the lower migration alternative for AR15 than in the lower migration alternative for AR12.

Table 15 Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)

	2010	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	9,9	10,7	11,3	11,4	11,6	12,4
Higher life expectancy (2 extra years)	0,0	0,0	0,1	0,2	0,2	0,2
Higher lab. productivity (+0.25 pp.)	0,0	0,0	0,0	0,0	0,0	0,0
Lower lab. productivity (-0.25 pp.)	0,0	0,0	0,0	0,0	0,0	0,0
Higher emp. rate (+2 pp.)	0,0	-0,1	-0,2	-0,2	-0,2	-0,2
Higher emp. of older workers (+10 pp.)	:	:	:	:	:	:
Lower migration (-20%)	0,0	0,1	0,4	0,5	0,5	0,4
Risk scenario	0,0	0,0	0,0	0,0	0,0	0,0
Policy scenario: linking retirement age to increases in life expectancy	0,0	-0,1	-0,4	-0,5	-0,7	-1,0

Source: MoF, DG-ECFIN

Table 16 compares the present pension projections with previous projections in 2009 and 2012. In line with substantial (more favourable) developments in old age dependency ratio as well a more favourable developments in employment rates among older workers, the present projections implies a substantial downward revisions of changes in the pensions to GDP ratio towards 2060.

Table 16 Overall change in public pension expenditure to GDP under the 2006, 2009, 2012 and 2015 projection exercises

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	:	:	:	:	:	:	:
2009 **	4,68	8,21	-1,20	0,26	-2,35	:	-0,23
2012 ***	4,93	7,98	-1,15	0,01	-1,64	0,02	-0,29
2015****	2,48	5,56	-0,51	-0,11	-2,21	0,03	-0,27

Source: MoF, DG-ECFIN

Table 17 shows how the decrease in the public pension to GDP ratio towards 2060 to a large extent can be traced back to changes in assumptions on demographic and labour market developments. Changes in model assumptions, primarily related to incorporating pensioners living abroad, on the other hand contributes to an increase in pension expenditures as a share of GDP. Including pensioners living abroad in the projections contributes to a higher growth in number of pensioners towards 2060, but taking into account the associated lower growth in average benefits the net effect on the change in the pension to GDP ratio is not substantial.

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

	2010	2013	2020	2030	2040	2050	2060
Ageing report 2012	9,3	10,4	11,6	12,9	13,7	13,9	14,2
Change in assumptions	-0,2	-0,5	-0,9	-1,7	-2,5	-2,6	-2,1
Improvement in the coverage or in the modelling	0,0	0,0	0,0	0,1	0,2	0,3	0,3
Change in the interpretation of constant policy	:	:	:	:	:	:	:
Policy related changes	:	:	:	:	:	:	:
New projection	9,1	9,9	10,7	11,3	11,4	11,6	12,4

Source: MoF

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

Tax and pension systems are typically detailed and complex involving a large degree of individual heterogeneity. Accordingly, there are substantial aggregation problems when calculating the total effect on government budgets of changes in tax or pension systems. To overcome these problems, micro simulation

models represent a socioeconomic system by a sample of decision units (e.g. persons), and then model the behaviour of these primary units. Contrary to what is possible in aggregate models, inhabited by one or a few representative agents, the detailed and complicated tax and benefit rules may be exactly reproduced.

The dynamic micro simulation model MOSART is especially designed to analyse the first order effects on individual pension entitlements, benefits, and government pension expenditures of changes in the Norwegian public pension system. The model simulates the life courses of the Norwegian population, using a set of transition probabilities to determine the occurrence of socio-demographic events, emphasizing what is relevant for individuals' accumulation of public pension entitlements. It captures the following events: migration, deaths, births, marriages, divorces, educational activities, retirement, and labour force participation. The model covers social security old age pensions and disability pensions.

Transitions between states over the life course depend on individual characteristics, and the transition probabilities have been estimated based on historical data. For retirement decisions, adjustments have been implemented in order to capture incentives for postponement of retirement in the reformed old age pension system. The model includes an accurate description of the pension system and captures relevant details of the population dynamics, as well as the heterogeneity of individual age-earnings profiles and individual public pension entitlements.

The macro assumptions from AWG is calibrated and translated to the model population in the micro simulation model, maintaining the heterogeneity of the model population while respecting aggregate assumptions from AWG concerning demographic developments (including net immigration), participation rates etc. by age and gender.

Statistics Norway maintains the MOSART-model and runs the projections for the government. The model is well established as the central tool for evaluating development in pension expenditures in Norway, and is updated on a regularly basis in order to capture changes in demographic projections as well as changes in social security old age and disability pensions systems. Accordingly the reform of the old age pension system is implemented in the current version of the model.

Methodological annex

Economy- wide average wage at retirement

In the projections labour productivity is driving the evolution of economy-wide average wage as well as the economy-wide average wage at retirement.

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

	2013	2020	2030	2040	2050	2060
Economy-average wage	57,2	71,4	102,3	145,6	206,6	293,3
Economy-average wage at retirement	69,4	86,7	119,8	176,7	242,2	356,0

Source: Commission Services

Pensioners vs Pensions

Only number of pensioners specified in pension projection model.

Pension taxation

In the projections tax revenues as a share of pension expenditures stays constant over time.

Disability pension

The evolution of the disability pension expenditure and the number of pensions/pensioners entitled to a disability pension is driven by demographic developments by means of age- and gender specific transition probabilities. whether a reform is affecting the average amount of the disability benefit (i.e. by increasing replacing percentage of the average wage). Disability pensions are transformed into old age ones at the age of 67.

Table A2 – Disability rates by age groups (%)

	2010	2013	2020	2030	2040	2050	2060
Age group -54	:	:	:	:	:	:	:
Age group 55-59	:	:	:	:	:	:	:
Age group 60-64	:	:	:	:	:	:	:
Age group 65-69	:	:	:	:	:	:	:
Age group 70-74	:	:	:	:	:	:	:
Age group 75+	:	:	:	:	:	:	:

Source: Member State

Survivor pensions

The model simulates the life courses of the Norwegian population, using a set of transition probabilities to determine the occurrence of socio-demographic events, emphasizing what is relevant for individuals' accumulation of public pension entitlements. It captures the following events: migration, deaths, births, marriages, divorces, educational activities, retirement, and labour force participation.

Non-earnings related minimum pension

In the previous system pensions consisted of a basic amount (equal for all) and additional income related pensions calculated from a positive threshold income level. The new system also has a minimum guarantee pension, but income related pensions are calculated from total income (not only from income above a threshold level). However, also under the new system there will be a fraction of the pensioners

who are just entitled to minimum/guarantee (not income related pensions) pensions. The level of this guarantee pension is comparable to the basic pension under the previous system.

Contribution

Implicit contribution rate is by assumption constant over the projection horizon.

Alternative pension spending decomposition

Table A4 is equivalent to Table 8 contained in the body of the country fiche. Table 8 is calculated by dividing into sub-intervals so to have smaller residual effect (interaction effect).

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

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

Source: Commission Services