MINISTRY OF FINANCE

Pension projections – Denmark (AWG)

November 12th, 2014

Part I: Overview of the Pension System

The Danish pension system can be divided into three pillars:

1. The ***first pillar*** consists primarily of the public old-age and is financed on a PAYG basis. This is a universal defined benefit scheme financed by general taxes aiming at guaranteeing a minimum pension for the pensioners. Disability pensions are also included in the first pillar
2. The ***second pillar*** consists primarily of (privately organized) labour market pension schemes, which are contribution-defined. This pillar also contains tax-financed earnings-related civil servant pensions. However these are in general in the process of being phased out. The ATP and LD-schemes are also included here.
3. The ***third pillar*** consists of individual, voluntary pension schemes similar to the schemes in pillar 2. The public voluntary early retirement pension (VERP) is also placed in this pillar.

I.1 First Pillar Pensions

The old-age pension and the disability pensions are considered as belonging to the first pillar pensions. In the following sections each of these is described separately.

Public old-age pension consists of a basic amount and a pension supplement.

The basic amount is DKK 70,900 (euro 9,500) annually in 2014 and taxable. The basic amount is reduced only on the basis of earnings from earned income. If the pensioner has earned income of more than DKK 301,200 (euro 40,400) annually, the basic amount is reduced by 30 per cent of the part of the earned income that exceeds the threshold. The basic amount is fully phased out if earned income is higher than DKK 531,600 (euro 71,300).

The pension supplement is DKK 73,600 (euro 9,900) annually for single pensioners and DKK 35,600 (euro 4,800) annually for married or cohabiting pensioners in 2014. The pension supplement is taxable and reduced if the pensioner or his/her spouse or cohabitant has other income above a certain limit besides public old-age pension (e.g. earned income, benefits from occupational or private schemes and capital income). The supplement is reduced with 16-32 per cent of the income that exceeds a specified threshold. The percentage reduction and the threshold depend on the marital status of the pensioner and whether the spouse is a pensioner or not. E.g. if the pensioner is single, the phase-out of the supplement starts at an additional income of DKK 66,500 (euro 8,900), the phase-out rate is

30.9 % and the supplement is completely phased out at an additional income of DKK 305,000 (euro 40,900).

Public old-age pension is paid upon application from the age of 65. From 2004, rules on deferred pension have been introduced, meaning that postponement of retirement to a higher age then 65 results in a higher pension. It is possible to postpone retirement with up to 10 years. The additional benefit is calculated as the period postponed relative to the expected lifetime at the postponed retirement age, multiplied by the regular old age pension. The additional benefit is added until death.

In order to be eligible for old-age pension, the rules are as follows: The minimum requirement is 3 years residence in Denmark between the age of 15 and the retirement age. For people who are neither Danish citizens nor EU citizens, this requirement is increased to 10 years, where at least 5 years have to be just before the retirement age. Furthermore, the pension is reduced proportionally if the pensioner has lived less than 40 years in Denmark before reaching the retirement age.

People, who are eligible for old-age pension, can also be eligible for the "supplementary pension benefit", which is targeted at the poorest pensioners. The maximum yearly benefit is DKK 16,200 (euro 2,200) in 2014. To receive the supplementary pension benefit, the pensioner cannot have more than DKK 80,300 (euro 10,800) in liquid wealth. The full benefit is received if the pensioner does not have income (apart from old-age pension) in excess of DKK 19,100 (euro 2,600) for singles and DKK 37,900 (euro 5,100) for married or cohabiting couples. The supplementary pension is reduced if the income is larger than this threshold and is fully phased out if the income is larger than DKK 66,500 (euro 8,900) for singles and DKK 133,400 (euro 17,900) for married or cohabiting couples.

In 2013 the old-age pension expenditure amounted to 6.0 % of GDP.

Disability pension is an anticipatory pension for people who are not able to support their own living. Persons between 18 and 65 years may be awarded an anticipatory pension if they satisfy a number of conditions concerning citizenship, residence and entitlement. The key conditions for being awarded anticipatory pension are: that the working capacity is permanently reduced; that the reduction is of such an extent that the person will not be able to support himself fully or partially from paid work; and that all possibilities to improve the working capacity has been tried out.

As a result of a reform of disability pension in 2012, disability pension is only awarded to people above the age of 40, except for cases where it is obvious that work capacity cannot be improved. People below 40 years are instead assigned to a "resource process" in order to improve their work capacity. This is not considered disability pension and is therefore not included in the projection. The size of benefits depends on past schemes and is on average slightly lower than disability pension.

The reform of disability pension took effect in 2013 and the data on the actual reform effect is still limited. Early reports on the number of new disability pen-

sions granted shows a substantial decline in the first half of 2013 indicating a substantial effect of the reform. However, a similar increase in people on "resource process" has not been observed.

The disability pension is DKK 211,900 (euro 28,400) annually in 2014 for singles and DKK 180,100 (euro 24,100) for married and cohabiting people.

Disability pension is means tested, based on earned income and capital income. The pension is reduced if this income is larger than DKK 72,200 kr. (euro 9,700) for singles and DKK 114,400 (euro 15,300) for married or cohabiting couples. Furthermore, the benefit also depends on the spouse's income and on whether the spouse is a pensioner. The disability pension is reduced with 30 percent of the income above the threshold; although only with 15 percent if the spouse also has a right to a social pension (disability or old-age pension).

Eligibility rules for disability pension are the same as for old-age pension. However, for disability pension, the reduction if the pensioner has lived abroad is based on the number of years between the age of 15 and the age when disability pension is granted. If the pensioner has lived at least 4/5 of this period in Denmark, full disability pension is granted. Otherwise, the pension is reduced proportionally. In addition, to receive disability pension, the conditions mentioned above must be met.

In 2013 the disability pension expenditure amounted to 2.3 % of GDP.

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

		2013	2020	2030	2040	2050	2060
Men and women - with 20 contribution years	statutory retirement age	65	66	68	70	71,5	72,5
	earliest retirement age	60	63	65	67	68,5	69,5
	penalty in case of earliest retirement age	:	:	:	:	:	:
	bonus in case of late retirement age			Varies[1]			
Men and women - with 40 contribution years	statutory retirement age	65	66	68	70	71,5	72,5
	earliest retirement age	60	63	65	67	68,5	69,5
	penalty in case of earliest retirement age	:	:	:	:	:	:
	bonus in case of late retirement age			Varies[1]			

1) Postponement of retirement to a higher age than the statutory retirement age results in a higher pension. It is possible to postpone retirement with up to 10 years. The additional benefit is calculated as the period postponed relative to the expected lifetime at the postponed retirement age, multiplied by the regular old age pension. The additional benefit is added until death.

Note: Earliest retirement age is set to statutory retirement age for the VERP scheme, which requires 30 years of contributions. Se the description below. The age limits are calculated based on the life expectancy in the EUROPOP2013 projection, which may differ from the official projections used in the Danish Ministry of Finance.

Changes in the statutory retirement age for old-age pension due to increases in life expectancy have to be confirmed by Parliament 15 years before they take effect (12 years for changes in the VERP age). In the projection, it is assumed that Parliament confirms these increases in the retirement age.

Source: The Danish Ministry of Finance

I.2 Second Pillar Pensions

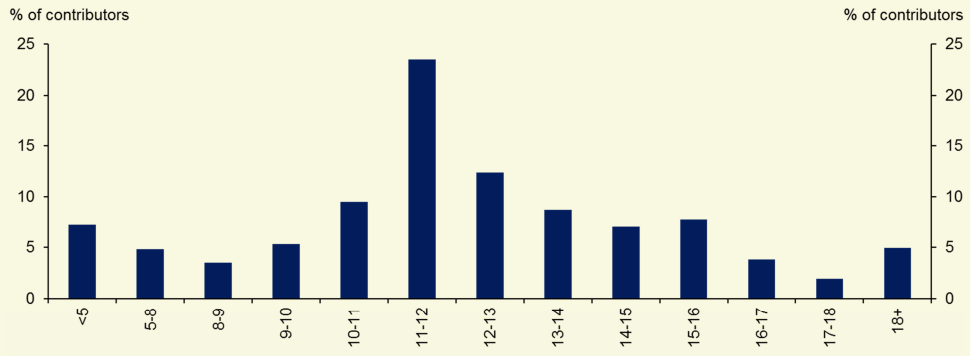
The second pillar consists primarily of (privately organized) **labour market pension schemes** and aims to secure citizens a reasonable replacement rate when they retire. Labour market pension schemes presently cover more than 90 % of wage earners between 25 and 59 years.

Total savings in the labour market pension schemes are estimated at 99 % of GDP in 2013.

Labour market pensions are contribution-defined, i.e. the pension benefits depend on the contributions paid and the accumulated return on savings. Contribution rate varies, depending on the wage agreement. 60 % of those with contributions have a contribution rate between 10 and 15 %, *cf. figure 1.*

Figure 1

Contributions to occupational schemes as a share of wages, by size of contribution, wage earners, 25-59 years



Source: Ministry of Economic affairs and the Interior

Furthermore, the coverage of the occupational schemes has also increase from 73 % in 1995 to more than 90 % in 2012, *cf. figure 2*. Before 1995 the coverage was much lower as occupational schemes were only introduced in the private labour market in the beginning of the 1990s. This is also illustrated by the size of contributions from occupational schemes which has increased from 1.3 % of GDP in 1980 to 4.9 % of GDP in 2012, *cf. figure 3*. If private contributions are also includ-

ed, pension contributions increased from 2.3 % of GDP in 1980 to 6.3 % of GDP in 2012.

Figure 2
Share of wage earners, 25-59 years that contribute to occupational schemes, 1995-2012

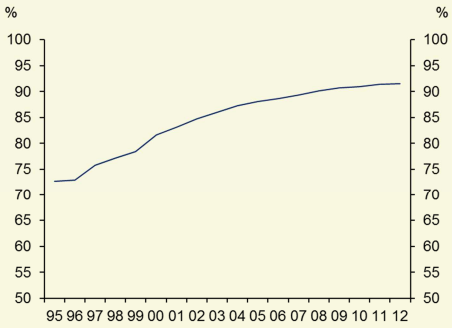
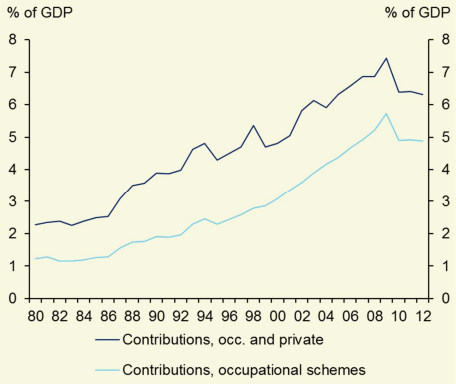


Figure 3
Contributions, occupational and private schemes



Source: Ministry of Economic affairs and the Interior and own calculations

The composition of benefits in the labour market pension schemes varies considerably. Typically, a life-long current retirement pension is provided, which may be combined with rate pension (paid out over 10-25 years) and/or capital pension (paid out as a lump sum benefit). To this may be added disability pension and spouse's and child's pensions.

In 2013 benefits from occupational and private schemes amounted to 3.8 % of GDP.

The **Labour Market Supplementary Pension Scheme (ATP)** is a contribution-defined and savings-based schemes. Almost all citizens of working age pay contributions to ATP. Furthermore, several groups of persons temporarily or permanently outside the labour market contribute to ATP. Thus, this scheme ensures almost all future pensioners supplementary pension besides public old-age pension. For a full-time employee, the employer contributes DKK 180 (euro 24) per month, while the employee contributes DKK 90 per month (euro 12). Total savings in ATP amounts to 31 % of GDP in 2013.

In 2013 benefits from ATP amounted to 0.7 % of GDP.

Civil servant pensions are defined-benefit schemes. The amount of the pension depends on the number of years of employment as a public servant and the final salary. The maximum pension is 57 % of the final salary and is achieved for people who have worked 37 years as a civil servant. Pensions are funded by government, regional or local authorities out of current income, i.e. taxes.

Defined-benefit pension schemes in the form of civil servant pension schemes will have diminishing importance in both the central government and the local government sectors going forward. This is due to changes in the employment form where new public employees are only hired as civil servants within a narrow

set of job (primarily within the armed forces and the police). All other public employees are instead enrolled in the labour market pension schemes described above.

The share of the population receiving civil servant pension is gradually reduced so that 19,000 persons receive civil servant pension in 2060 compared to around 122,000 persons in 2013.

In 2013 the civil servant pension expenditure amounted to 1.3 % of GDP.

Employees' capital fund (LD) is based on mandatory contributions from wage earners in the period 1977-1979 and is closed for new contributions. Total savings amount to 3 % of GDP in 2013. In 2013 benefits from LD amounted to 0.2 % of GDP.

I.1.3 Third Pillar Pensions

Individual, private pension savings plans are started on the initiative of private individuals and are independent of employment conditions. In these schemes, the individual makes his/her own choices about the size of the contributions, the composition of benefits etc.

Individual pension schemes can be set up with banks, insurance companies or pension funds as defined contribution plans.

The individual schemes are typically capital pension or rate pension schemes, but may also be life-long annuity pensions. The pension benefit depends on the savings (including return) made by the individual. Total savings in private pension plans are estimated at 32 % of GDP in 2013

Voluntary early retirement pension (VERP) is for all employees and self-employed persons who are members of an unemployment insurance fund and the VERP scheme and who have reached the age of 60 years, but who are not yet 65 years old.

The member must have been a member of an unemployment insurance fund and paid the voluntary early retirement contributions for 30 years to be eligible for VERP. Furthermore, it is a precondition that the membership and the contributions start no later than the age of 30.

The basic benefit paid in the VERP is DKK 192,900 (euro 25,900) annually, if retiring before the age of 62. This amount is further reduced based on the person's pension wealth. As a general rule, VERP benefits are reduced by 3 per cent of pension wealth above a threshold of DKK 294,000 (euro 39,400).

If retiring at the age of 62 or later, the basis benefit is raised to DKK 211,900 (euro 28,400) and the reduction based on the pension wealth is avoided.

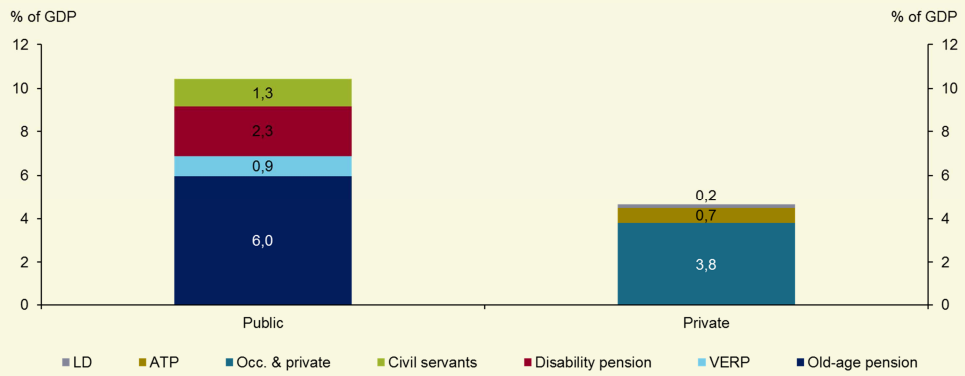
The VERP was reformed as part of the *Retirement Reform*. See the description of the new rules for the VERP scheme in section 1.2.

In 2013 the VERP expenditure amounted to 0.9 % of GDP.

Overview of expenditures and benefits in 2013

Figure 4 provides an overview of the public and private pension benefits in the starting year of the projection, 2013.

Figure 4
Public and private pension benefits, 2013



Source: Own calculations

Indexation of public pensions

The benefits for different types of transfer payments are automatically adjusted once a year on the basis of wage developments in the private sector (the area covered by the Danish Employers' Confederation). Transfer payments are adjusted at the rate adjustment percentage; cf. the Rate Adjustment Percentage Act.

The rate adjustment percentage for a given fiscal year is fixed on the basis of wage developments two years before the fiscal year. The rate adjustment percentage for 2014 was thus fixed on the basis of wage developments from 2011 to 2012.

As a part of the 2012 Tax Reform, the indexation of all income transfers were lowered in the period 2016-2023, according to table 2. However, old-age pensions were, overall, exempted from this. In the projection, VERP and disability pensions are therefore affected by the 2012 Tax Reform.

Table 2
Lower indexation of income transfers according to 2012 Tax Reform

	2016	2017	2018	2019	2020	2021	2022	2023
Change, %-points	-0.3	-0.4	-0.75	-0.75	-0.75	-0.75	-0.75	-0.75

Source: Danish Ministry of Finance

Taxation of pensions

Taxation of public pension

Public pensions (old-age, disability, VERP and civil servant) is subject to regular personal income taxation. However, they are not taxed with the 8 per cent payroll tax.

Taxation of private pensions

Both labour market pension schemes (2nd pillar) and individual pension schemes (3rd pillar) are, as a general rule, taxed ETT (contributions exempt, returns taxed, benefits taxed).

Contributions to private and occupational pensions can be deducted from ordinary income tax at the time they are paid into the schemes. However, contributions are still taxed with the 8 per cent payroll tax. Furthermore, there is a ceiling on the size of contributions to rate pensions at DKK 50,900 (euro 6,800) in 2014.

When benefits are paid out from life-long and rate pensions they are subject to the personal income tax, but not the payroll tax. Benefits from capital pensions are taxed with a flat 40 per cent rate.

In the assessment of fiscal sustainability the contributions received and payments made from the pension sector must be included, because pension savings are not taxed until the pensions are paid out, while contributions to pension schemes can be deducted from ordinary income tax at the time they are paid into the schemes. All else equal, the future rise in revenue resulting from increasing pension payments will improve public finances.

Due to the 2012 tax reform, there can be no new contributions to tax-exempted capital pensions (last contributions in 2012). Instead, contributions can be made to a new capital pension (first contributions in 2013), where contributions are not exempted from taxation, but where benefits are not taxed (so capital pensions have changed from ETT to TTE). Contributions to the new capital pensions cannot be larger than DKK 28,100 (euro 3,800) in 2014.

1.2 Recent reforms of the pension system

Welfare agreement - 2006

In 2006, The Danish Government (at the time consisting of The Liberal Party and The Conservative Party) concluded the *Welfare Agreement* with the Social Democrats, the Danish People's Party and the Social-Liberal Party. Thus, a large majority of the Danish Parliament is behind the agreement. The key elements are:

1. The increase in the voluntary early retirement pension (VERP) age from 60 to 62 years in 2019 to 2022 and the public old-age pension age from 65 to 67 years in 2024 to 2027.
2. The indexation of the age thresholds in the retirement system as of 2025 for the early retirement age and 2030 for the public old-age pension.

The Welfare Agreement introduces a principle of indexation to help ensure that longer life expectancy and better health also leads to more active years in the labour market.

A specific formula for calculating the VERP and pension age on the basis of future observed mean life expectancy for 60 year olds is enshrined in the legislation. Changes in the VERP and pension age shall be calculated every 5 years – based on the latest observed life expectancy – and confirmed by Parliament 10 years before they take effect (15 years before for old-age pension). It is a key requirement for the government's long-term fiscal strategy that current legislation describing the indexation rule is adhered to. In the light of the fact that Parliament has to confirm the increase in the retirement age – and therefore also has the power to say no to the increase – it is an important part of the agreement that it is backed by a large majority of Parliament.

If life expectancy does not increase relative to 2004/2005 the above-mentioned new age limits will remain in force. If life expectancy increases, the age threshold for VERP and old-age pension will in the long run increase in line with life expectancy for 60-year olds.

Retirement reform - 2011

In December 2011 a new pension reform was adopted in Parliament. The reform has 3 main elements:

- The reform brings forward the increase in the retirement ages in the Welfare Agreement from 2006. The retirement age for VERP will increase from 60 to 62 years from 2014-2017 (as opposed to from 2019-2022 in the Welfare Agreement), while the public old-age pension age will increase from 65 to 67 years in 2019-2022 (as opposed to from 2024-2027). From 2027, the VERP and old-age pension retirement age is linked to the life expectancy as described in the Welfare Agreement, *cf. table 3*.
- VERP is reduced from 5 to 3 years from 2018-2023. Private pension wealth lowers the VERP amount to a higher degree than now. Furthermore, the system of enrolment into the VERP is changed. At present members of unemployment insurance schemes are automatically enrolled at the age of 30, while leaving the scheme requires a written letter. With the reform this is changed, so that members of the unemployment insurance schemes must actively inform the insurer that they wish to join the VERP-scheme. For a description of the changes in VERP benefits, *see table 4*.
- A new senior disability pension is introduced as an administrative fast track into the disability pension for persons 5 years before the statutory retirement age, however the objective criteria for receiving the disability pension are unchanged.

Table 3
Statutory retirement age, VERP and old age pension with reforms

	Statutory retirement ages, 2006-reform		Statutory retirement ages, 2011-reform	
	VERP	Old age pension	VERP	Old age pension
2012	60	65	60	65
2013	60	65	60	65
2014	60	65	60½	65
2015	60	65	61	65
2016	60	65	61½	65
2017	60	65	62	65
2018	60	65	62½	65
2019	60½	65	63	65½
2020	61	65	63	66
2021	61½	65	63	66½
2022	62	65	63½	67
2023	62	65	64	67
2024	62	65½	64	67
2025	63	66	64	67
2026	63	66½	64	67
2027	63	67	65	67
2028	63	67	65	67
2029	63	67	65	67
2030	64	68	65	68

Table 4
Benefit rules for VERP, before and after Retirement Reform

Before	After
If retiring before age of 62 (4-5 years before the old-age pension retirement age): Basic benefit is DKK 192,900 (euro 25,900) annually. This amount is further reduced based on the person's pension wealth. As a general rule, VERP benefits are reduced by 3 per cent of pension wealth above a threshold of DKK 294,000 (euro 39,400).	*If retiring before age of 62 (4-5 years before the old-age pension retirement age):* Not possible
Retiring at the age of 62 or later (Up to 3 years before the old-age pension retirement age): Basic benefit is DKK 211,900 (euro 28,400) and the reduction based on the pension wealth is avoided.	*Retiring at the age of 62 or later (Up to 3 years before the old-age pension retirement age)*: Basic benefit is DKK 211,900 (euro 28,400) This amount is further reduced based on the person's pension wealth. As a general rule, VERP benefits are reduced by 4 per cent of all pension wealth.

The indexation mechanism is essentially unchanged from the Welfare Agreement from 2006. However, due to the shortening of the VERP period to 3 years, the indexation for the VERP age does not occur until 2027 (2025 before reform). Indexation of old age pension still takes place for the first time in 2030. Parlia-

ment still has to confirm the indexation for the first time in 2015, 12 years before the increase takes effect. See box 1 for a detailed description of the indexation mechanism.

Box 1
Description of the indexation mechanism

The period on old-age pension is intended to be 14.5 years (17.5 including VERP), based on life-expectancy for a 60-year old (unweighted average for men and women).

The first decision concerning the indexation mechanism is to be taken by Parliament in 2015, and then every 5 years. Changes in old-age pension age are decided 15 years before they occur (12 years for VERP), so the first increase due to indexation is in 2030 (2027 for VERP). The maximum increase in the retirement age is restricted to 1 year every 5 years.

Example: Increase in old-age retirement age in 2030 (decision in 2015):

- **Assumed life expectancy** = life expectancy for 60 year old in 2013/14 (latest known data in 2015) + assumed increase of 0.6 years = (60 +23.1) + 0.6 = **83.7**
- **Calculated retirement age in 2030** = assumed life expectancy – 14.5 years = 83.7-14.5 = 69.2 years
- **Calculated retirement age in 2030 (rounded)** = Calculated retirement age in 2030 rounded to nearest half year = 69 years
- **Actual retirement age in 2030 =** 68 (due to restriction of max increase with 1 year – old-age retirement age is 67 years in 2029)
- **VERP age** is then increased with 1 year 3 years earlier (in 2027), to maintain a 3 year VERP-period

Source: Danish Ministry of Finance

With the assumptions about the increase in life expectancy for people aged 60 in the EUROPOP2013 population projection and the indexation rule, the expected statutory retirement ages in 2060 are assumed to be 69.5 years for VERP and 72.5 years for old-age pension, *see figure 5 and 6*. The increase in the statutory retirement age should also be seen in the light of improved health etc., i.e. a 72.5 year old in 2060 will be healthier than a 72.5 year old in 2014.

Figure 5
Remaining life expectancy for a 60 year old, unweighted average for men and women

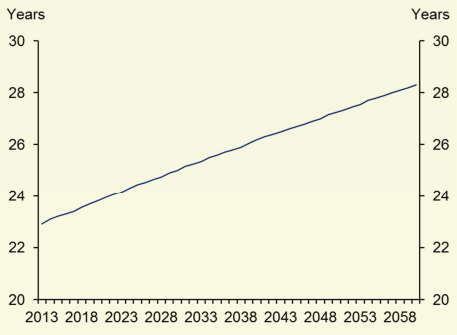
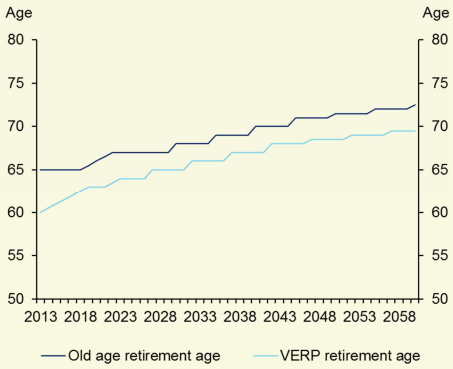


Figure 6
Age thresholds for VERP and public old-age pension



Note: Changes in the VERP and old-age retirement age due to increases in life expectancy have to be confirmed by Parliament 12 (VERP) and 15 (old-age) years before they take effect. In the projection, it is assumed that Parliament confirms these increases in the retirement age.
Source: Own calculations based on EUROPOP2013

Part II: Demographic and labour force projections

2.1 Demographic development

The population is expected to increase from 5.6 million inhabitants in 2013 to 6.5 million in 2060, *cf. table 5*. Furthermore, the old-age dependency ratio is projected to increase from 28 in 2013 to 42 in 2060, which – all else equal – will lead to higher expenditures on public pensions. Life expectancy at 65 increases with around 5 years for both men and women. Life expectancy at 60 is an important number in the Danish retirement system, as the retirement age is linked to this number and it is therefore also included in the table. Net migration is projected to stay positive throughout the projection period.

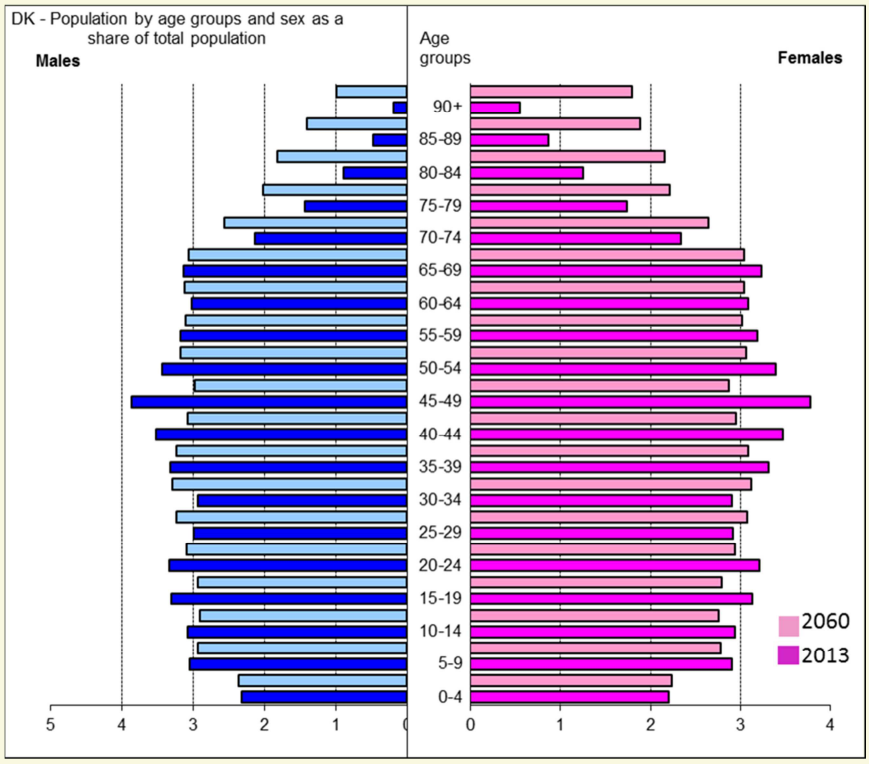
Table 5
Main demographic variables evolution

	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	5615	5788	6069	6285	6423	6543	2060
Population growth rate	0,4	0,5	0,4	0,3	0,2	0,2	2024
Old-age dependency ratio (pop65/pop15-64)	27,9	31,6	36,9	40,7	39,4	41,8	2060
Ageing of the aged (pop80+/pop65+)	23,1	23,8	31,5	33,1	39,5	39,2	2055
Men - Life expectancy at birth	78,2	79,3	80,8	82,2	83,5	84,8	2060
Men - Life expectancy at 60	21,4	22,3	23,4	24,6	25,6	26,7	2060
Men - Life expectancy at 65	17,5	18,3	19,3	20,3	21,3	22,2	2060
Women - Life expectancy at birth	82,1	83,2	84,7	86,2	87,5	88,7	2060
Women - Life expectancy at 60	24,4	25,3	26,6	27,8	28,9	29,9	2060
Women - Life expectancy at 65	20,2	21,1	22,2	23,3	24,3	25,3	2060
Men - Survivor rate at 65+	85,7	87,2	89,1	90,7	92,1	93,2	2060
Men - Survivor rate at 80+	54,5	58,3	63,5	68,2	72,4	76,1	2060
Women - Survivor rate at 65+	90,6	91,7	93,0	94,1	95,0	95,7	2060
Women - Survivor rate at 80+	66,9	70,4	74,8	78,7	82,0	84,9	2060
Net migration	21,2	18,9	19,9	16,3	10,5	10,0	2013
Net migration over population change	0,9	0,7	0,7	0,9	0,9	0,8	2045

Source: European Commission

Figure 7 shows the development in the population pyramid from 2013 to 2060. As in other member states, a larger share of the population in 2060 will be in older cohorts, compared to 2013.

Figure 7
Population pyramid, 2013 and 2060



Source: European Commission

2.2 Labour force

Labour force participation rates (LFPR) are projected to increase for older workers due to the increase in the retirement ages described in part I. For people aged 55-64, the LFPR will increase from 65.3 % in 2013 to 78 % in 2060*, cf. table 6*. The largest increase will occur in the period until 2020 where the LFPR will already have increased to 74.2 %

For people aged 65-74, the LFPR has a much lower starting point at 10.9 %, mainly reflecting the statutory retirement age of 65 years. As the retirement age is increased to 72.5 in 2060, the LFPR in this age group increases to 34.1 % in 2060.

Table 6

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	65,3	74,2	76,2	76,8	77,9	78,0	2060
Employment rate for workers aged 55-64	62,0	71,3	73,5	74,2	75,2	75,4	2060
Share of workers aged 55-64 on the total labour force	94,9	96,1	96,6	96,6	96,6	96,6	2040
Labour force participation rate 65-74	10,9	14,4	22,4	24,9	28,1	34,1	2060
Employment rate for workers aged 65-74	10,9	14,3	22,3	24,8	28,1	34,0	2060
Share of workers aged 65-74 on the total labour force	99,6	99,7	99,7	99,8	99,8	99,8	2047
Median age of the labour force	40,0	41,0	40,0	40,0	41,0	41,0	2016

Source: European Commission

Due to pension reforms, the average effective exit age is projected to increase with 3.6 years for men from 2013-2060 and with 4.6 years for women, *cf. table 7 and 8*.

However, the increase in the average effective exit age is smaller than the increase in e.g. the statutory old-age pension age, which increases from 65 years in 2013 to 72.5 years in 2060, an increase of 7.5 years, *cf. table 1 above*. The smaller effect on the effective exit age compared to the statutory retirement age should be seen in the light of the fact that the increase in the statutory retirement age due to the indexation rule has to be confirmed by Parliament. Therefore, the Commission has not included the full effect of the increase in the statutory retirement age in the projection of employment and in the calculation of the average effective exit age.

Furthermore, the entry age is also projected to decrease such that the total increase in the average effective working career is projected to be 5.7 years for men and 6.4 years for women. In total, the percentage of adult life spent at retirement is approximately unchanged in 2060 compared to 2030 for both men and women.

Table 7

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)	24,9	22,9	22,9	22,9	22,9	22,9	2013
Average effective exit age (CSM) (II)	64,3	66,2	67,0	67,3	67,6	67,9	2060
Average effective working career (CSM) (II)- (I)	39,4	43,3	44,2	44,5	44,8	45,1	2060
Contributory period	0,0	0,0	0,0	0,0	0,0	0,0	2013
Contributory period/Average working career	0,0	0,0	0,0	0,0	0,0	0,0	2013
Duration of retirement **	18,3	17,5	17,7	18,7	18,8	19,7	2060
Duration of retirement/average working career	46,5	40,4	40,1	42,1	42,0	43,7	2013
Percentage of adult life spent at retirement***	28,3	26,6	26,5	27,5	27,5	28,3	2013
Early/late exit****	1,5	1,8	1,7	1,8	2,5	5,0	2060

Source: European Commission

Table 8

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)	25,0	23,2	23,2	23,2	23,2	23,2	2013
Average effective exit age (CSM) (II)	63,1	65,3	65,5	66,1	66,9	67,7	2060
Average effective working career (CSM) (II)- (I)	38,1	42,1	42,3	42,9	43,6	44,5	2060
Contributory period	0,0	0,0	0,0	0,0	0,0	0,0	2013
Contributory period/Average working career	0,0	0,0	0,0	0,0	0,0	0,0	2013
Duration of retirement **	21,9	21,1	21,4	22,4	22,6	22,6	2057
Duration of retirement/average working career	57,5	50,2	50,6	52,2	51,8	50,8	2013
Percentage of adult life spent at retirement***	32,7	30,8	31,0	31,8	31,6	31,2	2013
Early/late exit****	2,5	1,8	2,3	3,6	4,0	5,7	2060

Source: European Commission

Part III: Projection results

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

All pension schemes are included in the projections, including old age pension, disability pension, civil servant pension, VERP, ATP, LD, occupational and private labour market schemes.

[ESSPROS]

Table 9

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

	2003	2004	2005	2006	2007	2008	2009	2010
1 Eurostat total pension expenditure	:	:	:	:	:	:	:	:
2 Eurostat public pension expenditure	:	:	:	:	:	:	:	:
3 Public pension expenditure (AWG)	:	:	:	:	:	:	:	:
4 Difference (2) - (3)	:	:	:	:	:	:	:	:
5 Expenditure categories not considered in the AWG definition, please specify:	*:*	*:*	*:*	*:*	*:*	*:*	*:*	*:*
5.1 ...	*:*	*:*	*:*	*:*	*:*	*:*	*:*	*:*
5.2 ...	*:*	*:*	*:*	*:*	*:*	*:*	*:*	*:*
5.3 ...	*:*	*:*	*:*	*:*	*:*	*:*	*:*	*:*

Source:

3.2 Overview of projection results

Public pension expenditures decrease from 10.4 % of GDP to 7.3 % of GDP in 2060, a decrease of 3.2 % of GDP, *cf. table 10 and figure 8*. Around 60 % of the decline occurs in the period 2013-2022. The decrease in the public pension expenditures is a result of a number of different factors, see below.

Net public pension expenditures also decline throughout the projection period as well as the tax revenue from public pensions. In the projection, the tax rate on each of the public schemes are kept constant at the 2013-level. However, the average tax rate is not the same for the different pension schemes and the total implicit tax shows a declining trend due to compositional effects; see part IV for more details concerning tax rates.

Table 10
Projected gross and net pension spending and contributions (% of GDP)

Expenditures	2013	2020	2030	2040	2050	2060	Peak year*
Gross public pension expenditure	10,4	8,9	8,5	8,1	7,6	7,3	2013
Private occupational pensions	4,6	5,6	5,4	5,9	6,4	5,9	2044
Private individual pensions	:	:	:	:	:	:	:
Mandatory private	:	:	:	:	:	:	:
Non-mandatory private	:	:	:	:	:	:	:
Gross total pension expenditure	15,1	14,5	13,8	14,0	14,0	13,2	2013
Net public pension expenditure	7,5	6,4	6,1	5,9	5,6	5,3	2013
Net total pension expenditure	10,2	9,7	9,3	9,4	9,4	8,9	2014
Contributions	**2013**	**2020**	**2030**	**2040**	**2050**	**2060**	**Peak year***
Public pension contributions	0,2	0,1	0,1	0,1	0,1	0,1	2013
Total pension contributions	6,2	5,8	5,8	5,8	5,8	5,8	2013

Note: The contributions to the public pension schemes only consist of VERP-contributions. Only the total of the occupational and private schemes together are reported.
Source: Own calculations

Benefits paid from private schemes are increasing over time from around 4½ % of GDP in 2013 to around 6 % of GDP in 2060, mainly reflecting the maturation of the pension schemes, *cf. figure 9* and the description in part I. Contributions as a share of wages remain constant in the projection. However, as a share of GDP, contributions decline slightly until 2018 due to higher growth in productivity compared to wages, see discussion below.

Figure 8
Public pension expenditures

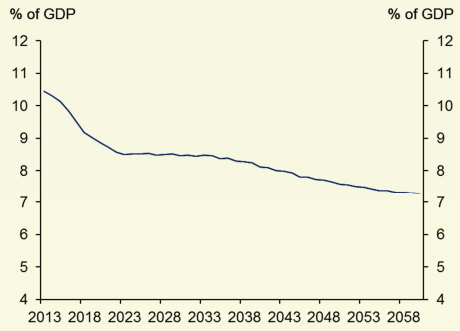
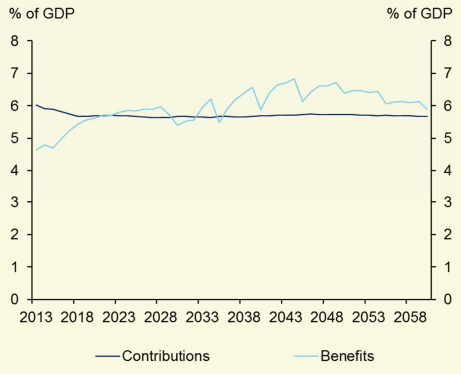


Figure 9
Private pension expenditures and contributions



Note: "Private pensions" include both occupational and private schemes as well as ATP and LD
Source: Own calculations

Taxes on private pensions are substantial in absolute terms. Due to the increase in benefits paid out, the taxes on private pensions increase from 2.0 % of GDP in 2013 to 2.3 percent of GDP in 2060. The average tax rate exhibits a minor decline over time, which is again due to compositional effects.

The projected decline in public pension expenditures is due to a number of factors, *cf. table 11 and figure 10*.

Table 11
Projected gross public pension spending by scheme (% of GDP)

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

Source: Own calculations

First and foremost, the increase in the old-age pension retirement age as described in part I contributes to the decline in expenditures on old age pension from 6 % of GDP to 4.6 % of GDP, due to a lower number of pensioners and higher employment, *cf. figure 10 and 11*.

Figure 10
Public pension expenditures, by scheme

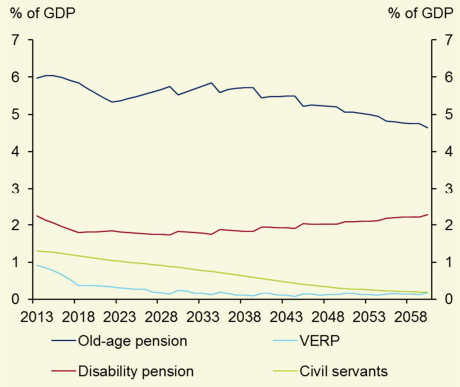
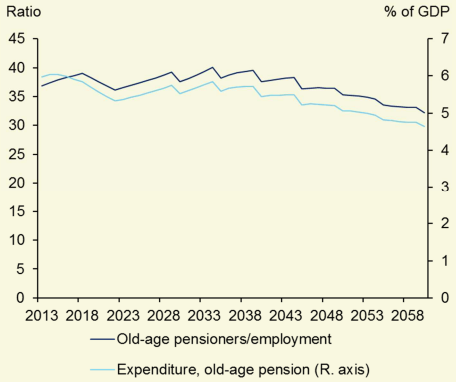


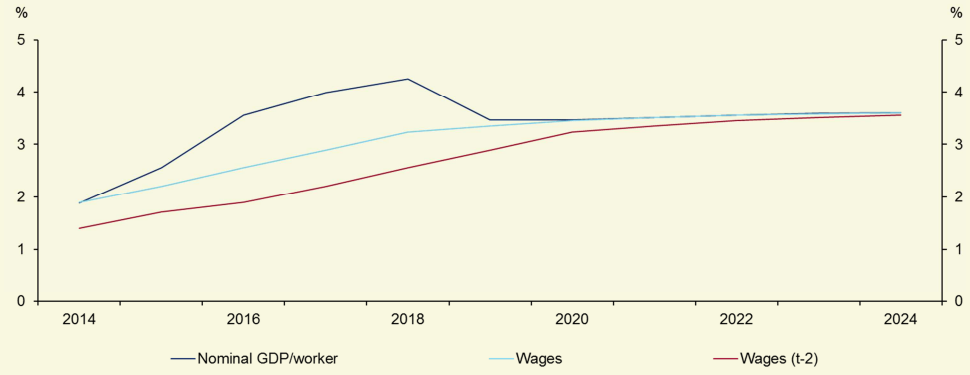
Figure 11
Old-age pension expenditures and ratio of old-age pensioners to employment



Source: Own calculations

In the period until 2018, the expenditures decline even though the ratio of old-age pensioners to employment increases. This is because the productivity per worker increases more than wages, which leads to lower expenditures as a share of GDP, *cf. figure 12*. This feature of the macroeconomic assumptions affects all pension expenditures. Furthermore, income transfers are regulated in line with wage growth 2 years before, which also leads to a lower indexation in the first couple of years, *cf. figure 12*.

Figure 12
Growth rates: Productivity and wages



Source: Own calculations

The reform of VERP in 2011 (a part of the Retirement Reform) contributes to the decline in VERP expenditures from 0.9 % of GDP in 2013 to 0.4 % of GDP in 2018 and further down to 0.2 % of GDP in 2060.

Expenditures to civil servants pensions also drop from 1.3 % of GDP in 2013 to 0.2 % of GDP. This occurs because only very few people are hired as civil servants (primarily within the armed forces and the police). All other public employees are instead enrolled in the occupational pension schemes.

Finally, expenditures on disability remain stable at around 2.3 % of GDP. It drops initially, partly due to lower indexation compared to productivity cf. above, and partly due to a strong increase in employment. Furthermore, the indexation of disability benefits are also reduced in the period 2016-2023 due to the 2012 tax reform, as described in part I. From around 2030, expenditures on disability benefits begin to increase. This is due to the increase in retirement ages, where it is assumed that the share of people on disability pension above the retirement age in 2014 (65 years) and below the increased retirement age are projected to increase relative to younger age groups. See model description in part IV.

3.3 Description of the main driving forces behind the projection results

The decomposition of the development in public pension expenditures is shown in *table 12*.

Table 12

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	-1,6	-0,4	-0,3	-0,5	-0,3	-3,2	-0,063
Dependency ratio effect	1,2	1,3	0,9	-0,3	0,4	3,7	0,080
Coverage ratio effect	-1,2	-1,1	-0,7	-0,1	-0,6	-3,7	-0,080
Coverage ratio old-age*	*-0,2*	*-0,8*	*-0,6*	*-0,2*	*-0,6*	*-2,4*	*-0,049*
Coverage ratio early-age*	*-3,9*	*-1,4*	*0,2*	*-0,5*	*-0,1*	*-5,7*	*-0,131*
Cohort effect*	*-0,8*	*-1,5*	*-1,5*	*1,0*	*-0,4*	*-3,2*	*-0,074*
Benefit ratio effect	-1,1	-0,3	-0,4	-0,2	0,1	-2,0	-0,042
Labour Market/Labour intensity effect	-0,4	-0,3	-0,1	0,0	-0,2	-0,9	-0,020
Employment ratio effect	*-0,4*	*-0,1*	*-0,1*	*0,0*	*0,0*	*-0,5*	*-0,010*
Labour intensity effect	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,001*
Career shift effect	*-0,1*	*-0,2*	*-0,1*	*0,0*	*-0,2*	*-0,5*	*-0,010*
Residual	0,0	-0,1	0,0	0,0	0,0	-0,2	-0,001

Source: European Commission and own calculations

The decomposition shows that the dependency ratio gives rise to an increase in the public pension expenditures. The expenditures are lower in 2060 compared to 2013 primarily due to the decrease in the coverage ratio, which is caused by the

increase in the retirement age. The decline in the benefit ratio also contributes to the decrease in expenditures. The decrease in the benefit ratio occurs due to 6 factors:

- Lower indexation of VERP and disability benefits compared to wages due to 2012 Tax Reform as described in part 1.
- Composition effect: In 2060, there will be relatively more people on old-age pension than on pensions with higher benefits such as VERP, disability and civil servant pension.
- Recipients of civil servant pensions decrease over time and is almost phased out in 2060. Since most recipients of civil servants pension also receives old-age pension, this leads to a decrease in the benefit ratio.
- The increase in supplementary income from private pensions leads to a reduction of the public old age pension and hence, a reduction in the benefit ratio.
- Income transfers are regulated in line with wage growth 2 years before, which leads to a lower indexation in the first couple of years, *cf. above*.
- Productivity per worker increases more than wages until 2018, *cf. above*.

Virtually everyone is covered in the old age pension scheme, *cf. table 13*. The benefit ratio for public pensions decreases from 42 % in 2013 to 35 % in 2060 due to the first 5 factors mentioned above[1]. For old-age pensions, the decline in benefit ratio is much smaller; from 32 % in 2013 to 29 % in 2060. For occupational and private schemes, the benefit ratio increases from 25 % in 2010 to 38 % by 2060, due to the maturation of the occupational schemes. The total reported benefit ratio is projected to be stable. However, for an old-age pensioner, the total reported benefit ratio (including occupational and private pensions), is projected to increase from 57 % in 2013 to 67 % in 2060.

The replacement rate develops in line with the benefit ratio. The only difference is that since the wage at retirement is higher than the average wage, the replacement rate is lower than the benefit ratio. The benefits used for the replacement rate and the benefit ratio are the same. In the projection, there is no difference between the benefit for new and older pensioners belonging to the same scheme.

[1] But not the 6th, since the benefit ratio in table 13 compares with wages, while table 12 compares with GDP.

Table 13
Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)

	2013	2020	2030	2040	2050	2060
Public scheme (BR)	42,5	39,1	37,6	35,9	34,8	35,1
Public scheme (RR)	39,7	36,5	35,1	33,5	32,5	32,8
Coverage	100,0	100,0	100,0	100,0	100,0	100,0
Public scheme old-age earnings related (BR)	57,5	56,2	60,2	66,1	70,6	64,9
Public scheme old-age earnings related (RR)	53,7	52,5	56,3	61,7	66,0	60,6
Coverage	9,2	8,7	6,4	3,7	1,9	1,4
Private occupational scheme (BR)	25,1	30,7	29,6	32,2	37,1	37,6
Private occupational scheme (RR)	23,5	28,7	27,7	30,1	34,7	35,1
Coverage	75,4	80,6	81,0	80,7	78,9	75,6
Private individual scheme (BR)	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:
Coverage	:	:	:	:	:	:
Total (BR)	61,5	63,9	61,6	61,8	64,1	63,5
Total (RR)	57,4	59,7	57,5	57,8	59,9	59,4

Note: Coverage is calculated with reference to number of pensioners.
Source: Own calculations

As mentioned in part I, currently more than 90 % of wage earners contribute to occupational schemes. However, the pension model for occupational and private schemes does not follow each individual, but follows the contribution, wealth and benefits for a cohort as a whole. Therefore, the model is not well designed to calculate the coverage ratio for occupational and private schemes. See part IV for a more detailed description. In the calculation of the benefit ratio for occupational schemes, the number of recipients is therefore based on number of recipients of old-age pension.

Furthermore, only the total benefit ratio for occupational and private schemes is reported, since the decomposition into occupational and private schemes is rather uncertain.

Dependency ratios

The number of pensioners increases until around 2040, and then declines again. On the other hand, employment is projected to increase throughout the projection period. This results in a decline in the Pension System Dependency Ratio (SDR), *cf. table 14*. This can be compared with an increase in the old-age dependency ratio, due to a large increase in the number of people aged 65+, while the population aged 15-64 remains relatively stable.

Table 14
System dependence ratio and old-age dependency ratio

	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	1318,4	1334,0	1371,4	1400,3	1394,3	1360,5
Employment (thousand) (II)	2699,5	2857,6	2960,4	3006,4	3110,5	3189,4
Pension System Dependency Ratio (SDR) (I)/(II)	48,8	46,7	46,3	46,6	44,8	42,7
Number of people aged 65+ (thousand) (III)	1013,3	1160,0	1358,9	1507,0	1516,6	1610,5
Working age population 15 - 64 (thousand) (IV)	3628,5	3669,6	3685,0	3706,3	3849,5	3854,4
Old-age Dependency Ratio (ODR) (III)/(IV)	27,9	31,6	36,9	40,7	39,4	41,8
System efficiency (SDR/ODR)	1,7	1,5	1,3	1,1	1,1	1,0

Source: European Commission and own calculations

Number of pensioners compared with inactive and total population

The total number of pensioners as a share of the inactive population is close to 100 in 2013 for the age groups older than 55 years, *cf. table 15 and 16*. However, for the age groups 60-74, the share falls as the retirement age increases.

An example can illustrate these results: Take the age group 65-69. In 2060, the old-age retirement age is 72.5, so it is not possible for this age group to receive old-age pension. Furthermore, the VERP age is 69.5 years, so only a small share of the age group could be eligible. In any case, not many people contribute to this scheme any longer. Also, one has to contribute for 30 years, so it is not possible to receive VERP benefits if this has not happened.

The share of the age group on disability benefits is projected to between 19 and 24 %, which is higher than for younger age groups, see part IV for a more detailed description.

The source of income for people that have retired, but have not yet reached the statutory retirement age can be occupational and private pensions, which – as a general rule – can be paid out 5 years before the public old-age pension age. Furthermore, occupational and private pensions with contributions before May 1st 2007 can be paid out at the age of 60 (5 years before the current public old-age pension age). Another source of income can be private savings outside the pension system.

Early pay out of occupational and private pensions is not explicitly modelled in the pension projection. However, for the assessment of fiscal sustainability it does not make a significant difference when the occupational and private pensions are paid out.

Table 15
Pensioners (public scheme) to inactive population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	7,8	5,7	4,7	4,7	4,7	4,6
Age group 55-59	80,7	83,4	80,2	79,1	74,1	73,9
Age group 60-64	86,2	67,9	54,3	56,8	59,7	60,0
Age group 65-69	113,9	114,3	86,2	44,5	44,9	44,2
Age group 70-74	104,4	105,1	108,4	109,5	90,7	76,9
Age group 75+	98,6	98,5	98,4	98,3	98,1	97,8

Source: European Commission and own calculations

Table 16
Pensioners (public schemes) to total population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	3,1	2,2	1,8	1,8	1,8	1,8
Age group 55-59	14,1	13,5	12,3	12,7	12,0	12,0
Age group 60-64	45,3	24,8	17,5	17,0	17,3	16,6
Age group 65-69	97,2	88,5	57,5	27,4	25,3	22,2
Age group 70-74	98,6	98,6	98,1	97,5	79,0	64,9
Age group 75+	98,6	98,5	98,4	98,3	98,1	97,8

Source: European Commission and own calculations

The ratio of pensioners to inactive population is lower for the age group 65-69 than for the age group 60-64 from 2040 and onwards. This reflects that there are more inactive people in the age group 65-69 compared to the age group 60-64, which again reflects a lower participation rate for the age group 65-69. Compared to the total population, there are more pensioners in the age group 65-69 compared to ages 60-64 throughout the projection period.

For the age group 60-64, the ratio of pensioners to inactive population declines until 2030, due to fewer people on VERP, as the statutory retirement age for VERP reaches 65 years in 2027. From around 2040, the ratio increases slightly, which is due to a higher ratio of people on disability pension. This mainly reflects a higher participation rate as the ratio of pensioners to *population* is approximately constant from 2040 to 2060.

New pension expenditures

Expenditures on new public pensions are not an output from the public pension models, but have to be calculated ex-post.

The number of new pensioners has been calculated using the following formula, where it is utilized that the change in the stock of old-age pensioners for the same cohort between two periods can either be due to new pensioners or deaths:

$$Stock(y,a) - stock\ (y-1,a-1) = New(y,a) - deaths(y,a) =>$$
$$New(y,a) = Stock(y,a) - stock\ (y-1,a-1) + deaths(y,a)$$

,where *y* is year, and *a* is age.

The reported numbers in table 17 are strongly dependent on the increases in the retirement age, since virtually everybody receives old-age pension at the earliest possible date, see also description in part IV. The retirement age for the old-age pension is increased with 1 year in 2030 and 2040 and with ½ year in 2050 and 2060. Therefore, there are almost no new old-age pensioners in 2030 and 2040, and only half a cohort in 2050 and 2060. For this reason, the numbers in table 17 underestimate the underlying trend in number of new pensioners. Therefore, a 5 year average has been calculated, which better reflects the underlying trend. Furthermore, figure 13 and 14 illustrate the development over the period 2010-60 for new pensioners and expenditures on new pensioners.

Total expenditures on new pensions are calculated as the number of new pensioners times the average pension. However, only data on the average pension is available, and not for the average *new* pension. Using the average pension for new old-age pensioners leads to slightly biased results, since younger cohorts will have larger payouts from private pensions than older cohorts due to the build-up of the occupational scheme. This leads to lower public pension expenditures for younger cohorts. This is not taken into account with this rough estimate, which therefore overestimates the expenditures for younger cohorts in each year, and therefore it overestimates the expenditures on new pensions.

Table 17 also shows minimum and average public pensions. The minimum public old-age pension is received by people with substantial additional income, see description in part I. Only a small fraction of the population of pensioners has such a large additional income. The ratio between the average pension and the minimum pension declines slightly over the projection period due to the increase in occupational pension benefits which lowers the public pension supplement (and therefore lowers the average pension), but does not affect the minimum pension (because the supplement is already phased out for people receiving the minimum pension).

Table 17
Projected and disaggregated new public pension expenditure

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	1.058	554	33	39	1.443	2.186
I-b Projected new pension expenditure (millions EUR) - average over 5 years	1.015	659	1.351	1.814	2.549	3.340
II. Number of new pensioners	70.604	32.269	1.365	1.139	30.302	32.187
II-b. Number of new pensioners - average over 5 years	65.936	38.663	55.579	53.418	53.507	53.033
III. Minimum amount	9.372	10.965	15.551	22.126	31.404	44.601
IV. Average flat rate public pension (I/II)	14.984	17.181	24.289	33.964	47.625	67.906
V. Pension relative to minimum amount (IV/III)	1,60	1,57	1,56	1,54	1,52	1,52

Source: Own calculations

Figure 13
Number of new old-age pensioners

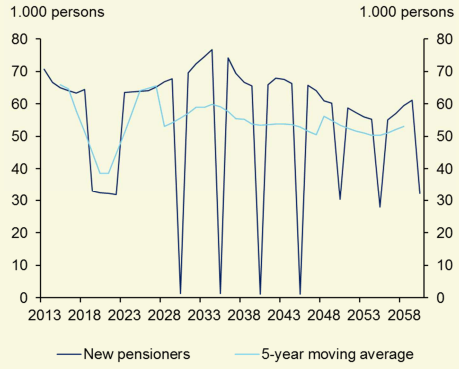
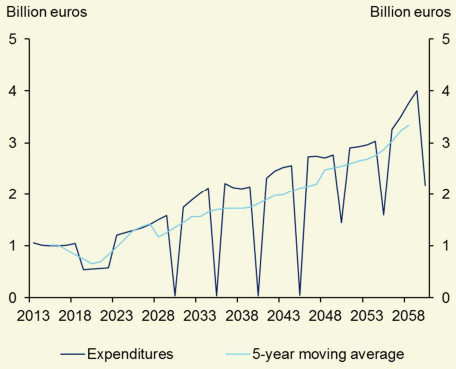


Figure 14
Expenditures on new old-age pensioners



Source: Own calculations

3.4 Financing of the pension system

All public pensions are financed on a PAYG basis, i.e. financed by general taxes. To become eligible for the VERP scheme, however, one must pay contributions for 30 years. Therefore, the only contributions in table 18 are contributions to the VERP scheme.

Table 18

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 contribution	398,2	352,4	492,7	777,2	1140,2	1624,2
Employer contribution	*:*	*:*	*:*	*:*	*:*	*:*
Employee contribution	*398,2*	*352,4*	*492,7*	*777,2*	*1140,2*	*1624,2*
State contribution	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*
Number of contributors (I)	616,9	480,3	484,0	536,6	554,6	556,3
Employment (II)	2699,5	2857,6	2960,4	3006,4	3110,5	3189,4
Ratio of (I)/(II)	0,2	0,2	0,2	0,2	0,2	0,2

Source: European Commission and own calculations

3.5 Sensitivity analysis

The results from the sensitivity analyses are reported in *table 19*.

Table 19

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

	2010	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	10,4	8,9	8,5	8,1	7,6	7,3
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	-0,1	-0,1
Higher emp. of older workers (+10 pp.)	0,0	-0,2	-0,4	-0,3	-0,3	-0,3
Lower migration (-20%)	0,0	0,0	0,1	0,1	0,2	0,2
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	0,0	0,0	0,0	0,0	0,0
Total Pension Expenditure						
Baseline	15,1	14,5	13,8	14,0	14,0	13,2
Higher life expectancy	0,0	0,0	0,1	0,2	0,0	0,0
Higher lab. productivity (+0.1pp.)	0,0	0,0	-0,2	-0,3	-0,3	-0,3
Lower lab. productivity (-0.1pp.)	0,0	0,0	0,2	0,3	0,4	0,4
Higher emp. rate (+1 p.p.)	0,0	-0,2	-0,3	-0,3	-0,3	-0,3
Higher emp. of older workers (+5 pp.)	0,0	-0,3	-0,6	-0,6	-0,6	-0,6
Lower migration (-10%)	0,0	0,1	0,2	0,3	0,4	0,4
Risk scenario	0,0	0,0	0,1	0,3	0,4	0,4
Policy scenario: linking retirement age to increases in life expectancy	0,0	0,0	0,0	0,0	0,0	0,0

Source: Own calculations

Higher life expectancy
Higher life expectancy increases public expenditures with 0.2 % of GDP in 2060. Higher life expectancy for 60 year olds will have an effect on the retirement age due to the indexation rule. However, the maximum increase in the retirement age is 1 year every 5 years, and this maximum increase already takes place in the baseline until 2045. Therefore, it is only from 2050-2060 that the retirement age is affected, *cf. figure 15*. As a result of this, expenditures increase until around 2050 as the number of pensioners increase, *cf. figure 16*. From around 2050, the effect from the higher retirement age and higher employment kicks in and leads to a lower effect in 2060 compared to 2050.

The fact that the indexation rule includes a maximum increase of 1 year every 5 years also means that the effect of this sensitivity scenario is not linear, i.e. the effect of 2 year increase is not twice as large as the effect from a 1 year increase.

Figure 15
Retirement age, baseline and HLE

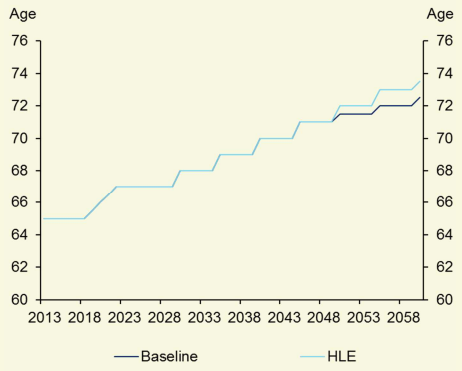
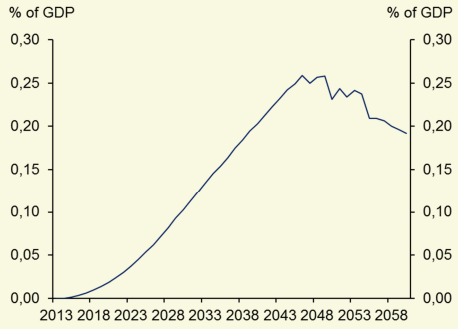


Figure 16
Difference in public pension expenditures in HLE compared to baseline



Source: Own calculations

Higher/lower labour productivity and risk-scenario
Since pensions are indexed in line with nominal wages, a change in the labour productivity does not alter the results in any perceptible way. There is a very small effect on the old-age pension supplement as e.g. lower productivity increases private pension benefits as a share of GDP which leads to a reduction in the old-age pension supplement.

Higher employment rate and Higher employment rate for older workers
A higher employment rate increases GDP which lowers the public pension expenditures as a share of GDP.

Public pensions are flat rate and therefore not earnings related. Therefore, public pension expenditures do not increase when people spend more years on the labour market.

Lower migration
This scenario results in higher expenditures than in the baseline scenario. The nominal expenditures decreases slightly due to a lower number of pensioners, but the lower inflow of migrants reduces labour supply and hence nominal GDP, thereby increasing the expenditures as a share of GDP.

Policy scenario
Since the retirement age is already linked to life expectancy in the baseline scenario, the impact of the policy scenario is very limited.

3.6 Description of the changes in comparison with earlier projections

Since the 2006-report, pension reforms have contributed to a lowering of the change in pension expenditures from +3.2 % of GDP in the 2006-report to – 3.2 % of GDP in 2015, *cf. table 20*.

Compared to the 2012-report, expenditures decline with 2 % of GDP more in the current projections, which is almost solely due to a lower effect from the dependency ratio.

The change in pension expenditures relative to GDP in different Ageing Reports are also affected by output and employment gaps in the starting year. If the employment gap is large and negative, the closing of this gap will – all else equal - lead to a decline in expenditures. The flipside of the coin is that expenditures are higher as a share of GDP in the starting year than would be the case if output and employment gaps were 0. This should be kept in mind when different versions of the Ageing Reports are compared.

Table 20
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 *	3,20	7,21	-2,80	-0,39	-0,48	:	-0,33
2009 **	0,11	6,47	-4,95	-0,14	-0,53	:	-0,73
2012 ***	-1,15	5,66	-4,34	-0,48	-1,21	0,01	-0,79
2015****	-3,16	3,69	-4,30	-0,48	-1,41	0,02	-0,69

Note: * 2004-2050; ** 2007-2060; *** 2010-2060; **** 2013-2060
Source: European Commission

The change compared to the 2012-report is further explained in table 21.

Table 21
Decomposition of the difference between 2012 and the new public pension projection (% of GDP)

	2013	2020	2030	2040	2050	2060	Change, 2013-2060
Ageing report 2012	10,2	10,0	9,9	9,7	9,1	8,9	-1,3
Change in assumptions	0,5	-0,4	-0,6	-0,8	-0,9	-0,9	-1,4
Improvement in the coverage or in the modelling							
Change in the interpretation of constant policy							
Policy related changes:							
- Lower indexation of benefits according to 2012 Tax Reform	0,0	-0,1	-0,2	-0,1	-0,1	-0,1	-0,1
- Reform of disability pension	0,0	-0,3	-0,5	-0,5	-0,5	-0,4	-0,4
Residual	0,2	0,3	0,3	0,2	0,1	0,1	-0,1
New projection	10,4	8,9	8,5	8,1	7,6	7,3	-3,2

Source: Own calculations

The change in underlying assumptions, including demographic and labour force projections, can explain 1.4 %-points of the difference wrt. the change from 2013-2060. However, one should be careful with the interpretation of this effect, as the nominal GDP from AR12 have been used whereas the benefits per pensioner is taken from AR15 as it is not clear what the counterfactual benefits per pensioner should be. Since nominal GDP in 2013 is lower in AR15 compared to AR12 this leads to an artificially positive effect in 2013 from the change in assumptions.

There are two policy related changes which impacts the results:

- Lower indexation of income transfers (2012 Tax Reform): Lowers expenditures with around 0.15 % of GDP from 2023 and onwards.
- Reform of disability pension: Lowers expenditures with 0.4 % of GDP in 2060 compared to 2013. The main feature of the 2012-reform is that disability pension is only awarded to people above the age of 40, except for cases where it is obvious that work capacity cannot be improved. The reform explains virtually the whole difference compared to number of disability pensioners compared to AR12*, cf. figure 17*. For expenditures, other factors are at play apart from the reform, *cf. figure 18*, including the larger increase in productivity per worker compared to wages until 2018 and that income transfers are regulated in line with wage growth 2 years before. These factors lead to a lower indexation in the first couple of years, as discussed above wrt. the benefit ratio. The lower indexation due to the 2012 tax reform also affects expenditures compared to AR12.

Figure 17
Disability reform: Effect on pensioners

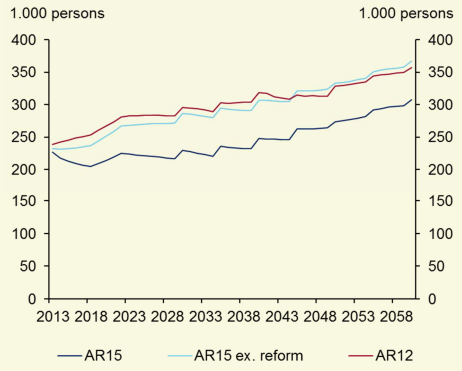
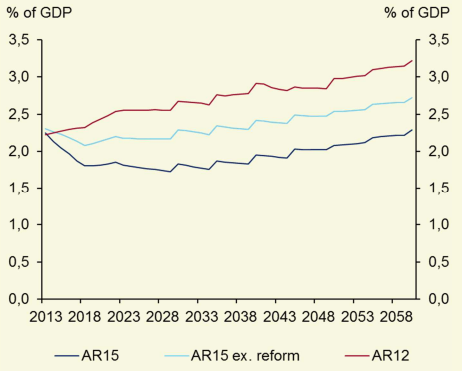


Figure 18
Disability reform: Effect on expenditures



Source: Own calculations

Private pensions: Change compared to AR12

Benefits from private pensions increase with 1.3 % of GDP from 2013-2060 in AR15 compared to 2.2 % of GDP in AR12, *cf. figure 19*. This can be explained by a number of factors: First, contributions are lower in AR15, mainly due to a lower starting point*, cf. figure 20*. Lower contributions eventually lead to lower benefits. Second, nominal GDP growth rate is higher in AR15 compared to AR12. This lowers the pension wealth as a share of GDP because pension wealth is to a higher degree "eroded" by GDP growth. Lower pension wealth as a share of GDP also leads to lower benefits as a share of GDP.

Figure 19
Benefits, private pensions

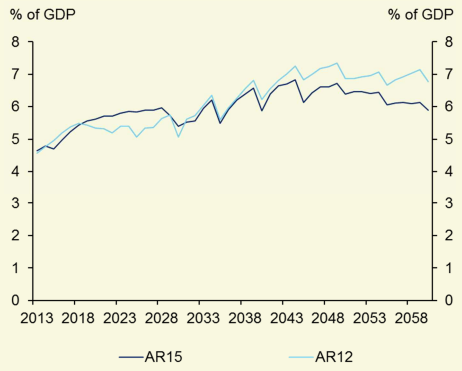
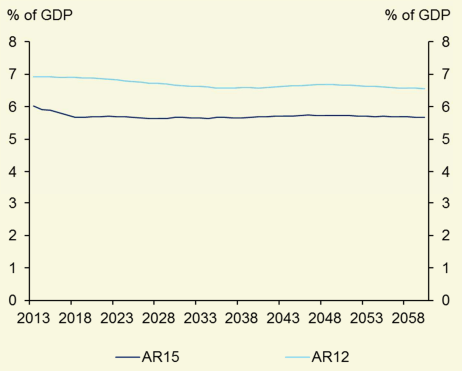


Figure 20
Contributions, private pensions



Source: Own calculations

Part IV: Description of the pension projection model and its base data

Old-age pension and disability pension

General description of the model
The principle behind the projection is to keep the shares of the population in the various schemes constant (broken down by age, gender and ethnic origin). The number of recipients of public pensions is then driven by the demographic changes of the population.

On top of the pure demographic projection the effect of the most recent economic reforms are included. Most noteworthy for the number of pensioners are the two pension reforms: "The Welfare agreement" and "The Retirement Reform" which among other initiatives index the retirement age to life expectancy, *see figure 21*.

As a counterpart to the increasing retirement age, the share of the population receiving other forms of public transfers, primarily disability pension, is likewise expected to increase. As a result, the observed increasing trend for receiving disability pension in the age group 45-54 is extrapolated until the retirement age, as illustrated in *figure 22*.

Figure 21
Effect of indexation: Share of population on old age pension

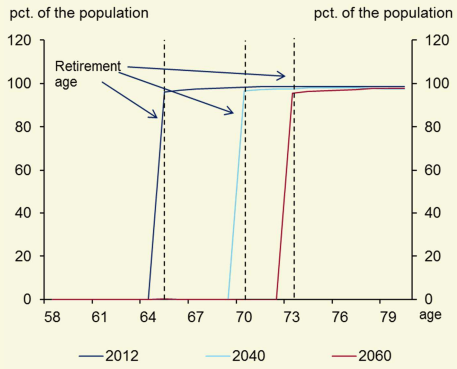
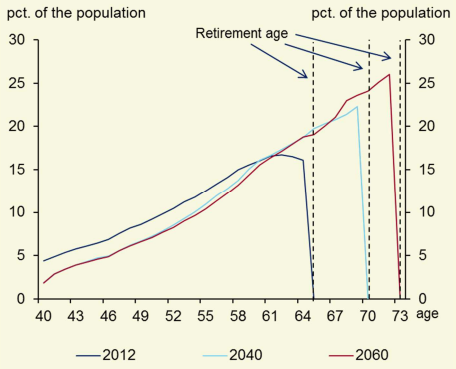


Figure 22
Effect of indexation: Share of population on disability pension



Source: Own calculations

Due to the 2012-reform of disability pension, disability pension is only awarded to people above the age of 40. This is projected to shift the age profile downwards, because the starting point at age 40 is lower. People below 40 years are instead assigned to a "resource process" in order to improve their work capacity. This is not considered disability pension and is therefore not included in the projection.

Furthermore, in the last 5 years before the old-age retirement, a flattening of the disability pension profile is currently observed. However, this is mainly due to

people receiving VERP benefits instead of disability pension. As VERP becomes less utilized in the projection period, the flattening of the profile is removed from the projection.

Data
The number of pensioners in each scheme broken down by age, gender and ethnic origin is from the "Register based labour force statistics" (RAS) provided by Statistics Denmark. The levels from RAS are adjusted to measure full-year recipients in the "Cohesive social statistics" also published by Statistics Denmark.

Assumptions and methodologies applied
In the projection, the distribution by origin is the same as in the national projection (the population projection by AWG is not distributed by origin).

The average pension benefit (per pensioner) in the projection is based on the 2013 level. In nominal terms, the pensions are indexed to the wage growth in the AWG assumptions two years earlier.

The pension supplement in the public old-age pension system is reduced if the pensioner has income in addition to the public old-age pension, for example benefits from the private pension schemes (although only from rate pensions and life-long annuity pensions, not from capital pensions). The benefits from the occupational and private schemes are projected to increase and the expenditures on the pension supplement per pensioner will hence decrease over time. Concretely, it is assumed that when private benefits from rate pensions and life-long annuity pensions increase with 1 % of GDP, public expenditures on old-age pension decreases with 0.12 % of GDP.

The tax rates used in the projections are based on the implicit tax rates in 2013, *cf. table 22*. The tax rate is lower for old-age pension compared to disability and VERP because the benefit is lower and therefore the basic deduction is relatively more important. For civil servants, it is assumed that the basic deduction is applied to other sources of income (typically old-age pension) and therefore the tax rate is higher than for VERP and disability.

Table 22
Tax rates used in projections of tax revenue from pension benefits, public schemes

	Tax rate
Old-age pension	24,3
Disability pension	30,0
VERP	29,4
Civil servants pension	40,8

Source: Own calculations

VERP

General description of the model
The Danish VERP requires that the member has been a member of an unemployment insurance fund and paid the voluntary early retirement contributions for 30 years. Furthermore, it is a precondition that the membership and the contributions start no later than the age of 30.

The MoF's model of VERP recipients projects presently active contributors along with future entrants as well as to what extent people utilize VERP-eligibility.

Assumptions on entrances to the VERP-scheme follows historical patterns corrected for policy changes (in particular the VERP-scheme in the 2011-reform). The projection allows for different characteristics and/or behavior between gender, 5 groups of origins and 5 groups of highest education attained.

Assumptions on the number of people who utilize their VERP-eligibility are based on expected lifetime at VERP-age (affecting the value of the marginal year as a pensioner), private pension size (income effect) and means testing (substitution effect), own payment rate (sorting effect, discouraging people with low propensity to utilize), and demographics (including education).

Private and occupational pension schemes

Institutional context
The AWG calculations relating to private pensions are carried out with a model developed by the Ministry of Finance, building on the pension model developed and maintained by DREAM[2].

In relation to the AWG calculations, only data and assumptions have been changed, not the model.

Assumptions and methodologies applied
All relevant macro numbers are implemented in line with the AWG assumptions.

Data used to run the model
In addition to the data from AWG, data from DREAM (originally from the tax authorities) is used to construct contributions to occupational and private pensions. Furthermore, data on the distribution of assets in the starting year are used to calculate the timing of the payments.

Data on wealth distributed by age is based on 2003-data. Currently, work is being carried out in order to collect pension wealth data on a yearly basis, which will make the projections more accurate.

---

[2] Danish Rational Economic Agents Model (www.dreammodel.dk).

General description of the model

The projection of occupational and individual private pensions schemes are based upon a cohort approach. Each generation accumulates pension wealth (*PW*) according to:

$$PW_t = C_t - B_t + (1 + i_t(1-\tau))PW_{t-1}$$

Where *C* is the annual contribution, *B* is the annual payment from the pension scheme as retiree, *i* is the rate of return on the accumulated pension wealth, and τ is the pension yield tax (15.3 percent). The generational pension wealth evolves with net contributions and rate of return (net of tax) on accumulated assets.

Occupational and private pensions can be paid out either as a lump-sum payment (capital pension) or over several years (either as an annuity for 10-25 years (rate pension) or as a life-long payment). In the model it is assumed that the 3 pension types are paid out over a number of years:

- Capital pension: Paid out over 11 years starting from the retirement age for VERP. This captures the fact that each individual in a generation can choose to have the pension paid out in different years.
- Rate pension: Paid out over 20 years starting from the retirement age for VERP
- Life-long pension: Paid out from the retirement age for old age pension until death. The modelling of the life-long pensions also includes disability and widower's pension.

The pension model covers both occupational and private schemes as well as ATP and LD. Occupational and private schemes are modelled together because the split in the data between occupational and private schemes is subject to uncertainty. Therefore, only aggregate numbers for the total of occupational and private schemes are covered. ATP is paid out as a life-long annuity while LD is paid out as capital pensions.

The basic principles of the model can be illustrated with the modelling of the rate pension scheme:

Contributions

Contributions are age-specific and are calculated according to the following formula for each cohort:

$$C(a,t) = contribution\ ratio\ (a,t) * wages(a,t) * (1 - payroll\ tax(t))$$

Where a=age and t=time. Contribution ratio is share of wages that are contributed to rate pensions. In the projection, the contribution rates are initially kept constant. However, as the pension age increases in line with the Retirement Reform, it is assumed that the extra years of contributions to the labour market schemes are partly neutralized through lower contributions to private individual schemes.

The profile for the contribution ratios are shown in figure 23. The contribution rates are scaled to fit the total contributions in the latest available year.

Figure 23
Contribution ratio, rate pensions

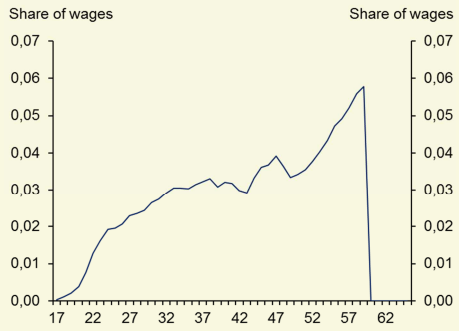
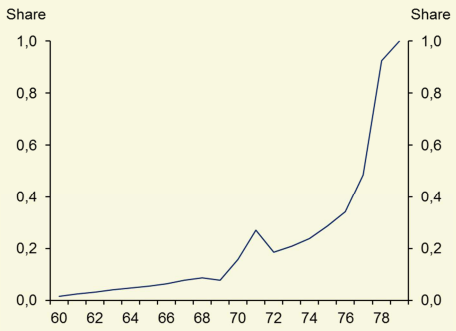


Figure 24
Benefit share, rate pensions



Source: Danish Ministry of Finance

Benefits

Benefits are calculated according to the following formula for each cohort:

$$B(a,t) = benefit\ share(a,t) * Pension\ wealth(a-1,t-1)$$

The benefit share is defined as the share of pension wealth in the previous period, which is paid out as benefits, *cf. figure 24*.

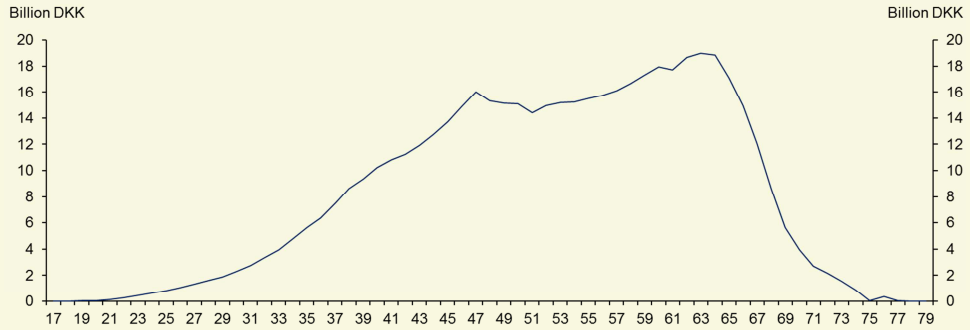
The profile for the benefit share moves in line with increases in the retirement ages.

Pension wealth

Given the formulas to calculate contributions and benefits, assumptions on interest rate at 5 % and constant tax rate on pension yields at 15.3 %, pension wealth is given.

Below is shown the distribution of wealth over age for rate pensions, *cf. figure 25*.

Figure 25
Pension wealth, rate pensions, by age



Source: Danish Ministry of Finance

It is also important to underline that the focus of the model is the cohort, not the individual. I.e. the primary focus of the model is the size of contributions, wealth benefits for each cohort, while the model is not well suited to project the number of contributors and recipients.

The tax payments on benefits have been calculated as the implicit tax rate for each scheme in 2013 multiplied by the benefits. The implicit tax rates are shown in table 23.

Payments from pensions are taxed as personal income, except for the new capital pensions that were introduced with the 2012 Tax Reform, since contributions to these pensions are taxed, while benefits are not. It is assumed that the basic deduction is used on the other sources of income (typically old-age pension).

The progressivity of the tax system has not been modelled. As benefits from private schemes increase in the future, this assumption leads to an underestimation of tax revenues.

Table 23
Tax rates used in projections of tax revenue from pension benefits, private schemes

	Tax rate
Rate pensions and life-long annuities	40,8
Capital pensions (ETT-scheme)	51,2
Capital pensions (TTE-scheme)	0
ATP	40,3
LD	51,2

Source: Own calculations