Council of the
European Union

Brussels, 4 May 2015
(OR. en)

6628/15
ADD 1

ECOFIN 153
SOC 119
BUDGET 10
STATIS 40

COVER NOTE

From:	General Secretariat of the Council
To:	Permanent Representatives Committee (Part 2) / Council (ECOFIN)
Subject:	The 2015 Ageing Report: Economic and budgetary projections for the EU 28 Member States (2013-2060)

Delegations will find attached the second part of the 2015 Ageing Report: Economic and budgetary projections for the EU 28 Member States (2013-2060).

1.4.2. Pension system financing

Contributions to pension schemes, paid by employers and employees, as well as self-employed persons, provide information on whether or not there is a potential future deficit in the pension system. The share of tax revenues allocated to financing the pension system is also taken into account, when relevant, as State contributions. In 2013, contributions to public pension schemes represented 9.6% of GDP at the EU aggregate level (see Table II.1.9). They are projected to slightly increase over the period 2013-2060 by +0.3 p.p. of GDP. However, there are wide differences across Member States. Indeed, substantial increases are projected in several countries, in particular in Germany (+2.6 p.p. of GDP), Cyprus (+2.5 p.p. of GDP), Norway (+2.5 p.p. of GDP) and Ireland (+1.5 p.p. of GDP), in line with legislated contribution rate increases or automatic in-built pension system stabilisers. ([50]) Contributions to the public pension system are projected to decrease in several Member States, in particular in Malta (-1.2 p.p. of GDP), Portugal (-1.0 p.p. of GDP), Estonia (-0.9 p.p. of GDP) and Latvia (-0.8 p.p. of wages). ([51]) Contributions to the public pension system represented 23% of the gross wage bill in 2013 at the EU aggregate level, and are expected to rise by +1.7 p.p. of the gross wage bill by 2060. ([52])

Table II.1.9: **Contributions to the public pension system in 2013 and 2060 (% of GDP)**

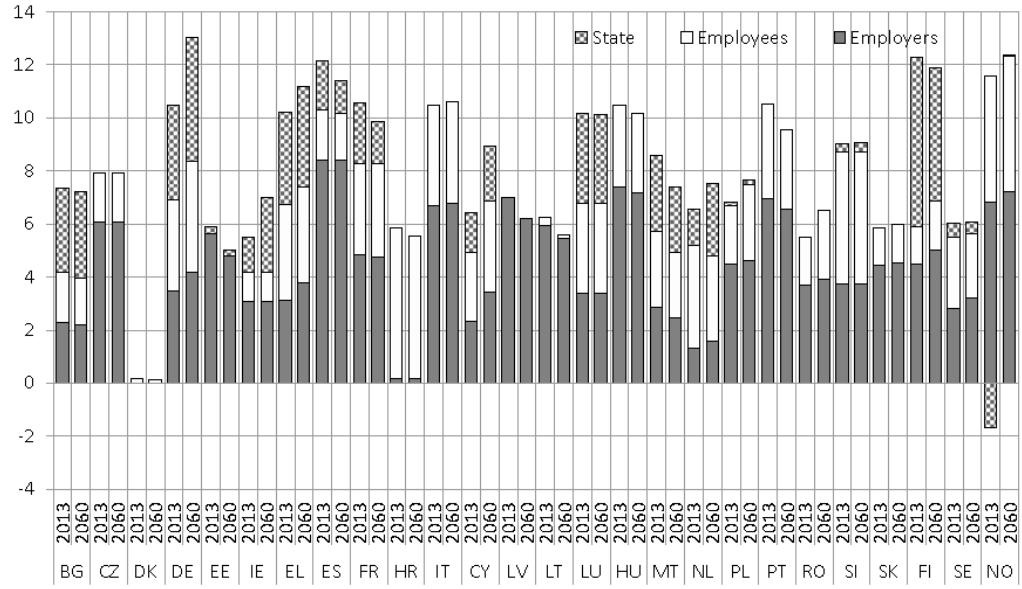
Country	2013	2060	Change 2013-2060
BE	:	:	:
BG	7.3	7.2	-0.1
CZ	7.9	7.9	0.0
DK	0.2	0.1	-0.1
DE	10.5	13.0	2.6
EE	5.9	5.0	-0.9
IE	5.5	7.0	1.5
EL	10.2	11.2	1.0
ES	12.1	11.4	-0.7
FR	10.6	9.9	-0.7
HR	5.8	5.6	-0.3
IT	10.5	10.6	0.2
CY	6.4	8.9	2.5
LV	7.0	6.2	-0.8
LT	6.3	5.6	-0.7
LU	10.2	10.1	-0.1
HU	10.5	10.2	-0.3
MT	8.6	7.4	-1.2
NL	6.5	7.5	1.0
AT	8.3	8.1	-0.2
PL	6.8	7.6	0.8
PT	10.5	9.6	-1.0
RO	5.5	6.5	1.0
SI	9.0	9.1	0.0
SK	5.9	6.0	0.1
FI	12.3	11.9	-0.4
SE	6.0	6.1	0.0
UK	:	:	:
NO	9.9	12.4	2.5
EU	**9.6**	**9.9**	**0.3**
EA	**10.2**	**10.7**	**0.5**

(1) BE: not reported as there is no specific contribution for public pensions. These expenditures are financed through a global contribution for all social security schemes.
IE: contributions reported are also used to finance other social benefits in addition to pensions.
UK: not reported.
Source: Commission services, EPC

In the majority of countries that provides a decomposition of contributions to the public pension system, employers' contributions tend to represent the greatest share (see Graph II.1.3). Employees' contributions share reaches high levels in some countries (in particular, in Croatia, the Netherlands and Slovenia), whilst State contributions are substantial in other Member States, notably Bulgaria, Germany and Finland. In most countries, the structure of contributions provided by employers, employees and the State to the pension system is projected to remain fairly unchanged over the period 2013-2060. Some exceptions exist however: the Netherlands should

([50]) For example, in Germany, contributions evolve in line with expenditures developments (see section 1.5). Indeed, the contribution rate is automatically adjusted to ensure the financial sustainability of the public pension system (see table II.1.11). In Cyprus, several future increases of contribution rates by 2060 have been legislated. In Ireland, State contributions are projected to rise as a share of GDP, due to the obligation of the State to cover any remaining financial gap.
([51]) In the case of Portugal, this reduction partially captures a base year effect due to extraordinary solidarity contributions at the beginning of the projection period.
([52]) Contributions as a percentage of the gross wage bill are presented in Table II.A2.2. in Annex 2.

Graph II.1.3: **Contributions to the public pension system decomposition between 2013 and 2060 (% of GDP)**



(1) BE: no data provided as there are no specific contributions to finance the public pension system.
IE: contributions are also used to finance other social benefits in addition to pensions.
UK: no data provided.
Source: Commission services, EPC

see a significant progression of State contributions share, whilst Finland projects a decrease of this share. In Norway, State contributions should turn positive towards the end of the projection period. ([53])

([53]) The negative State contributions in 2013 and during most of the projection period correspond to the contributions provided by the State pension fund (SPF) to financing government (pension and other) expenditures.

Table II.1.10: **Contribution rates to public pension system**

Country	Contribution rate: employers	Contribution rate: employees	State contributions	
			Contribution rate	Other provisions
BE	24.77% (for all Social security schemes)	13.07% (for all Social security schemes)	-	In the wage earners' scheme, social spending is also funded by State subsidies (16.3% of total in 2013) and alternative funding (16.5%) - mainly share of VAT revenues.
BG	7.1% (born after December 1959) /9.9% (born before January 1960)	5.7% (born after December 1959) /7.9% (born before January 1960)	12%	State commitment for covering the deficit on an annual basis.
CZ	21.5%	6.5%	-	Balance of pension system is part of general government budget.
DK	-	-	-	-
DE	9.45%	9.45%	-	State subsidies with annual indexation. "Sustainability fund" fluctuating between 0.2 and 1.5 of monthly pension expenditures. Contribution rate is set to meet this requirement.
EE	20% (if not participant to the 2nd pillar); 16% (if participant to the second pillar)	-	-	-
IE	Varies	Varies	-	Social Insurance Fund and Social Assistance Fund (used to finance other social benefits in addition to pensions). Shortfalls met by Exchequer.
EL	Main pensions majority: 13.33%; Auxiliary pensions: 3%	Main pensions majority: 6.67%; Auxiliary pensions: 3%	Varies	National budget / other sources
ES	Private sector: 23.6%	Private sector: 4.7%	-	Central government transfers amount to 12.16% of total expenditure.
FR	Private sector (CNAV): 10.20% up to the Social Security Ceiling (SSC), plus 1.75% above the SSC in 2014	Private sector (CNAV): 7.05% up to the SSC, plus 0.25% above the SSC in 2014		Pensions Reserve Fund and Old-age solidarity fund.
HR	-	20% (public PAYG scheme participants only); 15% (participants in both public PAYG scheme and mandatory fully-funded DC scheme)	-	Government committed to cover deficits.
IT	about 2/3 of 33%	about 1/3 of 33%	-	Residual fuding (pension expenditure exceeding contributions) funding by the State.
CY	7.8%	7.8%	4.6%	Reserve fund.
LV	20% (if no participant of 2nd tier) or 16% (if participant of 2nd tier)	-	-	-
LT	23.3%	3% (1% for participant in the private 2nd pillar)	-	-
LU	8%	8%	8%	Buffer fund of at least 1.5 times the amount of annual benefits.
HU	27%	10%	-	-
MT	10%	10%	10%	-
NL	-	17.9%	-	Government supplements shortfall between expenditure and funds raised by the 17.9% tax levy.
AT	Between 12.55% and 20% (according to status)	10.25% and 11.75% (according to status)	Between 5.30% and 12.55% (according to status)	Federal budget covers the deficits in public pension schemes.
PL	9.76%	9.76%	-	Demographic Reserve Fund.
PT	23.75%	11%	-	Social Security Trust Fund.
RO	Between 15.8% and 25.8% (according to working conditions)	10.50%	-	State provides funds from the national budget to cover the public pension system deficit.
SI	8.85%	15.50%	-	State provides funds from the national budget and other sources to cover the difference between the Institute's revenues from contributions and other sources, and the Institute's expenditures.
SK	Varies according to status and participation to the 2nd pillar	Varies according to status and participation to the 2nd pillar	Varies according to status and participation to the 2nd pillar	-
FI	National pensions: abolished in 2010. Earnings-related pensions: from 17.75% to 23.7% (according to sector)	Earnings-related pensions: 5.55% (18-52 years old) /7.05% (53-68 years old)	20.4% for State pensions	Nations pensions: funding from the State at 100%. Earnings-related pensions: 25% of private sector pension are prefunded.
SE	9.04%	6%	"Employer contribution" for social insurances	Buffer funds.
UK	13.80%	Varies according to status and earnings	-	Occasional top-ups to the National Insurance Fund if reserves fall below a threshold recommended by the Government Actuary Department.
NO	PAYG system without earmarked tax going to pensions	PAYG system without earmarked tax going to pensions	PAYG system without earmarked tax going to pensions	State Pension Fund contributes to financing government (pension and other) expenditures.

(1)
When several schemes prevail, the information reported refers to the main (general regime) pension scheme.
Source: Commission services, EPC

1.5. PENSION EXPENDITURE PROJECTIONS

1.5.1. Public pensions

Public pension expenditure change between 2013 and 2060

Public pension expenditure in the EU is projected to increase by +0.4 p.p. of GDP over the period 2013—2040, to 11.7% of GDP, before levelling down to around 11% of GDP by 2060 (see Table II.1.11). In the euro area, an increase of +0.7 p.p. of GDP is projected over the 2013-2040 horizon. In 2060, public pension expenditure ratio should reach 12.3% of GDP, a level similar to 2013.

Yet, the range of projected changes in public pension spending is relatively large across Member States (see Graph II.1.4). Croatia should record the highest decrease (-3.9 p.p. of GDP between 2013 and 2060), along with Denmark, Latvia (-3.1 p.p. of GDP) and France (-2.8 p.p. of GDP). In seven other Member States, a smaller decrease of public pension expenditure ratio - ranging from -2 p.p. of GDP to -0.7 p.p. of GDP - is projected (Italy, Greece, Sweden, Estonia, Spain, Portugal and Poland).

On the other hand, Luxembourg should experience the strongest increase of public pension spending ratio (+4.1 p.p. of GDP over 2013-2060), followed by Slovenia (+3.5 p.p. of GDP), Belgium (+3.3 p.p. of GDP) and Malta (+3.2 p.p. of GDP). Two Member States (Germany and Slovakia) and Norway should see their public pension expenditure ratio grow between 2 to 3 p.p. of GDP, whilst this ratio is projected to rise by a more moderate pace (between +0.7 and 1.1 p.p. of GDP) in the UK, Czech Republic, Netherlands and Ireland.

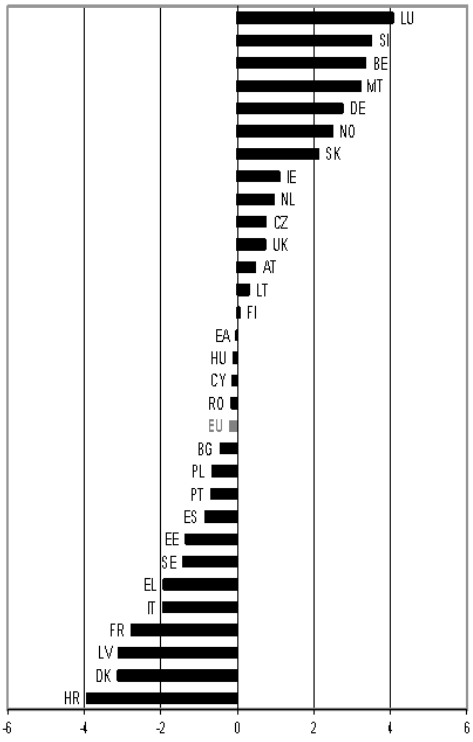
Finally, the ratio should be broadly stable (at the most +/- 0.5 p.p. of GDP) in seven countries (Austria, Lithuania, Finland, Hungary, Cyprus, Romania and Bulgaria).

Table II.1.11: **Level and change in gross public pension expenditure over 2013-2060, baseline scenario (in % and p.p. of GDP)**

Country	2013	2040	2060	Change 2013-40	Change 2013-60
BE	11.8	15.2	15.1	3.4	3.3
BG	9.9	8.4	9.4	-1.5	-0.4
CZ	9.0	9.0	9.7	0.0	0.7
DK	10.3	8.0	7.2	-2.3	-3.1
DE	10.0	12.2	12.7	2.2	2.7
EE	7.6	6.9	6.3	-0.7	-1.3
IE	7.4	10.0	8.4	2.7	1.1
EL	16.2	14.1	14.3	-2.1	-1.9
ES	11.8	11.9	11.0	0.1	-0.8
FR	14.9	13.8	12.1	-1.1	-2.8
HR	10.8	7.8	6.9	-3.0	-3.9
IT	15.7	15.8	13.8	0.1	-1.9
CY	9.5	9.4	9.3	-0.1	-0.1
LV	7.7	5.4	4.6	-2.3	-3.1
LT	7.2	9.4	7.5	2.2	0.3
LU	9.4	12.7	13.4	3.3	4.1
HU	11.5	9.6	11.4	-1.9	-0.1
MT	9.6	9.7	12.8	0.2	3.2
NL	6.9	8.3	7.8	1.5	0.9
AT	13.9	14.7	14.4	0.8	0.5
PL	11.3	10.0	10.7	-1.4	-0.7
PT	13.8	14.8	13.1	1.0	-0.7
RO	8.2	8.4	8.1	0.2	-0.1
SI	11.8	14.3	15.3	2.6	3.5
SK	8.1	8.1	10.2	0.0	2.1
FI	12.9	13.6	12.9	0.7	0.1
SE	8.9	7.5	7.5	-1.4	-1.4
UK	7.7	8.4	8.4	0.8	0.7
NO	9.9	11.4	12.4	1.5	2.5
EU	**11.3**	**11.7**	**11.1**	**0.4**	**-0.2**
EA	**12.3**	**13.0**	**12.3**	**0.7**	**0.0**

(1) These figures have been updated with ESA 2010 by the Commission services.
SK: the figures reported in this table do not include public expenditure on armed forces pension. They represented 0.4% of GDP in 2013, and are projected to remain roughly stable over the 2013-2060 horizon. Subsequent tables and graphs do not include either these expenditures.
Source: Commission services, EPC

Graph II.1.4: **Change in gross public pension expenditure between 2013 and 2060 in the baseline scenario (in p.p. of GDP)**



Source: Commission services, EPC

When looking at the contributions of the different general schemes to the projected change in public pension expenditure ratio (see Graph II.1.5), old-age and early pension schemes tend to contribute more often positively to the aggregate ratio dynamics. Overall, a moderate increase of +0.4 p.p. of GDP is projected over the period 2013-2060 at the EU level, and of +0.6 p.p. of GDP at the euro area level. Disability pensions and other pensions (including survivors' schemes) would, on the other hand, slightly decline over the projection horizon (respectively by -0.1 p.p. of GDP and by -0.5 p.p. of GDP at the EU and the euro area levels). This downward trend, for both types of pensions, would be the result of restricted eligibility criteria, as well as the assumed demographic and health trends (i.e. ageing population in good health).

Old-age and early pension spending should record an increase in 16 countries over the projection period, with the highest upward trend projected in Malta, Belgium and Luxembourg (+5.0 p.p. of GDP, +4.4 p.p. of GDP and +4.3 p.p. of GDP respectively). Denmark, Latvia and France, on the opposite, project significant decreases of old-age and early pension expenditures by 2060 (-3.1 p.p. of GDP, -2.8 p.p. of GDP and -1.9 p.p. of GDP respectively).

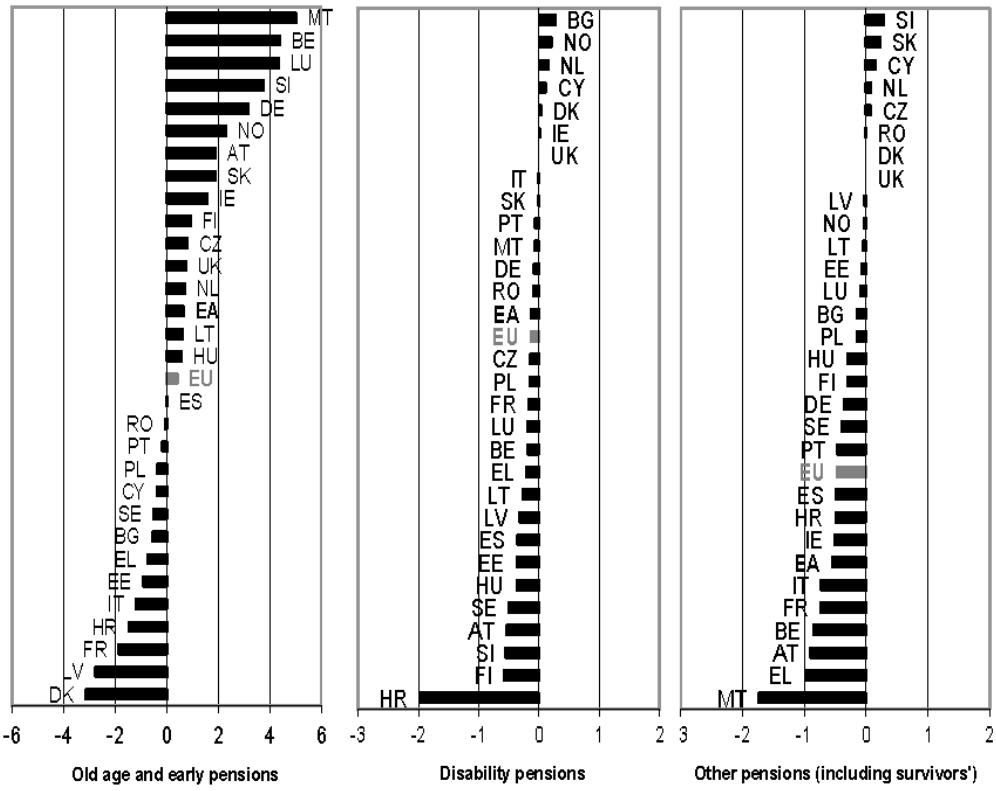
Disability pension spending is expected to decrease in most of Member States. It would only slightly increase or stabilise in 6 countries (Bulgaria, Norway, Netherlands, Cyprus, Denmark and Ireland).

Other pensions (including survivors' pensions) are also projected to decline in the majority of countries (21) over the period 2013-2060. This decrease, often mainly explained by survivors' schemes, results from converging life expectancies between men and women, changes in family structures (decrease of the number of marriages) and in some cases, recent reforms, including the impact of improving female participation rates over time. Only 6 Member States would see a limited progression or a stabilisation of spending in these schemes (Slovenia, Slovakia, Cyprus, the Netherlands, the Czech Republic and Romania).

Pension expenditure time-profile

At the EU and euro area aggregate level, public pension expenditures are expected to continue increasing over the next decades and to peak only in 2037 (at 11.7% of GDP and 13.1% of GDP respectively), before decreasing through the rest of the projection period. Implemented reforms will contribute to counteract the impact on pension expenditures of an ageing population. However, as these reforms are usually phased-in gradually, over several decades, the downward impact will become apparent only late in the projection period.

Graph II.1.5: **Change in gross public pension expenditure over the period 2013-2060 by main general schemes (in p.p. of GDP)**



(1) DK: no separate survivors' pensions exist in Denmark.
DE: disability pensions are part of old-age and early pension expenditures.
IE: old-age and early pensions include pension expenditure of public service occupational schemes.
HR: from 2015, total disability pensions will be converted to old-age pensions upon reaching standard retirement age.
EL: figures without small supplementary funds.
MT: other pensions include treasury pensions.
UK: there is no separate disability pension in the UK – state benefits are provided to those unable to work due to disability, and this is classified separately from the State pension system. Old-age and early pensions include public service pensions.
Source: Commission services, EPC

The pattern of pension expenditure over time is very different across countries. In Slovenia, Malta, Slovakia, the Czech Republic and Austria, the projected increase of public pension expenditure ratio in the long run would only materialize in the second half of the projection period. Indeed, between 2013 and the mid 2020's (Slovenia, Malta and Austria) or 2030's (Slovakia and the Czech Republic), public pension spending would either slightly decrease or remain stable in these countries (see Table II.1.12). Luxembourg, Germany and Norway would on the other hand experience a more regular increase through the whole projection period (in these countries, the through more or less coincides with the starting year, and the peak with the end year). In Belgium, the Netherlands and the UK, the bulk of the projected increase would be observed until the end of the 2030's (Belgium and the UK) – beginning of the 2040's (the Netherlands), date after which public pension expenditures would be roughly stable. In Ireland and Lithuania, the relatively strong upward trend of public pension spending between the beginning of the projection period and the peak reached respectively in 2045 and 2037 would be partially reversed by a decline up until 2060. Finally, in Cyprus and Romania, the public pension expenditures ratio would be relatively

Table II.1.12: **Projected through and peak years and values for gross public pension expenditure (% and p.p. of GDP) - for countries projecting to experience a through in public pension expenditures ratio during the first part of the projection period**

	Start year 2013	Through year (before peak)	Through value	Decrease from 2013 to through	Peak year (after through)	Peak value	Increase from through to peak	Decrease from peak to 2060	End year 2060	Change 2013-2060
LU	9.4								13.4	4.1
SI	11.8	2022	11.0	-0.8	2053	15.7	4.6	-0.4	15.3	3.5
BE	11.8				2037	15.3	3.5	-0.1	15.1	3.3
MT	9.6	2026	9.6	-0.002			3.2		12.8	3.2
DE	10.0	2014	10.0	-0.02			2.8		12.7	2.7
NO	9.9								12.4	2.5
SK	8.1	2033	7.6	-0.5			2.6		10.2	2.1
IE	7.4	2014	7.2	-0.1	2045	10.2	3.0	-1.8	8.4	1.1
NL	6.9				2041	8.4	1.5	-0.5	7.8	0.9
CZ	9.0	2034	8.8	-0.2	2057	9.8	1.0	-0.1	9.7	0.7
UK	7.7	2015	7.3	-0.4	2039	8.4	1.1	-0.03	8.4	0.7
AT	13.9	2021	13.9	-0.03	2037	14.7	0.9	-0.4	14.4	0.5
LT	7.2	2016	6.7	-0.5	2037	9.5	2.8	-2.0	7.5	0.3
EA	12.3	2018	12.3	-0.05	2037	13.1	0.8	-0.8	12.3	0.0
CY	9.5	2021	8.9	-0.5	2032	9.7	0.8	-0.4	9.3	-0.1
RO	8.2	2025	8.0	-0.2	2042	8.5	0.4	-0.4	8.1	-0.1

(1) Values are not reported when the through coincides with the start year (2013) and the peak with the end year (2060).
Countries reported in this table are the ones projected to experience a through in public pension expenditure before a peak over the projection period.
Source: Commission services, EPC

Table II.1.13: **Projected peak and through years and values for gross public pension expenditure (% and p.p. of GDP) - for countries projecting to experience a peak in public pension expenditures ratio during the first part of the projection period**

	Start year 2013	Peak year (before through)	Peak value	Increase from 2013 to peak	Through year (after peak)	Through value	Decrease from peak to through	Increase from through to 2060	End year 2060	Change 2013-2060
FI	12.9	2028	15.0	2.2	2052	12.7	-2.3	0.2	12.9	0.1
HU	11.5				2031	8.9	-2.6	2.5	11.4	-0.1
BG	9.9	2014	9.9	0.03	2028	8.1	-1.8	1.3	9.4	-0.4
PL	11.3				2040	10.0	-1.4	0.7	10.7	-0.7
PT	13.8	2033	15.0	1.2			-1.9		13.1	-0.7
ES	11.8	2047	12.6	0.8			-1.6		11.0	-0.8
EE	7.6	2018	7.8	0.2			-1.5		6.3	-1.3
SE	8.9				2049	7.2	-1.7	0.3	7.5	-1.4
EL	16.2	2014	16.2	0.05	2042	13.9	-2.3	0.4	14.3	-1.9
IT	15.7	2036	15.9	0.1			-2.1		13.8	-1.9
FR	14.9	2014	14.9	0.03			-2.8		12.1	-2.8
LV	7.7								4.6	-3.1
DK	10.3								7.2	-3.1
HR	10.8	2014	10.9	0.01			-3.9		6.9	-3.9
EU	11.3	2037	11.7	0.4			-0.6		11.2	-0.2

(1) Values are not reported when the peak coincides with the start year (2013) and the through with the end year (2060).
Countries reported in this table are the ones projected to experience a peak in public pension expenditure before a through over the projection period.
Source: Commission services, EPC

stable over the whole projection period (low standard deviation of 0.2 p.p. of GDP; see Annex 2, Table II.A2.3).

In 6 countries projecting an overall decrease (or stabilisation) of public pension expenditures over the period 2013 – 2060, an initial increase or stable level of public pension spending would be observed in the first part of the projection period (see Table II.1.13). This is the case of Finland (+2.2 p.p. of GDP until 2028), Portugal (+1.2 p.p. of GDP until 2033), Spain (+0.8 p.p. of GDP until 2047) and Italy (+0.1 p.p. of GDP until 2036). Estonia and France also project a roughly stable ratio during the first years of the projection period (until 2018 in Estonia and 2025 in France ([54])). In Hungary, Bulgaria and Poland, on the other hand, public pension expenditures, decreasing as a share of GDP until respectively 2031, 2028 and 2040, would pick up during the second part of the projection period. In Sweden and Greece, a similar, but milder, pattern would be observed. Finally, Latvia, Denmark and Croatia project a regular decrease of their public pension spending ratio over the whole projection period, thus registering the biggest decrease out of the 29 countries considered.

Looking at public pension spending dynamics by sub-periods, one can see that at the EU and euro area aggregate level, the ratio will be relatively stable until 2020, whilst it would increase over the next two decades (cumulated increase of +0.5 p.p. of GDP and +0.7 p.p. of GDP respectively; see Graph II.1.6). Public pension spending is finally projected to decrease over the last two decades of the projection period (cumulated decrease of -0.6 p.p. of GDP and -0.8 p.p. of GDP respectively). Between 2020 and 2030, the highest increase would be observed in Belgium (+2 p.p. of GDP), Lithuania (+1.9 p.p. of GDP) and Luxembourg (+1.4 p.p. of GDP; see Table II.1.14). Between 2030 and 2040, Slovenia projects to see the largest increase (+2 p.p. of GDP). During this period, the EU average increase would be limited (+0.1 p.p. of GDP), but more widespread than during the previous decade (with 18 countries seeing an increase of their public pension expenditures ratio). Finally, during the period 2050-2060, public pension spending would substantially decrease in Ireland, Spain and Portugal (-1.6 p.p. of GDP, -1.4 p.p. of GDP and -1.3 p.p. of GDP, respectively).

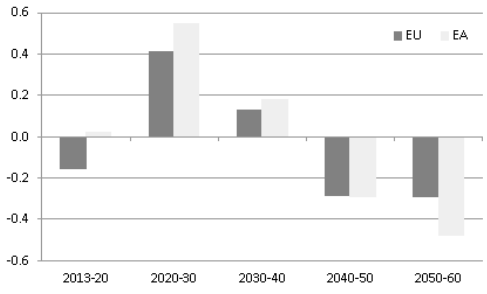
([54]) The ratio should remain stable until 2025 close to the "peak" value reached in 2014.

Table II.1.14: **Change in gross public pension expenditure over the period 2013-2060 (in p.p. of GDP)**

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
BE	0.9	2.0	0.5	-0.2	0.2	3.3
BG	-1.4	-0.3	0.3	0.8	0.3	-0.4
CZ	0.0	-0.1	0.0	0.7	0.1	0.7
DK	-1.5	-0.4	-0.3	-0.5	-0.3	-3.1
DE	0.3	1.2	0.6	0.2	0.3	2.7
EE	0.0	-0.5	-0.2	-0.2	-0.4	-1.3
IE	0.6	1.1	0.9	0.0	-1.6	1.1
EL	-0.7	-1.1	-0.3	0.3	-0.1	-1.9
ES	0.0	-0.5	0.7	0.4	-1.4	-0.8
FR	-0.3	0.0	-0.9	-1.0	-0.7	-2.8
HR	-0.6	-0.8	-1.7	-0.6	-0.3	-3.9
IT	-0.4	0.4	0.1	-1.0	-1.0	-1.9
CY	-0.5	0.7	-0.3	-0.2	0.2	-0.1
LV	-1.8	-0.4	-0.1	-0.3	-0.6	-3.1
LT	-0.4	1.9	0.7	-0.8	-1.1	0.3
LU	1.2	1.4	0.7	-0.2	1.0	4.1
HU	-1.7	-0.9	0.7	1.0	0.8	-0.1
MT	0.2	-0.2	0.1	1.3	1.8	3.2
NL	0.3	0.6	0.6	-0.3	-0.3	0.9
AT	0.0	0.6	0.3	-0.1	-0.3	0.5
PL	-0.7	-0.3	-0.4	0.5	0.3	-0.7
PT	0.7	0.4	-0.1	-0.4	-1.3	-0.7
RO	-0.1	0.0	0.4	-0.1	-0.3	-0.1
SI	-0.6	1.1	2.0	1.3	-0.3	3.5
SK	-0.1	-0.4	0.5	1.0	1.1	2.1
FI	1.4	0.7	-1.4	-0.8	0.2	0.1
SE	-0.7	-0.4	-0.4	-0.3	0.3	-1.4
UK	-0.3	0.6	0.5	-0.3	0.3	0.7
NO	0.8	0.6	0.1	0.2	0.8	2.5
EU	-0.2	0.4	0.1	-0.3	-0.3	-0.2
EA	0.0	0.5	0.2	-0.3	-0.5	0.0

Source: Commission services, EPC

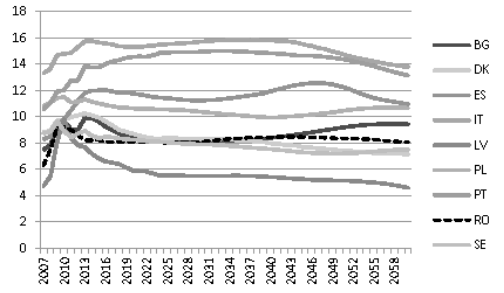
Graph II.1.6: **Change in gross public pension expenditure over the period 2013-2060 (in p.p. of GDP)**



Source: Commission services, EPC

Nonetheless, the interpretation of these time patterns should be, to some extent, made with caution. Indeed, the projected change of the public pension expenditures ratio over the period 2013-2060 is affected by a significant base year effect, due to the financial and economic crisis. Indeed, for the countries projecting a decrease of their public pension spending as a share of GDP between 2013 and 2060, which reported historical data back to before the crisis, one can see that the level reached by 2060 would often be higher or similar to the pre-crisis level (except for Sweden and Denmark; see Graph II.1.7). This base year effect seems particularly strong in Spain, Portugal, Latvia, Italy and Bulgaria. Projected decreases are of course also the result of legislated pension reforms (as seen from the age group decomposition that will be explained in section 1.6).

Graph II.1.7: **Gross public pension expenditure over the period 2007-2060 in selected countries (% of GDP)**



Source: Commission services, EPC

Expenditure developments by age group

In the vast majority of Member States, the share of public *pensioners* in age groups below 70 is projected to decrease over the period 2013-2060 (see Graphs II.1.13 to II.1.13). ([55]) On the other hand, this share should increase in age group 75+. These results reflect pension reforms introduced by many countries, including increasing retirement ages and required contribution period for full pensions, restrictions on early and disability pensions, as well as demographic factors.

Consequently, at the EU aggregate level, the share of public pensioners is supposed to go down over the period 2013-2060 for all age groups considered below 70 years old. (see Table II.1.15). The steepest decrease would be observed for the age group 60-64 during the first half of the projection period (around -9 p.p. over 2013-2060, of which close to -6 p.p. over 2013-2030). This trend is in line with the increase in statutory (including early) retirement ages, along with more restricted early pension and disability schemes in many Member States. A strong decline is also projected for the age group 65-69 during the second half of the projection period (around -7 p.p. over 2013-2060, of which -5.4 p.p. over 2030-2060), also as a result of increasing retirement ages and required

([55]) These graphs depict the evolution of the share of public pensioners in different age groups between 2013 and 2060. Countries that lie above (respectively under) the 45 degree line are projected to experience an increasing (respectively decreasing) share of public pensioners in the respective age group over the projection horizon.

contribution period for full pension. On the other hand, the share of public pensioners in the age group 70-74 would remain broadly constant over the projection period in the EU (+0.1 p.p.), whilst it would strongly increase for the age group above 74 years old (+21.5 p.p.), in line with demographic trends. By 2060, more than half of public pensioners would be older than 74 (against around one third in 2013).

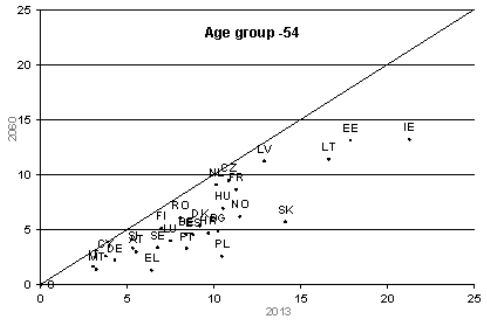
Table II.1.15: **Share of public pensioners in the EU by age groups (as % of total public pensioners)**

Share of public pensioners in the EU (%)							
Age group	2013	2020	2030	2040	2050	2060	Change 2013-2060
-54	7.8	7.1	6.0	5.1	4.7	4.7	-3.1
55-59	5.4	4.3	3.7	3.2	2.7	2.6	-2.8
60-64	13.8	10.4	7.9	6.2	5.4	4.9	-8.9
65-69	19.7	20.1	18.2	15.6	14.0	12.8	-6.9
70-74	17.3	19.6	20.0	19.9	18.4	17.4	0.1
75+	36.0	38.6	44.3	50.0	54.8	57.6	21.5

Source: Commission services, EPC

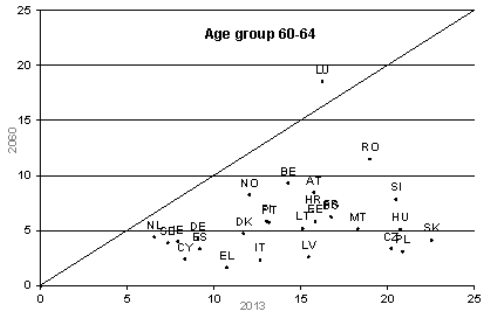
Public pension *expenditures* would also decrease for all age groups below 70 years old at the EU aggregate level (at the most by around -1 p.p. of GDP for the age groups 60-64 and 65-69; see Table II.1.16). In some countries however, public pension spending ratio would still rise for some of these age groups (for instance, in Luxembourg for the age groups 60-64 and, to a lesser extent, 65-69; in Belgium and Germany for the age group 65-69; see Table II.1.16). The public pension expenditure ratio would be roughly stable for the age group 70-74 at the EU aggregate level, although contrasting trends are projected for the different Member States (with increasing ratios for 14 countries). Pensions to GDP should substantially increase for the age group 75+ (+2.3 p.p. of GDP) at the EU aggregate level. By 2060, public pension expenditures for the age group 75+ would represent 6.7% of GDP (against 4.4% of GDP in 2013). Only three countries project a ratio broadly stable for the age group 75+ (Croatia, Latvia and Sweden). These trends in public pension expenditures by age groups reflect largely the evolution of pensioners' weight by age groups, but also pension formula revisions, which will be less favourable for future pensioners' generations.

Graph II.1.8: **Evolution of the share of public pensioners for age group -54 between 2013 and 2060 (% of total public pensioners)**



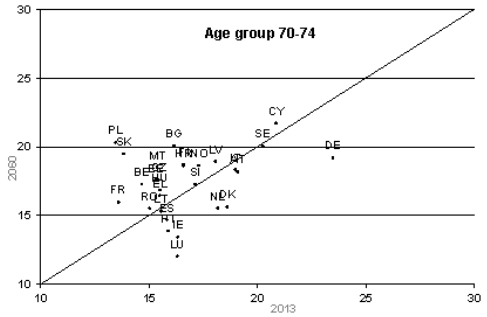
Source: Commission services, EPC

Graph II.1.9: **Evolution of the share of public pensioners for age group 60-64 between 2013 and 2060 (% of total public pensioners)**



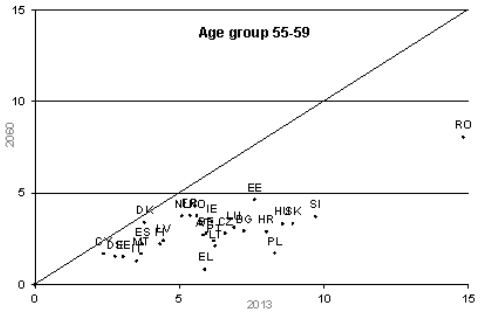
Source: Commission services, EPC

Graph II.1.10: **Evolution of the share of public pensioners for age group 70-74 between 2013 and 2060 (% of total public pensioners)**



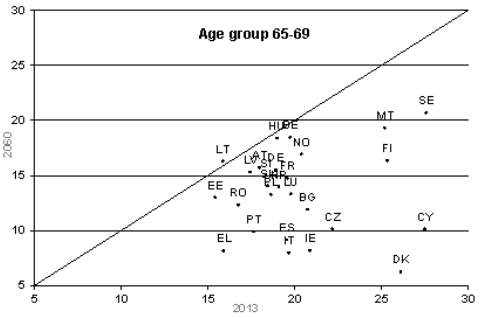
Source: Commission services, EPC

Graph II.1.11: **Evolution of the share of public pensioners for age group 55-59 between 2013 and 2060 (% of total public pensioners)**



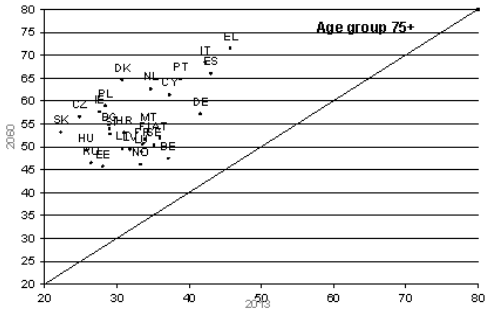
Source: Commission services, EPC

Graph II.1.12: **Evolution of the share of public pensioners for age group 65-69 between 2013 and 2060 (% of total public pensioners)**



Source: Commission services, EPC

Graph II.1.13: **Evolution of the share of public pensioners for age group 75+ between 2013 and 2060 (% of total public pensioners)**



Source: Commission services, EPC

Table II.1.16: **Gross public pension expenditure by age groups in 2013 and in 2060 (% of GDP)**

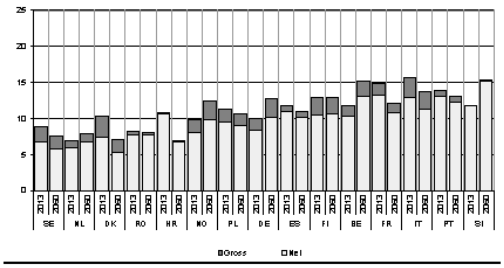
Country	Year	Age group					
		-54	55-59	60-64	65-69	70-74	75+
BE	2013	0.8	0.7	1.8	2.5	1.8	4.1
	2060	0.6	0.4	1.5	2.9	2.7	7.0
BG	2013	0.8	0.7	1.7	2.1	1.7	2.9
	2060	0.3	0.3	0.6	1.2	2.1	5.0
CZ	2013	0.7	0.5	1.9	2.1	1.5	2.4
	2060	0.6	0.2	0.2	0.9	1.9	6.0
DK	2013	1.2	0.5	1.6	2.4	1.7	2.8
	2060	0.5	0.3	0.5	0.6	1.1	4.0
DE	2013	0.4	0.3	1.0	1.8	2.3	4.2
	2060	0.2	0.2	0.6	1.9	2.4	7.4
EE	2013	0.8	0.4	1.1	1.3	1.4	2.7
	2060	0.5	0.2	0.3	0.8	1.2	3.3
IE	2013	1.1	0.3	0.4	1.2	0.9	1.6
	2060	0.9	0.2	0.3	0.6	1.0	4.1
EL	2013	0.9	1.2	2.2	2.8	2.3	5.3
	2060	0.1	0.1	0.2	1.2	2.7	8.7
ES	2013	0.8	0.5	1.4	2.7	2.0	4.5
	2060	0.4	0.3	0.4	1.2	1.9	6.7
FR	2013	0.7	0.4	2.4	3.5	2.4	5.5
	2060	0.4	0.3	0.6	1.9	2.3	6.7
HR	2013	1.3	0.8	1.7	2.0	1.8	3.2
	2060	0.3	0.2	0.5	1.0	1.3	3.7
IT	2013	0.2	0.6	2.5	3.4	3.0	5.9
	2060	0.1	0.1	0.2	1.5	2.9	9.1
CY	2013	0.2	0.4	1.5	2.7	1.8	2.7
	2060	0.2	0.2	0.2	1.1	2.1	5.5
LV	2013	0.5	0.2	1.0	1.6	1.3	2.6
	2060	0.3	0.1	0.1	0.7	0.9	2.5
LT	2013	0.8	0.4	1.0	1.2	1.2	2.4
	2060	0.6	0.1	0.3	1.2	1.2	4.0
LU	2013	0.4	0.7	1.8	1.9	1.5	3.0
	2060	0.2	0.4	2.9	2.0	1.7	6.2
HU	2013	0.5	0.8	2.6	2.5	1.9	3.2
	2060	0.4	0.3	0.6	2.5	2.3	5.4
MT	2013	:	:	:	:	:	:
	2060	:	:	:	:	:	:
NL	2013	0.8	0.4	0.5	1.6	1.2	2.4
	2060	0.8	0.3	0.4	0.4	1.1	4.8
AT	2013	0.6	1.4	2.4	2.6	2.6	4.1
	2060	0.5	0.5	1.5	2.4	2.7	6.4
PL	2013	1.0	1.0	2.5	2.2	1.6	3.1
	2060	0.3	0.3	0.5	1.5	2.1	6.0
PT	2013	0.5	0.8	2.2	3.5	2.7	4.2
	2060	0.3	0.3	0.7	1.3	2.1	8.5
RO	2013	1.1	1.8	1.1	1.1	1.2	1.9
	2060	0.9	1.2	0.7	0.8	1.2	3.3
SI	2013	0.2	1.0	2.4	2.3	2.0	3.8
	2060	0.2	0.4	1.1	2.0	2.6	9.0
SK	2013	0.7	0.5	1.9	1.6	1.3	2.2
	2060	0.4	0.2	0.3	1.5	2.1	5.7
FI	2013	0.6	0.5	1.7	3.6	2.4	4.0
	2060	0.5	0.2	0.8	2.4	2.5	6.5
SE	2013	0.5	0.3	0.6	2.3	1.8	3.3
	2060	0.4	0.2	0.3	1.5	1.5	3.6
UK	2013	:	:	:	:	:	:
	2060	:	:	:	:	:	:
NO	2013	1.0	0.6	1.3	2.2	1.8	3.0
	2060	1.0	0.6	1.3	2.1	2.1	5.2
EU	**2013**	**0.6**	**0.5**	**1.7**	**2.6**	**2.2**	**4.4**
	2060	**0.4**	**0.2**	**0.6**	**1.6**	**2.2**	**6.7**
EA	**2013**	**0.5**	**0.5**	**1.7**	**2.6**	**2.3**	**4.6**
	2060	**0.4**	**0.2**	**0.6**	**1.7**	**2.3**	**7.1**

(1) MT and the UK: public pension expenditure decomposition by age groups is not available.
LV and LT: 2014 data is used as a starting value.
AT: only earnings-related expenditure is covered.
EL: without small supplementary funds.
IE: without public service occupational schemes.
Source: Commission services, EPC

Gross versus net pension expenditure

The average level of taxes on pensions, over the panel of 15 countries for which projections are available (Sweden, the Netherlands, Denmark, Romania, Croatia, Norway, Poland, Germany, Spain, Belgium, France, Italy, Portugal, Slovenia and Finland), is estimated at 1.4% of GDP in 2013, and should remain roughly stable over the projection horizon (see Graph II.1.14). However, three countries should experience an increase of these taxes as a share of GDP (Germany, Norway and Belgium), whilst Denmark projects a decrease. These trends mainly capture the underlying dynamics of gross pension expenditures over GDP, as tax revenues as a share of gross public pension expenditures are generally assumed to remain constant over time. In some cases however, legislated changes to pension taxation can explain these dynamics. ([56])

Graph II.1.14: **Gross versus net public pension expenditure in 2013 and 2060 (% of GDP)**



(1) The graph only presents the countries for which (non-zero) data are available. Gross and net public pension expenditures overlap in the graph, so that the difference (dark blue bar) represents taxes on pensions.
Source: Commission services, EPC

1.5.2. Private occupational and individual pensions

The relevance of private occupational and individual schemes in total pension provision has increased in several Member States in recent years. Participation in second and third pillar schemes has been encouraged or even made mandatory in several countries to decrease the financial burden of ageing populations on public finances. However, in 2013, privately managed pension schemes were still rather young in the majority of these countries: out of the countries reporting such expenditures, ([57]) their contribution to pensions in payment was only significant in Denmark, the Netherlands and Sweden (see Table II.1.17). Over the projection period, private pension schemes are projected to expand in most of the countries considered, in particular in Latvia, Estonia and Croatia. By 2060, these schemes are expected to represent more than 40% of total pension expenditures in the Netherlands and Denmark, around a third in Sweden and Latvia, and more than a quarter in Estonia. ([58]) Private pension schemes should remain limited in Spain and Portugal over the projection period. Their weight in total pension spending, whilst increasing, should remain below 7% in Spain by 2060, and is even projected to decline in Portugal, representing less than 2% by 2060.

Table II.1.17: **Private (occupational and individual) pension schemes expenditure in 2013 and 2060**

	% GDP		% total pension expenditure	
Country	2013	2060	2013	2060
DK	4.6	5.8	30.8	44.7
EE	0.0	2.2	0.2	25.9
ES	0.7	0.8	5.3	6.9
HR	0.0	1.6	0.0	19.0
LV	0.0	2.2	0.0	32.2
LT	0.0	1.1	0.0	12.8
NL	5.2	6.5	43.2	45.5
PT	0.3	0.2	2.0	1.5
RO	0.0	0.8	0.0	9.3
SE	2.5	3.9	21.7	34.2

(1) The table only presents the countries which provided (non-zero) data for private (occupational and individual) pension schemes.
Source: Commission services, EPC

In Sweden, Denmark and the Netherlands, private pension expenditure mainly comes from *occupational* schemes (see Graph II.1.15). Indeed, in these countries, occupational schemes with high coverage rates (in 2013, close to 70% of total pensioners on average) and substantial additional pension provisions, on top of public pensions, have existed for quite a long time. In 2013, they represented 1.8% of GDP in Sweden, 4.6% of GDP in Denmark and up to 5.2% of GDP in the Netherlands, and are projected to expand further over the long-run (the highest value being reached by the Netherlands at 6.5% of GDP in 2060). In

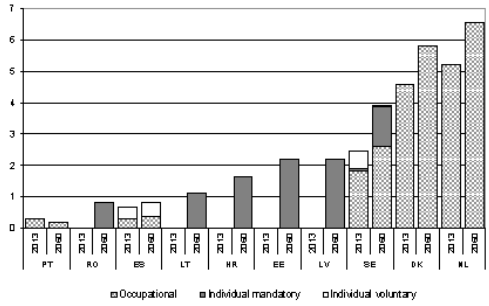
([56]) In Germany, the increase of public pension taxes to GDP is in line with the undergoing change in the tax regime related to contributions and pensions. Indeed, pension contributions will be completely exempted from tax by the year 2025, whilst pension benefits will be completely taxed by the year 2040.

([57]) Private pension expenditures are reported on a voluntary basis by Member States.

([58]) In other countries, on the other hand, private pension schemes have been shifted back to the public sector (Hungary, Poland).

Sweden, private *individual mandatory* pension schemes are also expected to mature over the projection period (*premium pension*), whilst private *individual voluntary* pension schemes (representing 0.6% of GDP in 2013) would gradually fade out as a result of the suppression of tax incentives. In other countries, the bulk of the expansion of private pension schemes is projected to come from *individual mandatory* schemes (Romania, Lithuania, Croatia, Estonia and Latvia). In Spain, private pension spending, limited as a share of GDP, would still rely by 2060 on a balanced mix of occupational and individual voluntary schemes.

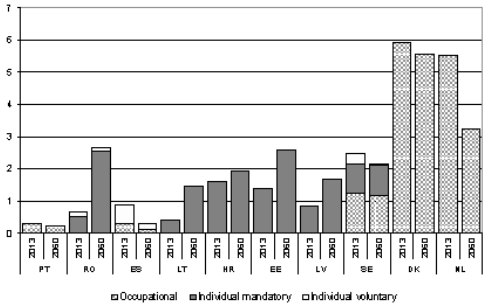
Graph II.1.15: **Expenditure for private occupational and individual pension schemes in 2013 and 2060 (% of GDP)**



(1)
The graph only presents the countries which provided (non-zero) data for private (occupational and individual) pension schemes.
Source: Commission services, EPC

Contributions to private pension schemes, as a percentage of GDP, will increase over the projection period in 5 countries (Romania, Lithuania, Croatia, Estonia and Latvia; see Graph II.1.16), whilst they will slightly decrease in 4 countries (Portugal, Spain, Sweden and Denmark). In the Netherlands, private contributions to occupational schemes are projected to significantly decrease over the period 2013-2060 (-2.3 p.p. of GDP), as a result of the decline of future pension contribution rates. This projected decline is the consequence of the reduced need to accumulate assets, resulting from the increase in the eligibility rate (the 2012 reform applying both to the public and private pension system).

Graph II.1.16: **Contributions to private occupational and individual pension schemes in 2013 and 2060 (% of GDP)**



(1)
The graph only presents the countries for which (non-zero) data are available.
Source: Commission services, EPC

1.6. DRIVERS OF PENSION EXPENDITURE

1.6.1. Decomposition of projected pension expenditure

A decomposition of the main underlying drivers of the evolution of the pension expenditure to GDP ratio is outlined in Box II.1.2 below. The overall change in gross public pension expenditure over the projection horizon 2013-2060 is decomposed into 4 drivers (dependency ratio, coverage ratio, benefit ratio and the labour market effects). The labour market effect is further decomposed into three drivers: employment, labour intensity and career shift effects (see Table II.1.18).

Confirming the results of the population projections (see Chapter 1), the demographic factor contributes the most to the increase in public pension expenditure over the period 2013-2060 (+7.6 p.p. of GDP at EU level), ranging from +2.6 p.p. in Sweden to as much as +12.4 p.p. in Poland.([59]) Moreover, for nearly all Member States the dependency ratio is the only factor contributing to increasing the pension expenditure to GDP ratio, while the coverage ratio, the employment effect as

([59]) Please note that due to a lack of necessary data IE public service occupational pensions are not included in the analysis of the decomposed pension expenditure drivers throughout the whole chapter. This also affects the decomposed EU28 and EA figures. All respective residual values are corrected accordingly in order to be consistent with the overall expenditure figures as a share of GDP which include these two components.

well as the benefit ratio contribute to limit the upward trend in pension expenditure for nearly all countries.

Although the upwards contribution of the ageing population is the largest single factor, the negative budgetary effect of demographic factors is fully offset by the other sub-components. As a consequence, gross public pension expenditure in 2060 stays at its 2013 level in the EA, while a slight decline in public pension expenditure as a share of GDP is projected for the EU as a whole by 2060 (-0.2 p.p.)

Among the factors contributing to a lowering of the expenditure trend, the labour market effect is the least pronounced. Increasing employment and labour intensity together with the effect of career shifts only leads to a reduction in the public pension expenditure over GDP ratio by more than 2 p.p. over the projection period for Greece, Spain, Italy, Cyprus and Portugal. Overall, the labour market effect is projected to reduce the upward pressure on pension expenditure by 1.4 p.p. on average for the EU. ([60]) Projected figures range from 0.0 p.p. of GDP in Romania to -6.2 p.p. of GDP in Greece.

The employment effect is by far the largest subcomponent of the labour market effect, totalling -1.0 p.p., in the EU as a whole. It also explains the large total decline in the labour market effect for Greece, Spain, Italy, Cyprus and Portugal, all countries with assumed strong declines in unemployment rates from very high initial values. The employment effect shows no significant impact for Romania and Finland.

The career shift effect is limited (on average -0.4 p.p. of GDP in the EU). The largest impact can be seen in Italy, Greece and Portugal (-1.0 p.p., -0.8 p.p. and -0.7 p.p. respectively), whereas it has no significant impact in Ireland, Lithuania, Luxembourg and Malta (0.0 p.p.).

([60]) As cross-border workers in Luxembourg are not covered in the labour force projections for the pension projection exercise, a deeper analysis of the employment effect contribution as well as the coverage ratio contribution is not meaningful.

Box II.1.2: **Decomposition of pension expenditure to GDP**

In order to analyse the dynamics and the underlying drivers of the pension spending to GDP ratio over time, the following decomposition formula is proposed:

$$\frac{\text{Pension Exp}}{\text{GDP}} = \overbrace{\frac{\text{Population}65+}{\text{Population}20-64}}^{\text{Dependency Ratio}} \times \overbrace{\frac{\text{Number of Pensioners(Pensions)}}{\text{Population}65+}}^{\text{Coverage Ratio}} \times \overbrace{\frac{\frac{\text{Average income from pensions(Average Pension)}}{\text{GDP}}}{\frac{\text{Hours Worked}20-74}{\text{Population}20-64}}}^{\text{Benefit Ratio}} \times \overbrace{\frac{\text{Population}20-64}{\text{Hours Worked}20-74}}^{\text{Labour Market /Labour Intensity}}$$

The Equation highlights the forces that affect the dynamics of pension expenditure. Indeed the overall change in public pension expenditure to GDP ratio can be expressed as the sum of the contribution of the following four main factors:

The dependency ratio effect, which quantifies the impact of demography, (the change in the composition of the population, old age versus working age) on the pension-to-GDP ratio. An increase in this ratio indicates a higher proportion of older individuals with respect to working age population, i.e. an ageing population. As the dependency ratio increases, the pension-to GDP ratio moves in the same direction.

The coverage ratio effect is defined as the number of pensioners of all ages to the population over 65 years. The analysis of the coverage ratio provides information about how the developments of the effective exit age and the share of the population covered by the pension system influence pension spending. As the coverage ratio increases, the pension expenditure-to-GDP ratio increases as well.

The benefit ratio effect indicates the development of the relative value of the average pension (public pension spending / number of pensioners) with respect to the average wage. It reflects the features of the legal framework of pension systems as far as the calculation and indexation rules are concerned.

The labour market/ labour intensity effect describes the effects of labour market behaviour on pension expenditure. In order to split this labour market behaviour policies into different drivers, a further decomposition is used:

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

More in detail, the 3 different labour market behaviour components can be interpreted as follows:

The employment rate effect is defined as the ratio of population aged 20-64 to the number of working people aged 20-64 (i.e. 1/employment rate). In Pay-as-You-Go systems, a higher employment rate helps increasing the sustainability of pension systems by allowing for a larger contribution base (at least in the short term), hence as the employment rate increases, the ratio of pension expenditure to GDP falls.

(Continued on the next page)

Box (continued)

The labour intensity effect is defined as the ratio of the working population 20-64 to the hours worked of the population 20-64 (i.e. 1/labour intensity). As labour intensity increases, the ratio of pension expenditure to GDP falls.

The career prolongation effect is defined as the ratio of hours worked by the population 20-64 to the hours worked by the population 20-74 (i.e. 1/career shift). Changes in this ratio (i.e. a decrease) capture the effect of a working life prolongation above the age of 65 (e.g. because of reforms that postpone the statutory retirement age or because of active ageing policies). An increase in the hours worked by people aged more than 65 helps to reduce the ratio of pension expenditure to GDP.

As a result of the macroeconomic assumptions used in the projections, the labour intensity contribution has more or less no impact on the change in the pension expenditure to GDP ratio (EU average: +0.1 p.p.). Only Italy, Luxembourg and Malta project an increasing effect of +0.1 p.p. of GDP. In all other Member States, the labour intensity effect is negligible.

Both the effects of the coverage rate as well as of the benefit ratio are more pronounced than the labour market effect in leading to downward pressure on the expenditure ratio.

Table II.1.18: **Decomposition of gross public pension expenditure change over 2013-2060**

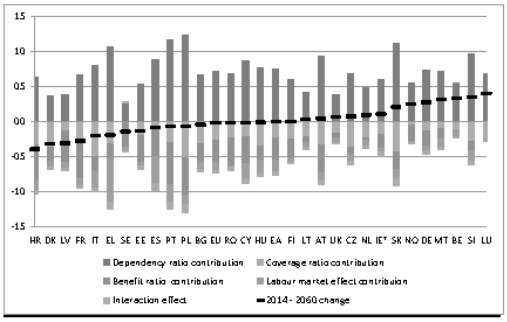
Country	2013 level	Dependency ratio contribution	Coverage ratio contribution	Benefit ratio contribution	Labour market effect contribution				Interaction effect	2060 level
					Total (a+b+c)	Employment rate (a)	Labour intensity (b)	Career shift (c)		
BE	11.8	5.6	-1.3	-0.3	-0.6	-0.6	0.0	-0.1	-0.1	15.1
BG	9.9	6.7	-3.1	-2.5	-1.2	-0.9	0.0	-0.3	-0.3	9.4
CZ	9.0	6.8	-3.6	-1.0	-1.0	-0.6	0.0	-0.4	-0.5	9.7
DK	10.3	3.6	-3.6	-2.0	-0.9	-0.5	0.0	-0.5	-0.2	7.2
DE	10.0	7.3	-1.3	-2.2	-0.7	-0.4	0.0	-0.4	-0.4	12.7
EE	7.6	5.4	-2.0	-3.8	-0.5	-0.4	0.0	-0.1	-0.4	6.3
IE*	7.4	6.0	-1.7	-2.1	-0.6	-0.5	0.0	0.0	-0.5	8.4
EL	16.2	10.6	-3.2	-2.1	-6.2	-5.5	0.0	-0.8	-1.0	14.3
ES	11.8	8.9	-0.6	-4.4	-3.8	-3.5	0.0	-0.4	-0.9	11.0
FR	14.9	6.7	-3.2	-4.7	-1.2	-1.0	0.0	-0.2	-0.4	12.1
HR	10.8	6.4	-3.3	-5.0	-1.7	-1.4	0.0	-0.3	-0.4	6.9
IT	15.7	8.0	-5.0	-2.1	-2.3	-1.4	0.1	-1.0	-0.5	13.8
CY	9.5	8.7	-2.1	-3.8	-2.2	-1.7	0.0	-0.5	-0.6	9.3
LV	7.7	3.8	-1.4	-4.5	-0.8	-0.6	0.0	-0.1	-0.3	4.6
LT	7.2	4.3	-2.2	-0.9	-0.6	-0.5	0.0	0.0	-0.4	7.5
LU	9.4	6.8	-2.4	0.1	-0.3	-0.3	0.1	0.0	-0.2	13.4
HU	11.5	7.8	-3.5	-1.9	-1.9	-1.7	0.0	-0.2	-0.5	11.4
MT	9.6	7.2	-0.9	-1.4	-1.4	-1.4	0.1	0.0	-0.3	12.8
NL	6.9	4.8	-2.2	-0.5	-0.8	-0.5	0.0	-0.3	-0.3	7.8
AT	13.9	9.4	-3.3	-4.1	-1.0	-0.5	0.0	-0.5	-0.6	14.4
PL	11.3	12.4	-5.2	-5.2	-1.4	-0.8	0.0	-0.6	-1.2	10.7
PT	13.8	11.7	-3.1	-5.9	-2.6	-1.9	0.0	-0.7	-0.9	13.1
RO	8.2	6.8	-2.3	-4.0	0.0	0.0	0.0	-0.1	-0.6	8.1
SI	11.8	9.7	-2.7	-1.4	-1.5	-1.3	0.0	-0.3	-0.6	15.3
SK	8.1	11.3	-4.2	-2.6	-1.3	-0.8	0.0	-0.5	-1.0	10.2
FI	12.9	6.0	-2.5	-2.7	-0.5	-0.3	0.0	-0.2	-0.2	12.9
SE	8.9	2.6	0.2	-3.7	-0.4	-0.4	0.0	-0.1	-0.1	7.5
UK	7.7	3.9	-1.6	-0.7	-0.6	-0.5	0.0	-0.2	-0.2	8.4
NO	9.9	5.6	-0.5	-2.2	-0.2	-0.1	0.0	-0.1	-0.2	12.4
EU	11.3	7.2	-2.6	-3.0	-1.4	-1.0	0.1	-0.4	-0.4	11.1
EA	12.3	7.6	-2.4	-3.1	-1.6	-1.2	0.0	-0.4	-0.4	12.3

(1) IE: The decomposition excludes occupational public pensions, therefore the interaction effect is adjusted to match with the overall expenditure changes.
The decomposition is based on the number of pensioners.
Source: Commission services, EPC.

For the EU as a whole, the coverage ratio effect (-2.6 p.p.) is slightly smaller compared to the benefit ratio effect (-3.0 p.p.). However, large variations can be observed among Member States. Only Sweden (+0.2 p.p.) projects a small increase in the coverage ratio contribution to the pension expenditure to GDP ratio. On the contrary, strong downward effects of the coverage ratio on public pension expenditure are projected in Poland (-5.2 p.p.), Italy (-5.0 p.p.) and Slovakia (-4.2 p.p.).

A similar picture can be observed for the benefit ratio effect. Only one country projects upward pressures on expenditure due to an increasing benefit ratio effect (Luxembourg with +0.1 p.p.) while in countries like Portugal (-5.9 p.p.), Poland (-5.2 p.p.) and Croatia (-5.0 p.p.) a strong downward trend has been projected. The differences between countries – both for the coverage ratio as well as the benefit ratio effect – are in most of the cases due to different kinds of reforms affecting both the access to pensions (e.g. set up or shift to secondary pillars not classified in the public sector or increases in the statutory retirement age) and the generosity of future pension benefits (e.g. sustainability factors, less generous indexation rules).

Graph II.1.17: **Decomposition of public pension expenditure to GDP**



Source: Commission services, EPC.

Old-age dependency effect

The overall picture of the old-age dependency ratio effect on public pension expenditure is shown in Table II.1.19. Without any exception, the contribution of the old-age dependency ratio is bigger than the total change in the public pension to GDP in all Member States. Due to ageing populations, demographic factors are projected to be the main (and usually the only) increasing driver of public pension expenditure in the

upcoming decades. Recent pension reforms leading to increased retirement ages, higher employment rates (of older workers) and less generous pension entitlements have strengthened the counterbalancing impact on pension expenditure.

Table II.1.19: **Contribution of the dependency ratio effect to the change in public pension expenditure (in p.p. of GDP)**

Country	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
BE	1.1	2.3	1.1	0.3	0.8	5.6
BG	1.6	1.3	1.3	1.6	0.8	6.7
CZ	2.2	1.2	1.3	1.7	0.4	6.8
DK	1.2	1.3	0.9	-0.2	0.4	3.6
DE	1.3	3.2	2.0	0.4	0.4	7.3
EE	1.5	1.7	0.9	0.9	0.5	5.4
IE	1.9	2.5	2.1	1.6	-2.0	6.0
EL	1.7	3.0	3.8	2.6	-0.6	10.6
ES	1.8	3.4	3.6	1.9	-1.7	8.9
FR	2.7	2.7	1.7	-0.1	-0.3	6.7
HR	1.7	2.3	1.0	0.9	0.5	6.4
IT	1.2	2.7	3.3	0.9	0.1	8.0
CY	2.2	2.8	1.3	1.4	0.9	8.7
LV	1.0	1.7	0.7	0.3	0.1	3.8
LT	1.0	3.4	1.4	-0.8	-0.8	4.3
LU	0.6	2.0	1.6	1.1	1.5	6.8
HU	2.3	1.1	1.6	1.7	1.2	7.8
MT	2.4	2.2	0.1	1.0	1.5	7.2
NL	1.4	2.0	1.3	-0.1	0.2	4.8
AT	1.1	3.9	2.5	0.7	1.2	9.4
PL	3.5	3.0	1.3	2.9	1.7	12.4
PT	2.2	3.5	3.9	2.4	-0.1	11.7
RO	1.6	1.0	2.2	1.4	0.6	6.8
SI	3.0	3.2	1.9	1.9	-0.3	9.7
SK	2.5	2.5	1.6	2.7	1.9	11.3
FI	2.7	2.2	-0.1	0.3	0.9	6.0
SE	0.8	0.7	0.4	0.0	0.8	2.6
UK	0.8	1.5	0.9	0.3	0.4	3.9
NO	1.0	1.5	1.4	0.4	1.3	5.6
EU	1.7	2.5	1.9	0.9	0.2	7.2
EA	1.7	3.0	2.4	0.7	-0.2	7.6

Source: Commission services, EPC.

Table II.1.19 shows the contribution of the demographic factors to the change in public pension spending per decade over the projection horizon. The demographic effect is at its strongest in the first two decades of the projections (2013-2030), when the post-war baby-boom generation reaches the retirement age. The smallest impact is projected for Luxembourg least over the 2013-2020 period (+0.6 p.p.) while the demographic impact is the largest in Poland (+3.5 p.p.). The impact for the EU as a whole is 1.7 p.p. over the same period. Between 2020 and 2030, the demographic effect is at its strongest level (+2.5 p.p.). In that period, the minimum value is projected for Sweden (+0.7 p.p.) while the maximum impact is recorded for Austria (+3.9 p.p.).

The demographic effect is still significant in 2030-2040, when for the EU as a whole the dependency effect contribution is projected to be +1.9 p.p. of GDP. Thereafter the impact of demographics factors starts to decline, first to +0.9 p.p. between 2040 and 2050, falling to +0.2 p.p. in the final decade of the projection period (2050-2060). In four Member States (Denmark, France, Lithuania and the Netherlands) the contribution of the demographic change will become negative over the period 2040 to 2050. Between 2050 and 2060 the number increases to seven countries (Ireland, Greece, Spain, France, Lithuania, Portugal and Slovenia).

Coverage effect

Several reform steps have been taken in recent years by a number of Member States in order to limit the increasing effect of an ageing society on public pension expenditure. In many cases, these reforms were related to the abolishment or restriction of early retirement schemes, the increase in statutory retirement ages or the incentive to stay longer in the labour market on a voluntary basis, i.e. exiting labour markets beyond the legal retirement age. All these measures are reflected in a lower level of the coverage ratio (the number of pension benefit recipients as percent of the pensionable population, here measured as persons aged 65 or more, see Table II.1.20.

Table II.1.20: **Coverage ratio development in 2013-2060 (as % of population aged 65 and over)**

Country	2013	2020	2030	2040	2050	2060	Change 2013 - 2060 in p.p.
BE	134.1	133.3	128.6	126.4	124.5	122.6	-11.5
BG	156.2	138.8	126.9	116.7	110.7	108.6	-47.6
CZ	160.4	133.8	125.8	116.9	108.9	106.0	-54.4
DK	130.1	115.0	100.9	92.9	91.9	84.5	-45.6
DE	118.3	114.8	108.4	105.9	105.8	105.2	-13.1
EE	172.3	156.2	143.0	138.9	134.0	130.3	-41.9
IE	148.5	135.5	123.4	118.5	112.5	119.4	-29.1
EL	117.5	107.8	94.2	91.4	89.7	95.1	-22.4
ES	107.7	106.8	101.6	99.6	99.7	102.2	-5.5
FR	157.3	143.7	134.2	126.4	126.0	126.4	-30.9
HR	156.7	143.0	128.0	115.8	111.9	110.9	-45.7
IT	120.9	108.2	98.5	92.5	90.2	87.2	-33.7
CY	122.0	112.6	108.2	108.5	101.8	96.3	-25.7
LV	154.0	140.0	128.3	125.7	124.5	123.5	-30.5
LT	170.9	156.9	136.1	127.3	127.3	127.2	-43.7
LU	225.6	217.1	207.8	199.6	188.4	182.8	-42.8
HU	163.5	130.6	126.6	122.8	117.8	115.4	-48.0
MT	120.0	111.0	102.6	106.4	107.5	108.4	-11.5
NL	134.7	122.5	109.7	106.7	104.0	99.3	-35.5
AT	148.1	141.5	124.5	117.4	118.8	116.6	-31.5
PL	165.3	133.0	114.7	107.9	101.7	99.6	-65.7
PT	124.5	116.8	107.1	101.1	99.1	100.5	-24.0
RO	164.5	155.8	158.6	144.6	132.4	123.2	-41.4
SI	170.1	159.3	143.6	141.1	136.2	135.0	-35.2
SK	183.3	159.6	138.8	130.6	116.3	108.2	-75.1
FI	132.6	121.5	116.7	115.1	112.7	109.9	-22.7
SE	128.4	127.7	129.3	128.9	131.5	131.5	3.2
UK	118.2	103.1	96.0	98.6	94.1	95.1	-23.1
NO	140.3	137.8	132.5	128.2	132.1	133.5	-6.8
EU	133.1	122.1	113.2	108.8	106.3	105.4	-27.6
EA	128.7	121.0	112.5	107.8	106.6	106.3	-22.5

(1) The coverage ratio is calculated as the total number of public pensioners as a share of the population 65 and over. In case the number of pensioners was not provided, the number of pensions was used as a proxy.
Source: Commission services, EPC

The coverage ratio at age 65 is projected to be reduced over the projection period in all countries

except for Sweden. ([61]) This is firstly the effect of increasing statutory and as a consequence also effective retirement ages, in some countries even after age 65. Secondly, this is also due to stricter conditions for pension eligibility below the official retirement age (e.g. getting disability or early retirement pensions). In the EU, the coverage ratio is projected to fall by 28 p.p. from an initial level of 133% to 105%.

Table II.1.21: **Contribution of the coverage ratio effect to the change in public pension expenditure (in p.p. of GDP)**

Country	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
BE	-0.1	-0.5	-0.3	-0.2	-0.2	-1.3
BG	-1.1	-0.7	-0.7	-0.4	-0.2	-3.1
CZ	-1.6	-0.5	-0.6	-0.6	-0.3	-3.6
DK	-1.2	-1.1	-0.7	-0.1	-0.6	-3.6
DE	-0.3	-0.6	-0.3	0.0	-0.1	-1.3
EE	-0.7	-0.6	-0.2	-0.2	-0.2	-2.0
IE	-0.7	-0.8	-0.4	-0.5	0.6	-1.7
EL	-1.4	-2.0	-0.4	-0.3	0.9	-3.2
ES	-0.1	-0.6	-0.2	0.0	0.3	-0.6
FR	-1.3	-1.0	-0.9	0.0	0.0	-3.2
HR	-1.0	-1.1	-0.9	-0.3	-0.1	-3.3
IT	-1.7	-1.4	-1.0	-0.4	-0.5	-5.0
CY	-0.7	-0.4	0.0	-0.6	-0.5	-2.1
LV	-0.7	-0.5	-0.1	0.0	0.0	-1.4
LT	-0.6	-1.0	-0.6	0.0	0.0	-2.2
LU	-0.4	-0.5	-0.5	-0.7	-0.4	-2.4
HU	-2.3	-0.3	-0.3	-0.4	-0.2	-3.5
MT	-0.7	-0.8	0.4	0.1	0.1	-0.9
NL	-0.7	-0.8	-0.2	-0.2	-0.4	-2.2
AT	-0.6	-1.7	-0.8	0.2	-0.3	-3.3
PL	-2.3	-1.5	-0.6	-0.6	-0.2	-5.2
PT	-0.9	-1.2	-0.9	-0.3	0.2	-3.1
RO	-0.4	0.2	-0.7	-0.7	-0.6	-2.3
SI	-0.7	-1.1	-0.2	-0.5	-0.1	-2.7
SK	-1.1	-1.1	-0.5	-0.9	-0.7	-4.2
FI	-1.1	-0.6	-0.2	-0.3	-0.3	-2.5
SE	0.0	0.1	0.0	0.2	0.0	0.2
UK	-1.0	-0.5	0.2	-0.4	0.1	-1.6
NO	-0.2	-0.4	-0.4	0.3	0.1	-0.5
EU	-1.0	-0.8	-0.5	-0.3	-0.1	-2.6
EA	-0.8	-0.9	-0.5	-0.2	0.0	-2.4

Source: Commission services, EPC

Table II.1.21 depicts the contribution of the coverage ratio effect on public pension expenditure change in the period between 2013 and 2060.

Labour market effect

Measures aimed at the labour market improve the sustainability of pension systems through higher labour supply and thus faster potential GDP growth. Higher employment rates also increase the amount of pension contributions and in case the increase occurs also in older age groups, it leads to higher effective retirement ages and thus shortens the time spend on retirement.

The labour market effect is at its largest between 2013 and 2030 (see Table II.1.22), resulting in an overall effect of -1 p.p. for the EU. The labour market effect is projected to reduce public pension expenditure by -0.5 p.p. of GDP both between 2013 and 2020 and between 2020 and 2030. The effect is slightly smaller in the following decade (-0.3 p.p. in 2030-2040). Thereafter, the labour market effect has no significant impact on the overall EU pension expenditure to GDP.

Table II.1.22: **Contribution of the labour market effect to the change in public pension expenditure (in p.p. of GDP)**

Country	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
BE	-0.4	-0.2	-0.1	0.0	0.0	-0.6
BG	-0.6	-0.3	-0.1	0.0	-0.1	-1.2
CZ	-0.4	0.0	-0.1	-0.3	-0.2	-1.0
DK	-0.4	-0.2	-0.1	0.0	-0.2	-0.9
DE	-0.3	-0.3	-0.1	0.0	0.0	-0.7
EE	-0.2	-0.1	-0.1	0.0	0.0	-0.5
IE	-0.3	-0.3	-0.2	-0.1	0.3	-0.6
EL	-2.3	-2.2	-1.6	-0.4	0.2	-6.2
ES	-1.6	-1.6	-0.9	0.0	0.2	-3.8
FR	-0.3	-0.6	-0.3	0.0	0.0	-1.2
HR	-0.7	-0.5	-0.4	-0.1	0.0	-1.7
IT	-0.9	-0.9	-0.4	0.1	-0.2	-2.3
CY	-0.5	-0.9	-0.5	-0.2	-0.1	-2.2
LV	-0.2	-0.3	-0.2	0.0	-0.1	-0.8
LT	0.0	-0.2	-0.2	0.0	-0.1	-0.6
LU	-0.2	-0.2	-0.1	0.1	0.1	-0.3
HU	-1.3	-0.5	-0.1	0.0	0.0	-1.9
MT	-0.6	-0.7	-0.1	0.0	-0.1	-1.4
NL	-0.3	-0.3	-0.2	0.0	-0.1	-0.8
AT	-0.3	-0.4	-0.2	0.1	-0.1	-1.0
PL	-0.7	-0.3	-0.1	-0.3	0.0	-1.4
PT	-0.9	-1.2	-0.6	-0.1	0.2	-2.6
RO	-0.1	0.2	-0.1	0.0	-0.1	0.0
SI	-0.8	-0.6	0.0	-0.2	0.0	-1.5
SK	-0.2	-0.2	-0.2	-0.3	-0.4	-1.3
FI	-0.4	-0.1	0.1	0.0	0.0	-0.5
SE	-0.3	-0.1	0.0	0.0	-0.1	-0.4
UK	-0.2	-0.2	-0.2	-0.1	-0.1	-0.6
NO	-0.1	0.0	-0.1	0.0	0.0	-0.2
EU	-0.5	-0.5	-0.3	0.0	0.0	-1.4
EA	-0.6	-0.7	-0.3	0.0	0.0	-1.6

Source: Commission services, EPC

The largest contribution of the labour market effect is projected for Greece and Spain in the three first decades (2013 - 2040). As of 2040, the contribution becomes less pronounced, reflecting mostly the assumption of a constant structural unemployment rate in the Member States from that point onwards and only moderate increases in participation rates.

Benefit ratio effect

The current design of the pension system can impact the future generosity of the system in many ways. For example; indexation of pensions in payment and valorisation of past pensionable earnings / contributions paid, the way accrual rates are determined and increased age limits to receive a full pension are design features that impact the generosity of current and future pensions. Many countries have implemented measures that reduce the generosity of pension benefits to improve the

([61]) The case of Luxembourg is special, due to the country-specific situation concerning the development of the number of foreign pensioners receiving a pension from the Luxembourg pension scheme.

sustainability of their pension systems. The impact of the reduced relative generosity of pensions is captured by the benefit ratio effect.

In the EU as a whole, the benefit ratio effect would contribute to reduce the pension expenditure to GDP ratio over the projection horizon by 3.0 p.p. of GDP (see Table II.1.23). In 7 Member States (Spain, France, Croatia, Latvia, Austria, Poland and Portugal) the contribution of a decreasing benefit ratio is significant in absolute terms (i.e. above 4 p.p.). Only in Luxembourg the contribution of the change in the benefit ratio is projected to slightly increase the pension expenditure level (+0.1 p.p.).

In the first part of the projection period (2013-2020), the contribution of a change in the benefit ratio to the change in the overall pension expenditure to GDP ratio is modest (-0.2 p.p. in the EU), however with large divergences between individual Member States. In the first period (2013-2020), the highest upward pressure from the benefit ratio is projected for Greece (+1.3 p.p.) followed by Italy (+1.2 p.p.), while the largest negative contribution are expected for Latvia and Slovenia (-1.8 p.p. for both). In the subsequent period (2020-2030) the largest positive contribution is projected for Belgium at +0.4 p.p. The largest negative benefit ratio contribution would be projected in Spain (-1.5 p.p.). The largest fall in the contribution of benefit ratios is projected to show up over the period 2030-2040 (-1.0 p.p. in the EU). Here, the largest positive contribution is recorded in Slovenia (+0.3 p.p.), the largest negative one in Portugal (with -2.2 p.p.). The overall contribution of the benefit ratio in the EU stays significant in the period 2040-2050 (-0.8 p.p. of GDP for the EU on average).The impact of the benefit ratio becomes less pronounced during the last decade of the projection horizon (-0.4 p.p. in 2050-2060). The largest positive contribution is projected for Slovakia (+0.3 p.p.) and the strongest negative contribution again for Portugal (-1.5 p.p.).

Table II.1.23: **Contribution of the benefit ratio effect to the change in public pension expenditure (in p.p. of GDP)**

Country	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60
BE	0.3	0.4	-0.3	-0.3	-0.4	-0.3
BG	-1.2	-0.5	-0.3	-0.3	-0.2	-2.5
CZ	-0.1	-0.6	-0.5	0.0	0.1	-1.0
DK	-1.1	-0.3	-0.4	-0.2	0.1	-2.0
DE	-0.3	-0.9	-0.9	-0.1	0.0	-2.2
EE	-0.4	-1.3	-0.7	-0.8	-0.6	-3.8
IE	-0.2	-0.2	-0.5	-0.9	-0.4	-2.1
EL	1.3	0.3	-1.7	-1.4	-0.6	-2.1
ES	0.0	-1.5	-1.4	-1.3	-0.2	-4.4
FR	-1.1	-1.0	-1.3	-0.8	-0.5	-4.7
HR	-0.5	-1.3	-1.4	-1.1	-0.6	-5.0
IT	1.2	0.3	-1.6	-1.5	-0.5	-2.1
CY	-1.2	-0.6	-1.1	-0.7	-0.1	-3.8
LV	-1.8	-1.2	-0.4	-0.5	-0.5	-4.5
LT	-0.8	0.0	0.1	0.0	-0.2	-0.9
LU	1.1	0.1	-0.3	-0.6	-0.2	0.1
HU	0.0	-1.1	-0.5	-0.2	-0.1	-1.9
MT	-0.7	-0.8	-0.3	0.2	0.2	-1.4
NL	-0.1	-0.2	-0.3	0.0	0.0	-0.5
AT	-0.2	-0.8	-1.0	-1.1	-1.0	-4.1
PL	-0.8	-1.2	-0.9	-1.2	-1.2	-5.2
PT	0.5	-0.4	-2.2	-2.2	-1.5	-5.9
RO	-1.0	-1.3	-0.9	-0.6	-0.2	-4.0
SI	-1.8	-0.1	0.3	0.1	0.0	-1.4
SK	-0.9	-1.4	-0.4	-0.3	0.3	-2.6
FI	0.3	-0.7	-1.2	-0.8	-0.4	-2.7
SE	-1.1	-1.0	-0.7	-0.5	-0.4	-3.7
UK	0.1	-0.2	-0.4	-0.1	-0.2	-0.7
NO	0.1	-0.4	-0.7	-0.7	-0.5	-2.2
EU	-0.2	-0.6	-1.0	-0.8	-0.4	-3.0
EA	-0.2	-0.7	-1.2	-0.8	-0.3	-3.1

Source: Commission services, EPC

1.6.2. Benefit ratio and replacement rates

Many countries have in recent years implemented pension reforms to strengthen the financial sustainability of pension systems by tightening eligibility and decreasing benefits. This has led to sizable decreases in the projected pension generosity over the coming decades (see Table II.1.24 and Table II.1.25). Although reform measures might have addressed the fiscal sustainability concerns of pension systems, social or political sustainability challenges could still arise in countries with a steep reduction in the generosity of pensions. While it is very difficult to gauge to what extent pension benefits will be "adequate" in the future, it is still relevant to assess the effect these reforms will have in terms of pension adequacy. ([62])

The projections of the evolution of two indicators, the benefit ratio (the ratio between the average pension benefit and the economy-wide average wage) and the replacement rate at retirement (the average first pension as a share of the economy-wide average wage at retirement), as projected by the Member States, are depicted in Table II.1.24 and in Table II.1.25.

([62]) A more in-depth examination of this aspect can be found in the "Pension Adequacy Report", which will be published by the Social Protection Committee (SPC) in the course of 2015, dealing with the issue of adequacy of pensions.

A rather substantial decline is projected in the public pension benefit ratio for most of the Member States over the period 2013 to 2060, amounting to around -20 pp or more in 3 Member States (Spain, Portugal and Cyprus). ([63]) Only Luxembourg projects a slightly increasing public benefit ratio over the projection horizon (+2.1 pp). A benefit ratio decrease of around -9 pp is projected at the aggregated EU level (both GDP weighted and simple average). The decline in the total pension benefit ratio becomes smaller in 5 Member States (Estonia, Latvia, Portugal, Romania and Sweden), when the influence of occupational and private individual schemes on pension entitlements is also taken into consideration. The total benefit ratio still declines by -10 pp or more in Poland, Portugal, Romania and Sweden. Only Denmark and Lithuania report a slight increase in the total benefit ratio (by +2.1 p.p. and +2.8 p.p. respectively). ([64])

By 2060, the EU aggregate benefit ratio (for public pensions) would reach close to 38% (against 47% in 2013 – weighted average). The highest levels would be recorded in Luxembourg (53.4%), Greece (51.7%) and Italy (50.7%), whilst the lowest levels would be observed in Latvia (13.2%), Croatia (17.6%) and Estonia (18.8%). In Latvia and Estonia, which also report data on occupational and private individual pensions, the total benefit ratio would however be slightly higher (at 19.5% and 25.4% respectively).

([63]) In the case of Cyprus, the main driver of the decrease in benefit ratio is the closure of GEPS to new members effective 2011, as well as the reduced indexation on GEPS pensions in payment for existing beneficiaries.

([64]) Unfortunately, not all countries have reported projections on benefit ratios and replacement rates in occupational and private individual schemes. As a consequence, only a partial analysis of pension adequacy is possible as second and third pillar schemes can provide a substantial premium on public pension entitlements.

Table II.1.24: **Benefit ratio in 2013 and 2060 (in %)**

	Benefit Ratio (%)								
	Public pensions - earnings related			Public pensions			All pensions		
	2013	2060	p.p. change	2013	2060	p.p. change	2013	2060	p.p. change
BE	45.1	43.4	-1.7	42.5	41.8	-0.7			
BG	36.8	31.6	-5.3	34.2	27.5	-6.7			
CZ	42.6	40.7	-1.9	42.8	39.5	-3.3			
DK	57.5	64.9	7.5	42.5	35.1	-7.4	61.5	63.5	2.1
DE	40.8	35.6	-5.2	44.6	37.3	-7.4			
EE	34.6	20.2	-14.4	30.4	18.8	-11.6	30.5	25.4	-5.1
IE	29.6	26.5	-3.1	27.9	26.1	-1.8			
EL	57.8	43.7	-14.1	65.6	51.7	-14.0			
ES	65.4	40.2	-25.3	59.7	39.8	-19.9			
FR	52.5	38.7	-13.9	51.3	38.9	-12.4			
HR	34.9	20.5	-14.4	30.8	17.6	-13.2			
IT	59.2	52.8	-6.4	58.8	50.7	-8.1			
CY	74.9	42.4	-32.5	64.4	43.5	-20.9			
LV	30.3	14.0	-16.2	27.7	13.2	-14.5	27.7	19.5	-8.2
LT	36.9	35.9	-1.1	35.1	33.0	-2.1	35.1	37.9	2.8
LU	57.3	57.8	0.5	51.3	53.4	2.1			
HU	41.4	32.6	-8.8	40.8	31.9	-8.9			
MT	46.5	45.5	-1.0	48.3	44.1	-4.2			
NL	34.2	33.1	-1.1	35.9	34.2	-1.7	63.2	62.8	-0.4
AT				41.2	37.0	-4.1			
PL				47.9	29.4	-18.5	47.9	29.4	-18.5
PT	59.3	43.4	-15.8	61.8	41.7	-20.0	62.1	42.4	-19.6
RO	40.9	26.4	-14.5	37.0	23.4	-13.6	37.0	25.8	-11.2
SI	37.8	32.9	-5.0	33.8	30.2	-3.6			
SK	46.0	30.4	-15.6	45.7	33.3	-12.4			
FI	48.9	42.2	-6.7	52.1	43.8	-8.3			
SE	37.8	20.9	-16.9	42.1	26.3	-15.8	53.8	39.9	-13.8
UK	33.5	32.8	-0.7	36.4	33.9	-2.5			
NO				47.0	36.7	-10.3			
EU*	46.5	38.4	-8.1	46.9	37.8	-9.0			
EA*	49.6	40.3	-9.3	49.7	40.4	-9.3			
EU**	45.5	36.5	-9.0	44.0	34.9	-9.1			
EA**	47.6	37.7	-9.9	46.2	37.5	-8.7			

(1) Public pension earnings-related refers to old age earnings related pension. Public pensions aggregate includes disability, survivor and non-earnings-related benefits. All pension aggregate includes private occupational and private individual benefit and it is only reported when private pensions have been provided.
The 'Benefit ratio' is the average benefit of public pensions and public and private pensions, respectively, as a share of the economy-wide average wage (gross wages and salaries in relation to employees), as calculated by the Commission services.
* Weighted average.
** Simple average.
Source: Commission services, EPC

Replacement rates at retirement can provide information on whether a projected reduction in average pension benefit over time (i.e. a decreasing benefit ratio) is influenced by declining newly awarded pensions (as reflected in the replacement rate at retirement), or due to a decline in previously awarded pensions, mostly due to stricter indexation rules. The projected decline in the public pension replacement rate at the EU aggregate level, between 2013 and 2060, is larger than the one projected for the benefit ratio (around -12 p.p.), when looking at a weighted average, but similar when looking at a simple average (in line with sustainability factors in relatively large economies like Spain and Italy). In this case again, the projected decline would be quite widespread amongst Member States. Considering public pensions, only 2 reporting countries project an increase of replacement ratios over the projection period (Bulgaria and the Czech Republic). On the other hand, the largest decreases are projected in Spain (-30.4 pp), Poland (-24.4 pp), Greece (-16.4 pp) and Estonia (-14.9 pp). ([65]) These large drops can reflect the calculation of the first average pension being based on wages over the whole career (or increased from 15 to 25 years in Spain), and / or the valorisation being lower than the average wage growth. For Spain and Poland, the projected decline of the replacement rate is also the consequence of the impact of sustainability factors applied in pension benefit formulas. However, in most of the countries that provided data on the total replacement ratio, the decline in the replacement rate for public pensions would be offset to some extent by entitlements from 2nd and 3rd pillar schemes. This is the case in particular in Estonia, Denmark and Slovakia, where the total replacement rate is projected to increase between 2013 and 2060.

([65]) The substantial drop in the Polish benefit ratio and replacement rate can partially be explained by the connection of pension benefit calculation to life expectancy.

Table II.1.25: **Replacement rate in 2013 and 2060 (in %)**

	Gross Average Replacement Rate (%)								
	Public pensions - earnings related			Public pensions			All pensions		
	2013	2060	p.p. change	2013	2060	p.p. change	2013	2060	p.p. change
BE	39.5	38.8	-0.7						
BG	35.8	36.7	0.9	29.5	31.9	2.4			
CZ	43.3	49.3	6.1	32.2	33.7	1.5			
DK	53.7	60.6	7.0	39.7	32.8	-6.9	57.4	59.4	1.9
DE	38.9	33.9	-5.0	42.5	35.5	-7.0			
EE	40.1	25.2	-14.9	40.1	25.2	-14.9	40.4	44.1	3.7
IE	33.9	30.4	-3.5	31.2	28.7	-2.4			
EL	45.0	26.7	-18.3	38.7	22.3	-16.4	40.7	27.5	-13.2
ES	81.9	49.7	-32.2	79.0	48.6	-30.4			
FR	58.3	48.9	-9.4	50.6	39.2	-11.4			
HR	35.3	18.7	-16.7	27.9	16.5	-11.4	27.9	20.7	-7.1
IT	59.9	51.8	-8.0						
CY	44.2	49.2	5.0						
LV	38.1	19.1	-18.9	33.4	18.1	-15.3			
LT	34.9	34.8	-0.1				35.0	48.6	13.6
LU	77.7	64.6	-13.1						
HU	45.5	45.2	-0.3	33.0	29.1	-3.9			
MT	53.6	47.4	-6.1	49.4	45.6	-3.9			
NL	28.3	27.4	-0.9	29.8	28.3	-1.4	52.4	52.0	-0.3
AT	42.9	41.0	-1.9	51.0	44.7	-6.3			
PL				53.0	28.7	-24.4			
PT	57.5	30.7	-26.7				55.8	36.6	-19.2
RO	35.6	33.7	-1.9						
SI	36.1	34.1	-2.1						
SK	51.7	49.4	-2.4	51.7	49.4	-2.4	51.7	53.1	1.3
FI	42.6	42.0	-0.6				46.0	44.1	-1.9
SE	35.0	23.7	-11.3	35.6	29.0	-6.7	40.9	35.2	-5.7
UK									
NO				43.7	36.2	-7.5			
EU*	43.8	36.0	-7.8	47.5	35.3	-12.3			
EA*	53.0	44.2	-8.9	47.9	35.3	-12.6			
EU**	45.7	39.0	-6.8	68.0	53.4	-9.0			
EA**	47.6	39.2	-8.4	72.0	56.7	-9.4			

(1) Public pension earnings-related refers to old age earnings related pension. Public pensions aggregate includes disability, survivor and non-earnings-related benefits. All pension aggregate includes private occupational and private individual benefit and it is only reported when private pensions have been provided.
The 'Gross Average Replacement Rate' is calculated as the average first pension as a share of the average wage at retirement, as reported by the Member States in the pension questionnaire.
FR: disability schemes and non-earning-related schemes are not taken into account in the "public pensions" replacement rate calculation.
LV: 2015 values taken as starting point for the gross average replacement rates.
UK: new pensions (and therefore replacement ratios) have not been provided.
* Weighted average.
** Simple average.
Source: Commission services, EPC.

Yet, next to the change in replacement rates over time, it is also necessary to observe the level of replacement rates at the beginning and the end of the projection horizon. At the EU aggregated level, the public pension replacement ratio would reach around 35% by 2060 (against close to 48% in 2013 – weighted average). For earnings-related pensions, it is projected at 39% by 2060, with wide differences across the EU, ranging from 18.7% in Croatia to 64.6% in Luxembourg. When the replacement rate is very high in general or in comparison to other Member States (e.g. in Spain, Italy or Luxembourg) at the beginning of the projection period, countries might even have the political goal of reducing public pension replacement rates over time for reducing pressure on the financial sustainability of the pension systems. However, this could also have a possible negative effect on pension adequacy, if the long term levels of replacement rates fall below a minimum threshold and no other sources of pension entitlements are created by the governments.

The latter argument holds in general for all Member States with relatively low projected replacement rates in the future. There are several ways to increase pension entitlements: (1) it has become common practice in several Member States to either shift pension accumulation from public first pillar schemes to second and third pillar schemes or to build up additional entitlement in these schemes (Denmark, Estonia, Spain, Croatia, Latvia, Lithuania, the Netherlands, Portugal, Romania and Sweden have provided data on expenditures for second and third pillar

schemes, see 1.4.2). ([66]) (2) People are encouraged to start saving privately for their retirement income so that a part of future pension income is created by drawing down on accumulated assets and savings. (3) Being aware of declining public replacement rates over time, people might take the deliberate decision to expand working lives and thus, by increasing the contributory period, they might increase their pensionable incomes as well. The latter aspect is especially supported in those Member States with flexible retirement ages (e.g. Finland and Sweden). The magnitude of these factors is uncertain though.

1.6.3. Pension indexation

An indexation rule that is lower than wage indexation (i.e. price indexation rule), reduces the pension benefit of an individual relative to the average earning, as the latter increases, and thus may pose a risk of pension inadequacy over time. This especially holds in countries with low levels of replacement rates at retirement and for those people that are depending on the social safety net after retirement (i.e. minimum pensions and/or social assistance).

By definition minimum pensions or social allowance benefits are meant to cover from the potential risk of poverty, specific figures characterised by the absence of contribution or largely incomplete and insufficient working careers (hence the social welfare/ pension system cannot base their amount on any pensionable earning reference or valorisation rule). Those treatments, sometimes means-tested, are often quantified in the welfare legislation and their amount is lower compared to the average old-age earnings-related pension. In order to be effective in assuring the beneficiaries against the risk of poverty, it is hence key to assess how their value is updated over time. As shown in Table II.1.26, almost all countries but France, Ireland, Italy, Hungary Austria and Finland have legislated minimum pension and social assistance indexation rules above prices.

It is occasionally the case that a different, more generous, indexation rule is legislated or specific *ad-hoc* interventions are expected: minimum pensions have been discretionarily uprated in the past. ([67])

Despite existing legal indexation rules, several Member States decided to diverge from them in their projections and used an indexation rule that is more in line with current and past political practices i.e. that reflect constant effective policy (Spain, Italy, Hungary, Malta, Austria, Romania, Slovakia, Ireland, Lithuania and Finland). Other, strictly interpreting the no-policy change approach, projected minimum pension expenditure allowing for the legal indexation rule, i.e. Belgium, Bulgaria, Denmark, Estonia, France, Greece, Latvia, Netherland, Poland, Portugal and Norway.

When the legal indexation rule describes an indexation close to prices it would virtually lead to a gradual disappearance of minimum pensions in the very long run. This cast some doubts not only on whether these instruments will stay effective in covering against the risk of poverty (see the data on minimum pension level and poverty thresholds in Table II.1.26), but also on an underestimation bias in the projected expenditure. However, in almost all Member States, the proportion of public minimum pensions in relation to total public pension expenditure is currently small, and then the size of this possible underestimation may not be very important.

([66]) Possible transaction costs due to the re-allocation of one part of the former pension contributions to the PAYG scheme towards funded schemes need to be taken into account.

([67]) For instance, in France, in order to re-align the minimum income to the increased living standards, it has been decided in 2008 to raise exceptionally the minimum pension for single persons.

Table II.1.26: **Minimum pension and indexation**

Country	AWG(1)				
	Minimum pension expenditure over GDP (%)		Minimum pension benefit ratio (2013 - 2060 % change)	Indexation rule	
	2013	2060	2013	Used in the projections	Legal
BE	0.1	0.1	-14.6	Prices and living standard	Prices and living standard
BG	0.0	0.1	-40.2	Prices and wages	Prices and wages
CZ					Prices and wages
DK	6.8	4.7	-11.7	Wages	Wages
DE					Prices and wages & re-examination of pension value
EE				Prices and social taxes	Prices and social taxes
IE	0.6	0.3	-5.1	Wages	No fixed rule
EL	1.7	2.2	-32.4	Prices and GDP (max 100% prices)	Prices and GDP (max 100% prices)
ES	0.1	0.1	-0.5	Wages	Index for pension revaluation
FR	0.1	0.2	-22.4	Prices	Prices
HR					Prices and wages
IT	0.3	0.4	-3.1	GDP per capita as of 2019	Prices
CY	0.2	0.2	-19.8	Wages	Wages
LV	0.0	0.0	-69.0	Prices and wages	Prices and wages
LT	0.2	0.1	32.2	Wages	Yearly discretionary decision
LU	0.0	0.0			Wages
HU	0.0	0.0	-60.4	Wages	No fixed rule
MT	0.0	0.0		Wages	Prices and wages
NL	5.1	5.8	-3.1	Wages	Wages
AT	0.0	0.0		Wages	Prices
PL	0.7	0.2	-54.5	Prices and wages	Prices and wages
PT	1.3	1.8	-31.6	Prices and GDP	Prices and GDP
RO	0.1	0.1	-27.6	Wages	Prices and wages until 2030
SI					Prices and wages
SK	0.0	0.2	-14.6	wages	Prices and wages
FI	0.8	0.4	-48.4	Prices and wages	Price
SE	0.7	1.3	-32.7	Wages	Price
UK	0.6	0.3		Wages	Wages
NO	2.7	0.7		Wages	Wages

(1) The minimum pension benefit ratio is the average minimum pension divided by the economy-wide average wage. Minimum pension expenditure is approximated using "non-earnings-related old-age minimum pension" – line 24 of the reporting sheet (see Annex 1). Average pension is calculated dividing by the number of minimum pensions (line 74 of the reporting sheet).
DK, NL AWG data refers to old-age pensions (universal systems based on residency).
IE basic part of the non-earnings-related old-age pension system.
FI number of pensioners (line 106 of the reporting sheet) is used instead of pensions.
LT Data refer to non-earnings related old-age pensions where part of expenditure for minimum pensions is only 20% in 2013 and 70% in 2060; minimum pension benefit ratio % change is 7.2.
Source: Commission services, EPC.

1.7. DECOMPOSITION OF NEW PENSIONS

A disaggregation of annual flows of new earnings-related pension expenditure into its main drivers was first introduced in the pension projection questionnaire for the 2012 Ageing Report.

The disaggregation adds to the understanding of the underlying drivers of public pension expenditure und thus increases the transparency of the projection exercise. Indeed, together with the indexation rule applied to the stock of "old pensions", the assessment of the evolution of new pension expenditure completes the analysis of public pension expenditure over time. The reporting framework was further developed in this projection round to better take into account country specific pension design features, in particular in the case of pension point systems. ([68])

In general, new pension expenditures can be decomposed as follows:

([68]) See Annex 1 on the reporting sheet.

$$P_{new} = \overline{C}_{new}\overline{A}_{new}\overline{PE}_{new}N_{new}$$

where P_{new} is the overall spending on new pensions, $\overline{C}_{new}$ is the average contributory period or the average years of service of the new pensions, $\overline{A}_{new}$ is the average accrual rate of the new pensions, $\overline{PE}_{new}$ is the average pensionable earnings over the contributory period related to the new pensions and N_{new} is the number of new pensions (pensioners).

Contributory period

Projections on contributory years and average accrual rates help providing a clearer picture of the future drivers of (new) pension expenditure and the viability of the pension system as accrual rates might change over time and across different types of pensions. Contributory periods can increase for several reasons, such as rising statutory retirement ages that force employees to extent their working lives to receive full pensions. The increase in employment rates due to the abolishment of early retirement schemes or the tightening of eligibility criteria for certain pension benefits (e.g. disability pensions or additional contributory years for military service periods or number of children) can be other reasons for longer contributory periods.

Table II.1.27 shows the development of the average contributory period (or average years of service) for new pensions over time. Almost all countries show an increase of the contributory period over the projection horizon. ([69]) At aggregate EU level, where the average contributory period is increasing by 4.0 years (GDP weighted average; +3.6 years if simple average is applied). Only Estonia and Norway (-6.7 years and -3.0 years, respectively) show a clear downward trend. In Estonia, this is due to the fact that the possibility to "earn" additional contributory years e.g. via the number of children expires over time. In France, Hungary, Slovenia and Slovakia, the contributory period increases slightly. The highest increases in the average contributory periods can be observed in Greece (+7.1 years) and Portugal (+6.8 years) due to the rather low starting point and the recently legislated reforms. In Luxemburg the increase (+6.1 years) is due to the impact of resident female and cross border contributors on the total contributory period. In the case of FI the contributory period refers pension rights acquired since 2009.

([69]) No data provided by DK and NL as their systems are based on years of residence and by UK. In the case of DE and CY, point systems, the new pension decomposition does not allow for contributory period.

Table II.1.27: **Contributory period**

	2014	2020	2030	2040	2050	2060	2014-60
BE	37.1	38.2	38.4	38.8	38.8	38.9	1.8
BG	35.2	36.6	38.3	38.0	37.8	37.6	2.4
CZ	44.0	44.5	45.5	46.4	47.4	48.4	4.4
DK							
DE							
EE	39.4	37.9	35.1	33.8	32.5	32.7	-6.7
IE	38.7	39.8	41.3	42.3	43.0	43.6	4.8
EL	30.5	30.6	33.8	35.1	36.3	37.6	7.1
ES	36.7	37.7	38.9	39.1	39.4	39.7	3.0
FR	33.2	34.6	32.9	33.7	33.3	34.1	0.8
HR	35.3	35.8	36.7	38.2	38.8	39.1	3.8
IT	33.4	35.5	35.4	35.4	35.5	37.3	3.9
CY							
LV	35.3	36.3	37.4	38.1	38.1	38.1	2.8
LT	36.8	37.8	41.0	41.0	40.9	41.1	4.3
LU	30.5	30.8	32.4	34.7	35.4	36.6	6.1
HU	39.7	40.6	40.7	40.6	40.5	40.5	0.8
MT	35.7	36.0	37.0	37.2	37.5	37.9	2.2
NL							
AT	36.4	37.7	38.1	38.0	38.1	38.1	1.8
PL	33.5	34.8	36.5	37.5	37.4	37.6	4.1
PT	29.5	31.0	32.4	33.1	34.6	36.4	6.8
RO	31.1	32.4	33.1	33.3	34.0	34.3	3.2
SI	37.3	38.4	38.2	38.2	38.0	38.1	0.8
SK	41.6	41.1	40.4	40.2	40.7	42.1	0.4
FI	3.0	7.7	15.7	23.8	30.4	32.3	29.2
SE	39.9	40.8	40.7	38.9	41.5	41.5	1.6
UK							
NO	36.1	37.0	35.9	34.2	32.2	33.0	-3.0
EU*	34.2	36.5	36.6	37.1	37.4	38.2	4.0
EA*	33.6	36.1	36.2	36.7	36.9	37.7	4.1
EU**	34.6	35.6	36.5	37.1	37.6	38.2	3.6
EA**	33.3	34.0	34.5	34.9	35.1	35.8	2.5

(1)DK, NL flats systems based on years of residence.
DE, CY points systems with new pensions not depending on the contributory period.
FI contributory period refers to pension rights accrued since 2009.
UK no data provided.
* Weighted average (GDP)
**Simple average
Source: Commission services, EPC.

Several countries show an increasing trend for the average contributory period over (practically) the whole projection horizon 2013-2060, where the major part of the increasing effect is often obtained already at the beginning of the projection horizon due to legislated increases in retirement ages. In other countries, the development is rather volatile (e.g. Sweden or Bulgaria), reflecting e.g. cohort effect or counterbalancing effects of different pension reforms.

In general, an increasing trend in the average contributory period can have a decreasing effect on public pension expenditure as a longer working life translates into a shorter period of time during which a person receives pension benefits and on higher GDP growth due to higher employment rates. At the same time, one can however also accumulate a higher amount of pension entitlements during a longer career span, which has an increasing effect on pension expenditure. This can be counterbalanced if average yearly accrual rates are decreased at the same time.

Table II.1.28: **Average effective accrual rates**

	2014	2020	2030	2040	2050	2060	2014-60 (change in %)
BE	1.5	1.5	1.4	1.4	1.4	1.4	-6.7
BG	1.1	1.2	1.2	1.2	1.2	1.2	9.1
CZ	2.2	2.0	1.8	1.7	1.9	1.9	-15.2
DK							
DE							
EE	0.6	0.6	0.5	0.4	0.4	0.3	-38.8
IE							
EL	2.2	2.0	1.8	1.4	1.4	1.4	-36.3
ES	2.3	2.1	1.7	1.7	1.6	1.6	-32.5
ES SF	2.3	2.0	1.6	1.5	1.4	1.3	-42.0
FR	1.8	1.7	1.7	1.7	1.7	1.7	-4.8
HR							
IT	1.9	1.8	1.7	1.7	1.7	1.7	-11.3
CY	1.4	1.3	1.3	1.3	1.3	1.3	-7.1
LV	1.1	1.0	1.0	0.8	0.7	0.6	-41.3
LT	0.5	0.5	0.4	0.4	0.4	0.4	-29.7
LU	1.8	1.8	1.7	1.7	1.6	1.6	-13.2
HU	2.1	2.0	2.0	2.0	2.0	2.0	-4.8
MT	1.9	1.9	1.7	1.7	1.7	1.7	-14.4
NL	2.0	2.0	2.0	2.0	2.0	2.0	0.0
AT	1.2	1.1	1.2	1.2	1.1	1.1	-7.3
PL	1.0	1.0	1.0	1.0	1.0	0.9	-4.4
PT	2.1	2.1	2.2	2.2	2.2	2.2	7.7
PT SF	2.0	1.8	1.8	1.8	1.8	1.7	-14.2
RO							
SI	1.5	1.5	1.5	1.5	1.5	1.5	-3.5
SK	1.2	1.2	1.1	1.1	1.1	1.2	-5.3
FI	2.9	2.3	1.9	1.9	1.9	1.9	-35.4
FI SF	2.9	2.2	1.8	1.7	1.6	1.6	-44.6
SE	1.0	1.0	0.9	0.9	0.9	0.8	-12.6
UK							
NO	0.9	0.9	1.1	1.0	1.0	1.0	4.2
EU*	1.7	1.6	1.5	1.5	1.5	1.5	-13.7
EA*	1.8	1.7	1.6	1.6	1.6	1.6	-13.4
EU**	1.6	1.5	1.4	1.4	1.4	1.4	-9.0
EA**	1.6	1.6	1.5	1.4	1.4	1.5	-10.0

(1) ES, PT and FI: Accrual rates are ex-post downsized via the sustainability factor (see the "SF" lines). The effective accrual rates have been reported for the remaining countries mentioned in the box on sustainability (see Box II.1.2)
DK, NL and IE flats systems with new pensions not depending on accrual rates.
DE, HR, RO points systems with new pensions not depending on accrual rates.
FR Accrual rates are computed ex-post, for both DB and PS systems as they coexist in France (see the country fiche for further details regarding the calculation of the accrual rates).
SE figures for the NDC system.
UK no data provided.
*Weighted average (GDP)
**Simple average
Source: Commission services, EPC

1.7.1. Accrual rates

In the vast majority of Member States, accrual rates are going down over the period 2014-2060 (see Table II.1.28). ([70]) Only Bulgaria (+9.1%) and Portugal (+7.7%) show an increase in the average accrual rate over the projection horizon. In the latter country, the increasing effect on expenditure is however (more than) counterbalanced by the sustainability factor. At the EU level, accrual rates are decreasing by around 14%. The sharpest decreases have been projected in Latvia, (-41.3%), Estonia (-38.8), Greece (-36.3%), Finland (-35.4%) and Spain (-32.5%). In all these countries, except Latvia, the accrual rate is well above the EU average. For most countries, accrual rates are adjusted downwards, since contributory periods and retirement ages have been increased. There are other reasons for these sharp declines: stricter eligibility criteria for pension entitlements or shifting parts of the accrual to the second and third pillar (e.g. Estonia, Latvia, Lithuania and Slovakia). The latter two aspects are, as shown above, also coherently reflected in a downward trend in public benefit ratios (see Table II.1.23 and Table II.1.24).

([70]) No data provided by DK and IE, as new pensions in their flat-rate systems are not depending on the contributory period. DE, HR and RO point systems are not depending on accrual rates but on point value and average pension point development. Alternative decompositions were provided during the peer review process.

Table II.1.29: **Overview of sensitivity tests (including policy-change scenario): difference in assumptions compared with the baseline scenario**

Population		Labour force		Productivity		Policy-change scenario
High life expectancy	Lower migration	Higher employment rate	Higher employment rate older workers	Higher/lower labour productivity	Lower TFP (risk scenario)	Linking retirement age (policy scenario)
Increase of life expectancy at birth of two years by 2060 compared with the baseline projection.	20% less migration compared with the baseline projection.	Employment rate 2 p.p. higher compared with the baseline projection for the age-group 20-64.	Employment rate of older workers (55-74) 10 p.p. higher compared with the baseline projection.	Labour productivity growth assumed to converge to a productivity growth rate which is 0.25 p.p. higher/lower than in the baseline scenario.	TFP growth assumed to converge to 0.8% in 2060 (instead of 1%).	Early and statutory retirement age shifted year-over-year in line with change in life expectancy at current statutory retirement ages (in the Cohort Simulation Model).
		The increase is introduced linearly over the period 2016-2025 and remains 2 p.p. higher thereafter.	*The increase is introduced linearly over the period 2016-2025 and remains 10 p.p. higher thereafter.*	*The increase is introduced linearly during the period 2016-2025, and remains 0.25 p.p. above/below the baseline thereafter.*	*Convergence to the target rate in 2035 from the latest outturn year, i.e. 2013, and the period of fast convergence limited to 5 years, i.e. until 2040.*	
		The higher employment rate is assumed to be achieved by lowering the rate of structural unemployment (the NAWRU).	*The higher employment rate of this group of workers is assumed to be achieved through a reduction of the inactive population.*			

Source: Commission services, EPC

1.8. SENSITIVITY TESTS ([71])

The 2015 pension projection exercise is carried out on the basis of commonly agreed demographic and macroeconomic assumptions, as well as a "no-policy change" scenario (see Chapter 1 for a detailed description). Obviously, the assumptions used for such long run projections are surrounded with uncertainties. Therefore, a number of sensitivity tests have been carried out, in order to quantify the responsiveness of pension expenditures to changes in key underlying assumptions. In practice, changes to two types of variables were applied (see Table II.1.29 for a detailed description): demographic variables (life expectancy, migration flows) and macroeconomic variables (employment rate, productivity). Moreover, following the mandate of the EPC, a policy-change scenario has been introduced in this exercise, in order to assess the impact of automatic rules adapting the legal retirement age to changes in life expectancy over time. Moreover, as compared to the previous 2012 *Ageing Report*, a new productivity risk scenario has been applied, assuming lower Total Factor Productivity (TFP) growth (see Volume 1 of the 2015 *Ageing Report* for more details on all these alternative scenarios). In this section, the results will be presented as deviations from the "baseline". This relative impact can also be read as an "elasticity" parameter.

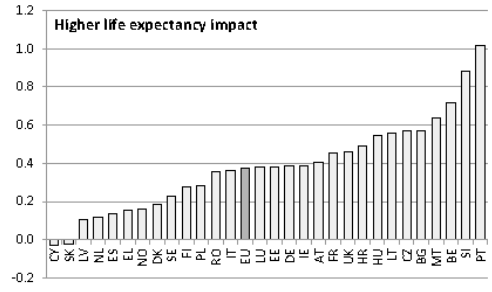
1.8.1. Sensitivity tests on demographic variables

An increase of life expectancy at birth (of 2 years by 2060 compared to the baseline) would generally result in a higher level of public pension expenditures (see Graph II.1.18). As people live longer, they are expected to receive pension benefits for a longer time span, weighting on pension spending. However, this effect is partially counter-acted by positive effects on the labour force and GDP, containing the increase of the public pension expenditure ratio (denominator effect). ([72]) In some countries, specific features of the pension system (linkage of retirement age or pension benefits to life expectancy; sustainability factors) also play as automatic pension spending stabilizers. At the EU aggregate level, in such a scenario, the public pension spending ratio would be increased by close to +0.4 p.p. of GDP by 2060, as compared to its baseline level. The strongest estimated impacts are recorded in Portugal (+1 p.p. of GDP), Slovenia (+0.9 p.p. of GDP) and Belgium (+0.7 p.p. of GDP). On the other hand, the impact would be limited (lower than +0.2 p.p. of GDP) in 8 countries (Cyprus, Slovakia, Latvia, the Netherlands, Spain, Greece, Norway and Denmark), all having introduced sustainability factors and / or linkages to life expectancy.

([71]) For the UK, sensitivity tests have only been performed for State pensions (and not public service pensions), for Ireland, they have been performed only for Public Social Security schemes (and not non-funded Private Occupational Public Service schemes).

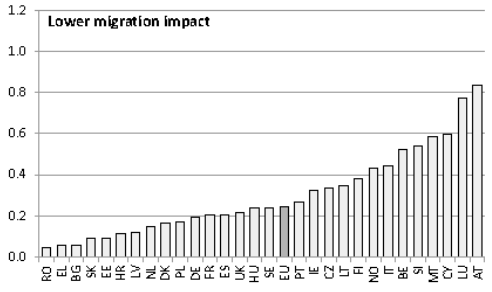
([72]) An increase of life expectancy is also associated with additional public pension contributions.

Graph II.1.18: **Impact of an increase of life expectancy on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**



Source: Commission services, EPC

Graph II.1.19: **Impact of lower migration on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**



Source: Commission services, EPC

In the lower migration scenario (with 20% less net migration compared to the baseline), public pension spending ratio is expected to be higher than in the baseline scenario in all the countries considered (see Graph II.1.19). Indeed, for countries assumed to experience lower migration in-flows, this results in a smaller labour force and hence GDP over the projection period, as migrants are supposed to be (for a large part) active in the labour market. The opposite applies for countries assumed to experience net migration outflows. At the same time, the number of pensioners is generally less affected by a lower migration over the projection period. At the EU aggregate level, the estimated impact would reach around +0.2 p.p. of GDP by 2060. The highest impact would be recorded in Austria (+0.8 p.p. of GDP), Luxembourg (+0.8 p.p. of GDP) and Cyprus (+0.6 p.p. of GDP), given the relatively important weight of migration flows in the population in these countries (as compared to the EU average). ([73])

1.8.2. Sensitivity tests on macroeconomic variables

Higher employment rates

A higher employment rate of older workers (for age group 55-74), of 10 p.p. compared with the baseline projection (increase introduced up until 2025), would have a limited impact (near 0 p.p.) on the change in the gross public pension expenditure at the EU aggregate level over the entire projection period (see Graph II.1.20). Indeed, in this scenario, two counter-acting effects are at play: on one hand, higher employment of older workers, achieved through a reduction of inactive population, leads to a higher GDP growth, a lower number of pensioners and a reduction in the average number of pension drawings years, weighting on gross public pension expenditure. However, on the other hand, employees will also be able to accrue additional pension rights, which will have an upward impact on gross public pension expenditure. In most of countries, the former effect dominates: indeed, 22 countries would experience a decrease of their public pension expenditure ratio, ranging from a maximum of -1.0 p.p. of GDP in Belgium to a minimum of -0.1 p.p. of GDP in Spain and Greece. On the opposite, in a few countries, the impact would be positive. It would be particularly large in France (+0.7 p.p. of GDP). ([74])

([73]) Annex 2 provides an additional graph with the impact over the period 2013-2037, which may be initially negative for countries projected in the baseline to experience net migration outflows over the first half of the projection period.

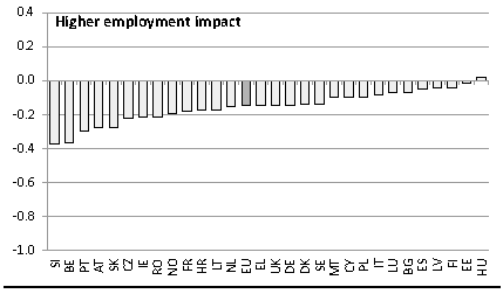
([74]) However, it should be noted that other (positive) effects, here not accounted for, would be observed such as a decrease of unemployment benefits and an increase of social contributions.

Graph II.1.20: **Impact of a higher employment rate of older workers on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**

Source: Commission services, EPC

A higher employment rate (for age group 20-64), of 2 p.p. compared with the baseline projection (increase introduced up until 2025), would slightly lower public pension expenditure at the EU aggregate level by -0.1 p.p. of GDP by 2060 (see Graph II.1.21). The strongest impacts are projected for Slovenia and Belgium (-0.4 p.p. of GDP in both cases). On the other hand, in Estonia and Hungary, the estimated impact is close to 0 p.p.. Compared to the higher employment rate of older workers scenario, the (often negative) impact is generally more limited.

Graph II.1.21: **Impact of a higher employment rate on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**



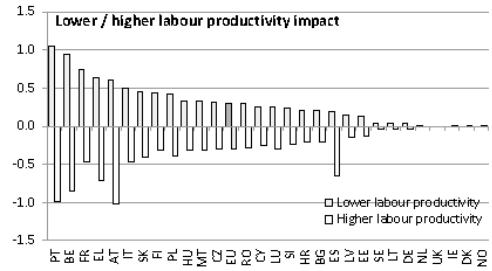
Source: Commission services, EPC

Higher / lower productivity

If *a permanent increase of +0.25 p.p. in the labour productivity growth rate* was introduced, gross public pension expenditure would be reduced by -0.3 p.p. of GDP by 2060 at the EU aggregate level (see Graph II.1.22). The reduction would be particularly high in Austria (-1.0 p.p. of GDP in both countries), Portugal (-1.0 p.p. of GDP) and Belgium (-0.9 p.p. of GDP), where pensions are not fully indexed to wages after retirement. In these cases, higher labour productivity growth leads to a faster GDP and labour income growth than pension growth (and thus to a fall in the benefit ratio). The increased gap between average pensions and average wages results in a decrease of public pension expenditure as a share of GDP. On the other hand, the impact of such an increased labour productivity would be negligible in countries applying indexation rules connected to nominal wage growth. This is the case in particular of the Netherlands, the UK, Ireland, Denmark and Norway.

A *permanent decrease of -0.25 p.p. in the labour productivity growth rate* would result in overall symmetrical results (see Graph II.1.22). At the EU aggregate level, the estimated impact, compared with the baseline, would reach +0.3 p.p. of GDP. Interestingly, the effects would not be fully symmetrical in 3 countries. In Spain and Austria, the change in public pension expenditure ratio would be more limited (+0.2 p.p. of GDP and +0.6 p.p. of GDP respectively, against -0.7 p.p. of GDP and -1.0 p.p. of GDP respectively, in case of an *increased* labour productivity growth compared to the baseline). In France, on the other hand, the upward impact, in this negative scenario, would reach +0.8 p.p. of GDP, against a more moderate decrease of -0.5 p.p. of GDP in case of an increased labour productivity growth.

Graph II.1.22: **Impact of higher / lower labour productivity growth on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**

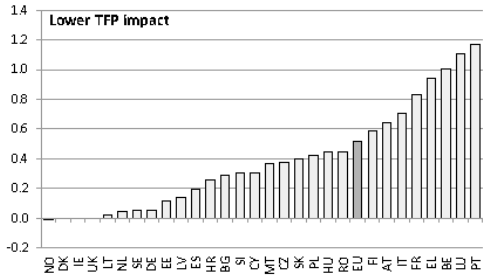


Source: Commission services, EPC

A *lower Total Factor Productivity (TFP) growth* (convergence to 0.8% in 2060 compared to 1% in the baseline scenario) would have a significant

upward impact on gross public pension expenditure at the EU aggregate level (+0.5 p.p. of GDP by 2060; see Graph II.1.23), as compared with the baseline scenario. In this scenario, a greater proportion of Member States (more than half) would register public pension expenditure increases over the 2013-2060 period. The highest estimated effect is projected for Portugal (+1.2 p.p. of GDP), Luxembourg (+1.1 p.p. of GDP), Belgium (+1.0 p.p. of GDP), Greece (+0.9 p.p. of GDP) and France (+0.8 p.p. of GDP). The upward impact would be in most cases similar in magnitude to the one estimated in the lower labour productivity growth scenario.

Graph II.1.23: **Impact of lower TFP growth on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**

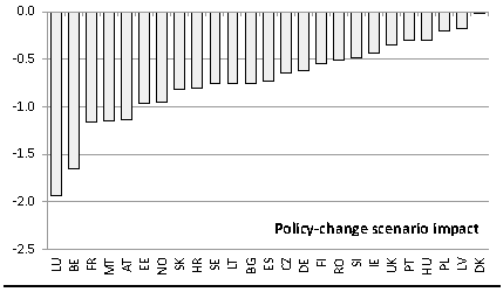


Source: Commission services, EPC

1.8.3. Policy-change scenario: linking retirement ages to increases in life expectancy

Introducing an *automatic* link between early and statutory retirement ages and life expectancy, starting from the base year, ([75]) would yield a substantial downward impact in most of countries (see Graph II.1.24). Indeed, such a link, by lowering the number of pensioners (and thus the coverage ratio), reduces gross public pension expenditure. This impact can be partially mitigated by an increase of average pensions, since longer careers are often associated with higher pension entitlements. By increasing labour supply, this linking policy also boosts GDP growth. ([76]) The strongest effect is projected for Luxembourg (-1.9 p.p. of GDP by 2060) and Belgium (-1.7 p.p. of GDP), countries which do not foresee any increase of retirement ages in the baseline scenario. The impact would also be substantial (around -1 p.p. of GDP) in France, Malta, Austria, Estonia and Norway. On the other hand, in Denmark, where a linkage of retirement age to life expectancy already exists (subject to parliamentary decisions), the projected impact is marginal. ([77])

Graph II.1.24: **Impact of linking retirement age to life expectancy on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**



Source: Commission services, EPC

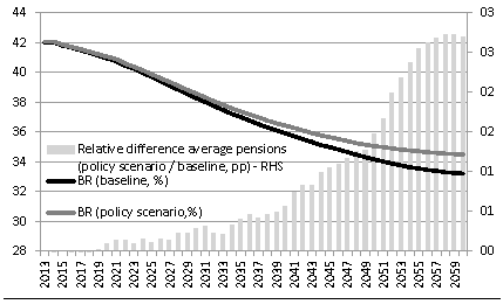
Increasing retirement ages in line with gains in life expectancy not only allows for a substantial reduction in pension expenditures, but also allows for accruing higher pension entitlements due to a longer working life in most cases. Indeed, in this scenario, average EU pension level would be around 2.7% higher in comparison to the baseline scenario (see Graph II.1.25). Consequently, the projected decrease of the benefit ratio over the projection period would be somehow reduced, since it would stabilise around 34½% (against around 33% in the baseline).

([75]) This increase translates into a rise of the effective retirement age compared to the baseline. To take into account the already legislated changes in retirement age reflected in the baseline scenario, the highest effective retirement age outcome between the one reported in the baseline and the one in the policy-change scenario is assumed at every point in time over the projection horizon. Therefore differences may occur also in case of countries where legislated statutory retirement age develops in line with life expectancy.

([76]) For more details of activity and expenditure impacts, see Schwan, A. and Sail. E, 2013, "Assessing the economic and budgetary impact of linking retirement ages and pension benefits to increases in longevity", *European Economy, Economic Papers*, no. 512, December.

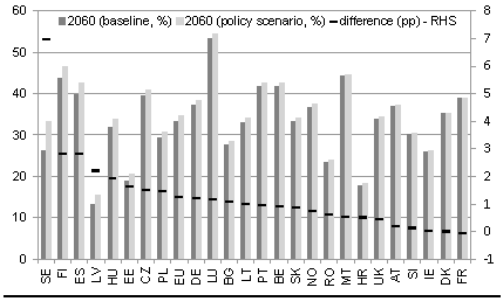
([77]) In other countries where an *automatic* linkage already exists, this alternative policy-change scenario has not been run (since coinciding with the baseline). This is the case of Italy, Greece, Cyprus and the Netherlands.

Graph II.1.25: **Benefit ratio and average pensions in the policy scenario compared to the baseline at the EU aggregate level**



(1) EU simple average (excluding countries in which a link to life expectancy already exists i.e. Italy, Greece, Cyprus and the Netherlands).
Source: Commission services, EPC

Graph II.1.26: **Benefit ratio in the policy scenario compared to the baseline in 2060 (%)**



(1) IT, EL, CY and NL: no policy scenario projections, as a link to life expectancy already exists.
Source: Commission services, EPC.

Across EU countries, the strongest impact would be observed in Sweden (with a benefit ratio increased by 7 p.p. by 2060), in line with the annuity formula used ([78]) (see Graph II.1.26). On the other hand, in France and Denmark, there would be no impact on the benefit ratio in this policy scenario compared to the baseline. In France, this result reflects projected behaviour of older people in the baseline (mainly retiring when they fulfil the conditions, in particular in terms of contributory period, to be able to benefit from a full pension). In Denmark, the presence of a link of the retirement age to life expectancy (even if not fully automatic) and the nature of public pensions (mainly flat-rate pensions) explain the neutral effect of this scenario on the benefit ratio.

In order to summarize the potential negative risks in terms of public pension spending associated to the different (unfavourable) sensitivity tests, ([79]) Table II.1.30 put together the estimated results. Some countries, projecting a significant increase of public pension expenditures over the period 2013-2060, are also particularly sensitive to the different unfavourable alternative scenarios (Belgium, Luxembourg, Slovenia and Malta). Other countries, also projecting a substantial rise of their public pension spending ratio in the long run, pension projections seem, on the other hand, less sensitive to these alternative scenarios (Germany, Norway and Slovakia). It is worth noting that, in some other Member States, where public pension expenditures should experience only a small increase or even a decrease by 2060 (in the baseline scenario), unfavourable demographic or macroeconomic developments could significantly alter these results (in particular, in Portugal, Austria, France and Italy).

([78]) In the NDC PAYG system, the annuity is calculated by dividing the individual account value by a factor reflecting life expectancy at the date of retirement. Hence, postponing the date of retirement has a strong impact on the annuity.

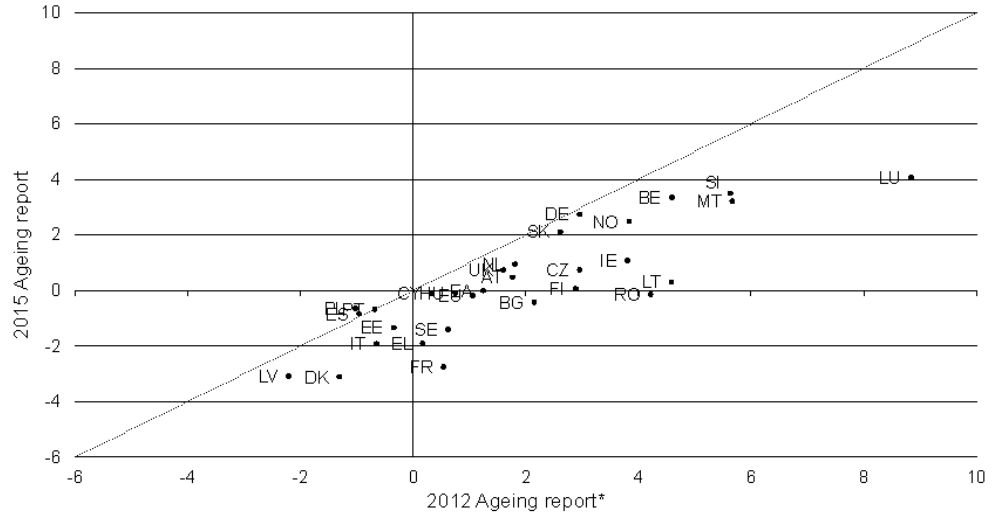
([79]) The sensitivity tests reported in the table below are the ones expected to increase public pension expenditures as compared to the baseline scenario.

Table II.1.30: **Summary table: impact of all (unfavourable) sensitivity tests on gross public pension expenditure change over 2013-2060 (deviation from baseline change, p.p. of GDP)**

Countries	Change 2013-60 baseline	Higher life expectancy	Lower migration	Lower labour productivity	Lower TFP (risk scenario)
LU	4.1	0.4	0.8	0.3	1.1
SI	3.5	0.9	0.5	0.2	0.3
BE	3.3	0.7	0.5	0.9	1.0
MT	3.2	0.6	0.6	0.3	0.4
DE	2.7	0.4	0.2	0.0	0.1
NO	2.5	0.2	0.4	0.0	0.0
SK	2.1	0.0	0.1	0.5	0.4
IE	1.1	0.4	0.3	0.0	0.0
NL	0.9	0.1	0.1	0.0	0.0
CZ	0.7	0.6	0.3	0.3	0.4
UK	0.7	0.5	0.2	0.0	0.0
AT	0.5	0.4	0.8	0.6	0.6
LT	0.3	0.6	0.3	0.0	0.0
FI	0.1	0.3	0.4	0.4	0.6
HU	-0.1	0.5	0.2	0.3	0.4
CY	-0.1	0.0	0.6	0.3	0.3
RO	-0.1	0.4	0.0	0.3	0.4
EU	-0.2	0.4	0.2	0.3	0.5
BG	-0.4	0.6	0.1	0.2	0.3
PL	-0.7	0.3	0.2	0.4	0.4
PT	-0.7	1.0	0.3	1.1	1.2
ES	-0.8	0.1	0.2	0.2	0.2
EE	-1.3	0.4	0.1	0.1	0.1
SE	-1.4	0.2	0.2	0.0	0.1
EL	-1.9	0.2	0.1	0.6	0.9
IT	-1.9	0.4	0.4	0.5	0.7
FR	-2.8	0.5	0.2	0.8	0.8
LV	-3.1	0.1	0.1	0.1	0.1
DK	-3.1	0.2	0.2	0.0	0.0
HR	-3.9	0.5	0.1	0.2	0.3

(1) The following thresholds are used for the colour-coding:
GREEN: < 0.2 p.p. of GDP (lower impact)
DARK GREEN: 0.2 - 0.5 p.p. of GDP
ORANGE: 0.5 - 0.8 p.p. of GDP
RED: 0.8 - 1.1 p.p. of GDP
DARK RED: > 1.1 p.p. of GDP (stronger impact)
In the higher life expectancy sensitivity test, legislation is assumed to remain unchanged as compared to the baseline (no link assumed between retirement age or benefits to life expectancy in countries where such as link does not exist).
Source: Commission services, EPC

Graph II.1.27: **Change in gross public pension expenditure (2013-2060) compared: 2012 Ageing Report(1) and current projection round (in p.p. of GDP)**



(1) New projections have been rebased with ESA 2010. For some countries, the 2012 AR* projections refer to updated figures (c.f. box below).
Source: Commission services, EPC

1.9. COMPARISON WITH THE 2012 AGEING REPORT

Public pension expenditure projections have been significantly revised in this exercise, as compared to the 2012 *Ageing Report* (see Graph II.1.27 as reflected by the distance from the 45 degree line). In the vast majority of countries, projections have been revised downward. At the EU aggregate level, public pension expenditures are now expected to slightly decrease by 2060 (-0.2 p.p. of GDP) against a projected increase (+1.1 p.p. of GDP) in the previous *2012 Ageing Report*. The biggest revisions can be observed in Luxembourg, Romania, Lithuania, France, Finland, Ireland, Bulgaria and Malta (with revisions ranging from –4.8 p.p. of GDP to -2.5 p.p. of GDP). 14 additional countries (Czech Republic, Slovenia, Greece, Sweden, Denmark, Norway, Austria, Italy, Belgium, Estonia, Latvia, the UK, the Netherlands and Hungary) have revised their projections significantly, although to a lesser extent (between -2.2 p.p. of GDP and – 0.9 p.p. of GDP). In Slovakia, Cyprus, Germany and Portugal, public pension expenditures are projected to follow a similar trend, as compared to the 2012 AR (with revisions of at the most -0.5 p.p. of GDP). Finally, only 2 countries (Spain and Poland) have revised upward their projections (by a limited +0.1 p.p. of GDP and +0.4 p.p. of GDP respectively).

In some countries, the presence of a substantial "base year effect", linked to the enduring effects of the financial and economic crisis, accounts for a large share of the revision. This is the case in particular in Bulgaria, Greece, Spain, Italy, Poland and Portugal. Indeed, in these countries, the level of public pension expenditures as a share of GDP has been substantially revised upward for the starting year 2013, implying a bigger decrease – or reduced increase – over the projection period (see Table II.1.32). This "base year effect" is nevertheless less important than in the 2012 *Ageing Report*, when comparing the two previous rounds of projections (with reference year being 2010). At the EU aggregate level, this effect is indeed limited.

Table II.1.31: **Comparison of gross public pension expenditure levels (2013 and 2060) in the 2012(1) and 2015 projections rounds (% and p.p. of GDP)**

Country	2013		2060		Change 2013-2060		Difference AR 2015 - AR 2012*		
	AR 2012*	AR 2015	AR 2012*	AR 2015	AR 2012*	AR 2015	Difference 2013	Difference 2060	Total difference
BE	11.6	11.8	16.2	15.1	4.6	3.3	0.2	-1.1	-1.3
BG	8.9	9.9	11.1	9.4	2.2	-0.4	1.0	-1.6	-2.6
CZ	8.7	9.0	11.7	9.7	3.0	0.7	0.2	-2.0	-2.2
DK	10.2	10.3	8.9	7.2	-1.3	-3.1	0.0	-1.8	-1.8
DE	10.4	10.0	13.4	12.7	3.0	2.7	-0.4	-0.6	-0.2
EE	8.1	7.6	7.7	6.3	-0.3	-1.3	-0.5	-1.5	-1.0
IE	7.9	7.4	11.7	8.4	3.8	1.1	-0.5	-3.2	-2.7
EL	14.4	16.2	14.6	14.3	0.2	-1.9	1.8	-0.3	-2.1
ES	10.6	11.8	9.6	11.0	-1.0	-0.8	1.2	1.3	0.1
FR	14.6	14.9	15.1	12.1	0.5	-2.8	0.3	-3.0	-3.3
HR	:	10.8	:	6.9	:	-3.9	:	:	:
IT	15.0	15.7	14.4	13.8	-0.6	-1.9	0.7	-0.6	-1.3
CY	10.1	9.5	10.4	9.3	0.3	-0.1	-0.7	-1.1	-0.5
LV	8.2	7.7	6.0	4.6	-2.2	-3.1	-0.5	-1.4	-0.9
LT	7.5	7.2	12.1	7.5	4.6	0.3	-0.3	-4.6	-4.3
LU	9.7	9.4	18.6	13.4	8.8	4.1	-0.4	-5.2	-4.8
HU	11.7	11.5	12.4	11.4	0.8	-0.1	-0.2	-1.0	-0.9
MT	10.3	9.6	15.9	12.8	5.7	3.2	-0.7	-3.2	-2.5
NL	6.8	6.9	8.6	7.8	1.8	0.9	0.1	-0.8	-0.9
AT	14.3	13.9	16.1	14.4	1.8	0.5	-0.4	-1.7	-1.3
PL	10.9	11.3	9.8	10.7	-1.0	-0.7	0.5	0.8	0.4
PT	13.4	13.8	12.7	13.1	-0.7	-0.7	0.4	0.4	0.0
RO	9.3	8.2	13.5	8.1	4.2	-0.1	-1.1	-5.5	-4.4
SI	11.4	11.8	17.0	15.3	5.6	3.5	0.4	-1.8	-2.1
SK	8.0	8.1	10.6	10.2	2.6	2.1	0.1	-0.4	-0.5
FI	12.3	12.9	15.2	12.9	2.9	0.1	0.5	-2.3	-2.8
SE	9.6	8.9	10.2	7.5	0.6	-1.4	-0.7	-2.7	-2.0
UK	7.6	7.7	9.2	8.4	1.6	0.7	0.1	-0.8	-0.9
NO	10.4	9.9	14.2	12.4	3.8	2.5	-0.5	-1.8	-1.4
EU	11.2	11.3	12.3	11.2	1.1	-0.2	0.1	-1.2	-1.3
EA	12.1	12.3	13.4	12.3	1.2	0.0	0.2	-1.1	-1.2

(1) New projections have been rebased with ESA 2010. For some countries, the AR 2012* projections refer to updated figures (cf. box below).
Source: Commission services, EPC

A comparison of the decomposition of the change in public pension expenditure between the 2012 *Ageing Report* and the current projection exercise into four variables (dependency ratio effect, coverage ratio effect, benefit ratio effect and labour market effect) is conducted (see Table II.1.32). At the EU aggregate level, the downward revision between the two projection exercise (-1.3 p.p. of GDP) is mainly explained by the dependency ratio effect (contribution of -0.8 p.p. of GDP), in line with more favourable demographic assumptions in this report (based on EUROPOP2013), ([80]) and the labour market effect (-0.6 p.p. of GDP).

([80]) In particular, the old-age dependency ratio is projected by Eurostat to increase less in this projection exercise (based on EUROPOP2013) than what was expected in the 2012 AR (based on EUROPOP2010).

Box II.1.3: **Comparing 2012 AR and 2015 AR projections**

When reading and interpreting the data provided in this section, the following elements have to be kept in mind:

- For some countries (namely BE, DK, ES, CY, LV, HU, NL, PL, SI and SK), projections have been updated, after the 2012 *Ageing Report*, following the adoption of pension reforms. In this case, the 2012 AR figures refer to these updated (and peer-reviewed) projections (and not to the original 2012 data AR);

- To facilitate comparisons between projections prepared for the 2015 *Ageing Report* and for the 2012 *Ageing Report*, pension expenditure change reported under 2012 AR has been recalculated by reference to the base year 2013;

- In most tables and graphs presented in this section (and the rest of the report), when pension variables are reported as a share of GDP, *new* projections have been rebased with ESA 2010 by the Commission services (but not 2012 AR data);

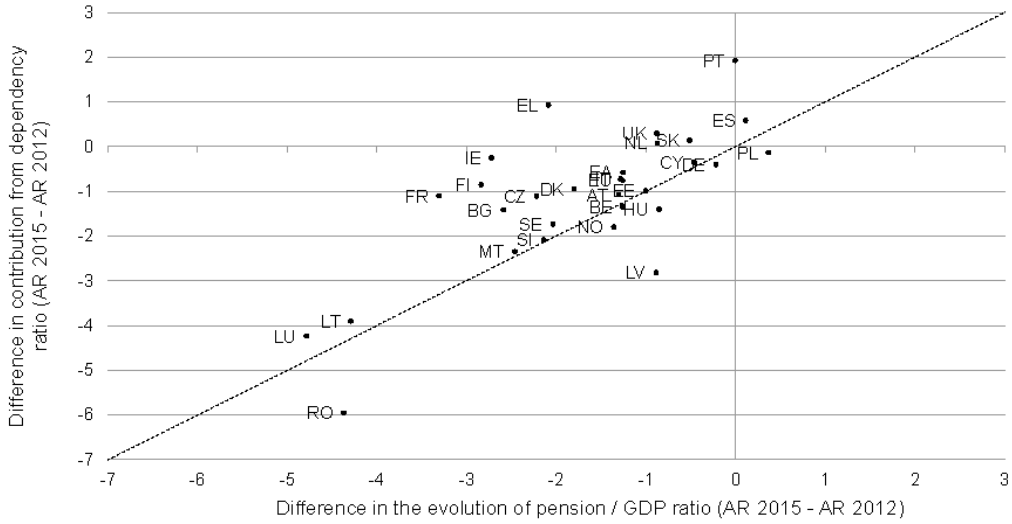
- In table II. 1. 34, presenting a decomposition – provided by the Member States - of the revision of pension expenditure change (over 2013-2060) between 2012 AR and 2015 AR, all data are, on the other hand, based on ESA 1995, and refer – unless specified – to original 2012 AR projections. As data are expressed in p.p. of GDP change between 2013 and 2060, the difference with ESA 2010 rebased figures is however very small.

In most of countries, a lower projected increase of the old-age dependency ratio contributes greatly to the downward revision (see Graph II.1.28). As compared to the previous projection exercise, the largest downward revisions of the dependency ratio contribution are recorded in Romania, Lithuania, Latvia, Malta and Slovenia. ([81]) In some cases however, the downward revision of the public pension spending ratio is larger than the revision of the dependency ratio, in particular in Greece, Ireland, France, Finland and Portugal. This larger revision can be explained in some countries (France, Finland and Ireland) by substantial downward revisions of the benefit ratio; in others (Greece and Portugal), an important downward factor is the labour market component. By contrast, for Latvia, Romania, Hungary and Poland, the opposite holds: the downward revision of the change in public pension expenditure (in fact an upward revision in the case of Poland) is lower than the revision of the dependency ratio.

Lower average pensions relative to average wages explain only part of the reduction in projected pension spending. For a large majority of countries, the benefit ratio has been revised down, following in several cases the adoption of pension reforms, but less than the projected change in pension to GDP ratio (see Graph II.1.29). There are however a few exceptions (Ireland, Germany and Slovakia).

([81]) The large revision in Luxembourg is difficult to comment on due to very large cross-border population effects.

Graph II.1.28: **Revision of the dependency ratio and of the change in gross public pension expenditure ratio (over 2013-2060), between AR 2012 and AR 2015 (in p.p. of GDP)**



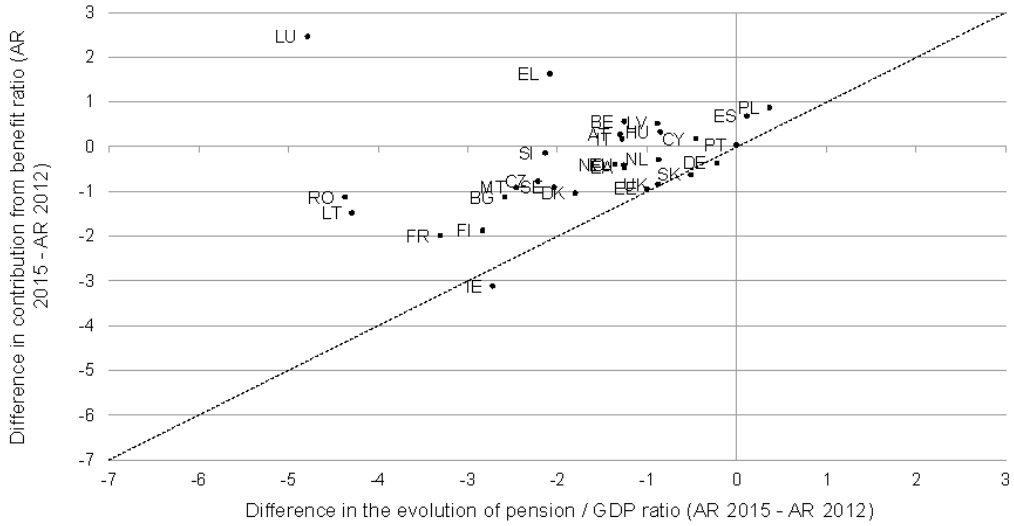
Source: Commission services, EPC

In some countries (notably Greece, Spain, Portugal and Italy), the labour market ratio pushes down the pension to GDP ratio over the projection period more heavily than previously projected, in line with more unfavourable initial conditions. Indeed, in these countries, a higher initial employment rate, than previously projected, translates into subsequent relatively larger reductions of this unemployment rate.

Finally, in 13 countries, the coverage ratio effect contributes to the downward revision of public pension expenditure ratio over the projection period, reflecting legislated increases of retirement ages and / or increases in the career requirements for full pension and / or tightening access to early and disability pension schemes. In other countries, the coverage ratio provides a less negative contribution than previously projected (notably in Romania, Norway and Malta).

An alternative decomposition of the change of the public pension to GDP ratio in this current round of projections, compared to the 2012 AR (see Table II.1.33), confirms that in most of countries, the first source of the revision comes from changes in demographic and macroeconomic assumptions. Indeed, for the countries that provided this alternative decomposition, on average 2/3rd of the revision of gross public pension expenditure ratio change, over the period 2013-2060, can be explained by this change in assumptions. In all countries, but two (Slovakia and Portugal), these new assumptions have contributed to revise downward the projected change of public pension expenditures.

Graph II.1.29: **Revision of the benefit ratio and of the change on gross public pension expenditure ratio (over 20163-2060), between AR 2012 and AR 2015 (in p.p. of GDP)**



Source: Commission services, EPC

In 14 Member States, pension reforms, adopted over the last 3 years, have also contributed greatly to lowering pressures on public pension expenditures. The estimated impact is particularly large in Cyprus (-5.3 p.p. of GDP), Spain (-2.6 p.p. of GDP), Ireland (-0.9 p.p. of GDP), the Netherlands (-0.6 p.p. of GDP), Austria (-0.6 p.p. of GDP), Bulgaria (-0.5 p.p. of GDP) and Denmark (-0.5 p.p. of GDP). On the other hand, the shift of pension schemes from the second to the first pillar in some countries (notably Poland) has contributed to increase public pension expenditures over the long-run (+1.4 p.p. of GDP).

Since the 2012 *Ageing Report*, several countries have improved their modelling techniques and / or extended the coverage of their pension projections. In 10 Member States, these improvements resulted in a reduction of public pension expenditure projections. The estimated impact of modelling revision on the projected pension to GDP ratio appears particularly important in Romania (-2.2 p.p. of GDP), Cyprus (-1.3 p.p. of GDP), France (-1.1 p.p. of GDP) and Sweden (-1.1 p.p. of GDP). In Hungary and Norway, on the contrary, these modelling / coverage improvements had a positive impact on pension to GDP ratio projections (+1 p.p. of GDP and +0.3 p.p. of GDP respectively).

Table II.1.32: **Decomposition of the difference in the gross public pension expenditure change over period 2013-2060 between the 2015 and 2012[(1)] projection rounds (in p.p. of GDP)**

Country	Change 2013 - 2060 (1+2+3+4+5)	Dependency ratio (1)	Coverage ratio (2)	Benefit ratio (3)	Labour market ratio (4)	Residual (5)
BE	-1.3	-1.4	-0.2	0.6	-0.3	0.1
BG	-2.6	-1.4	0.3	-1.1	-0.7	0.3
CZ	-2.2	-1.1	-0.1	-0.8	-0.6	0.3
DK	-1.8	-1.0	0.4	-1.0	-0.6	0.5
DE	-0.2	-0.4	0.6	-0.4	-0.5	0.5
EE	-1.0	-1.0	0.6	-0.9	0.1	0.2
IE	-2.7	-0.3	0.8	-3.1	0.0	-0.1
EL	-2.1	0.9	0.1	1.6	-4.4	-0.4
ES	0.1	0.6	0.5	0.7	-1.9	0.2
FR	-3.3	-1.1	-0.3	-2.0	-0.1	0.1
HR	:	:	:	:	:	:
IT	-1.3	-0.7	-0.3	0.2	-1.3	0.9
CY	-0.5	-0.4	-0.1	0.2	-0.8	0.7
LV	-0.9	-2.8	0.6	0.5	0.2	0.6
LT	-4.3	-3.9	0.7	-1.5	0.2	0.2
LU	-4.8	-4.2	-2.6	2.5	-0.4	0.0
HU	-0.9	-1.4	0.7	0.3	-0.9	0.3
MT	-2.5	-2.4	0.9	-0.9	-0.2	0.1
NL	-0.9	0.1	-0.5	-0.3	-0.4	0.3
AT	-1.3	-1.1	-0.3	0.3	-0.6	0.5
PL	0.4	-0.1	-0.4	0.9	-0.6	0.7
PT	0.0	1.9	-0.7	0.0	-1.4	0.2
RO	-4.4	-6.0	2.5	-1.1	-0.5	0.7
SI	-2.1	-2.1	0.4	-0.1	-0.6	0.3
SK	-0.5	0.1	-0.1	-0.6	-0.4	0.5
FI	-2.8	-0.9	-0.1	-1.9	-0.2	0.2
SE	-2.0	-1.7	0.6	-0.9	-0.1	0.2
UK	-0.9	0.3	-0.1	-0.8	-0.4	0.1
NO	-1.4	-1.8	0.9	-0.4	-0.2	0.1
EU	-1.3	-0.8	0.2	-0.4	-0.6	0.4
EA	-1.2	-0.6	0.1	-0.5	-0.7	0.4

(1) For some countries, the AR 2015 projections are compared to projections updated after AR 2012 (cf. box above).
Source: Commission services, EPC

Table II.1.33: **Alternative decomposition of the difference in the gross public expenditure change over 2013-2060 between the 2015 and 2012* projection rounds (in p.p. of GDP)**

Country	AR 2012*	Change in assumptions	Improvement coverage / modelling	Constant policy interpretation	Policy-related changes	AR 2015	AR 2015 - AR 2012
BE	4.6	-0.9			-0.2	3.5	-1.1
BG	2.2	-1.7		-0.4	-0.5	-0.4	-2.6
CZ	3.1	-1.7	-0.2		-0.4	0.8	-2.3
DK	-1.3	-1.4			-0.5	-3.2	-1.9
DE	3.0	-0.4			0.2	2.8	-0.2
EE	-0.3	-1.1				-1.4	-1.1
IE	2.6	-0.1	0.0		-0.9	1.6	-1.0
EL	0.2	:	:	:	:	-1.9	-2.1
ES	3.3	-1.6			-2.6	-0.9	-4.2
FR	0.5	-2.0	-1.1		-0.2	-2.8	-3.3
HR	:	:	:	:	:	-3.9	:
IT	-0.6	-1.4			0.0	-1.9	-1.3
CY	8.1	-1.7	-1.3		-5.3	-0.1	-8.2
LV	-2.2	-1.1	-0.1		0.3	-3.1	-0.9
LT	4.6	-3.4	-0.7		-0.2	0.3	-4.3
LU	8.9	-4.2	-0.5		-0.1	4.0	-4.9
HU	0.8	-1.5	1.0	-0.2	-0.2	-0.1	-0.9
MT	5.6	-2.2				3.4	-2.2
NL	1.8	-0.2			-0.6	1.0	-0.8
AT	1.8	-0.7			-0.6	0.5	-1.3
PL	-1.3	-0.9	0.0	0.0	1.4	-0.7	0.6
PT	-0.7	0.3			-0.4	-0.7	0.0
RO	4.2	-2.2	-2.2			-0.2	-4.4
SI	5.6	-2.4			0.3	3.6	-2.0
SK	2.6	0.3	-0.8			2.2	-0.4
FI	2.9	-2.9	-0.1		0.1	0.1	-2.8
SE	0.6	-1.1	-1.0			-1.5	-2.1
UK	1.6	:	:	:	:	0.8	-0.8
NO	3.8	-1.6	0.3			2.5	-1.3
EU**	**1.6**	**-1.2**	**-0.3**	**0.0**	**-0.3**	**-0.1**	**-1.7**
EA***	**1.8**	**-1.1**	**-0.3**	**0.0**	**-0.4**	**0.1**	**-1.7**

(1) EL, UK: decomposition not provided.
HR: no projections made for the 2012 AR.
IE: decomposition only provided for Public Social Security Schemes.
HU: decomposition provided for net public pension expenditures.
Reported figures are based on ESA 1995.
*For some countries, the AR 2012 column refers to updated (and peer-reviewed) figures, following the adoption of reforms. This is the case of BE, DK, LV, HU, NL, SI and SK.
** (GDP) weighted average of EU countries for which data are available.
*** (GDP) weighted average of EA countries for which data are available.
Source: Commission services, EPC

1.10. ANNEX - SCOPE FOR IMPROVEMENTS IN THE MEMBER STATES PROJECTIONS

Scope for improvement regarding Member States projections	
France	The baseline scenario relies on a retirement behaviour assumption (people retire only when they reach the full rate pension) consistent with current observed retirement behaviour. This assumption translates into decreasing coverage ratios for age group 60-64 and a gap between the effective Cohort Simulation Model exit age from the labour market and the projected effective retirement age.
Germany	It is conceptually not possible at this point to derive a measure for the "contributory period" due to the country specific modelling set-up of the German points system.
UK	The UK was unable to provide some of the data requested by the Ageing Working Group, namely including pension expenditure by age groups, number of pensioners by age groups, blocks on replacement rate, contributions/contributors and new pensions.

2. HEALTH CARE

2.1. INTRODUCTION

Projections of public expenditure on health care from 2013 to 2060 were run using Commission services' (DG ECFIN) models on the basis of the methodology and data agreed with the Member States delegates to the AWG-EPC. It should be noted that the projections focus on "core" health care and exclude long-term nursing care. ([82])

Demand for health care provision is sizeable and its potential benefits are high. However, those benefits come at a substantial cost: in the EU28 total expenditure on health care equalled 10.1% of GDP in 2012.

A substantial part of this expenditure – 7.8% of GDP on average ([83]) in the EU28 in 2012 – is public spending. Overall, public expenditure on health care has risen in most EU Member States over time. Table II.2.1 and Box II.2.1 present the evolution of public spending on health care, its share in total expenditure and total government outlays over the last decades.

Although in the aftermath of the economic crisis this rise has slowed down or reversed in some cases, this deviation from the trend is expected to be temporary. The size and growing importance of public expenditure on health care in government expenditure and the need for budgetary consolidation all across Europe makes health care expenditure an important topic in the policy debate on how to ensure the long-term sustainability of public finances.

The complexity of health care markets makes expenditure projections a challenging task. ([84]) The projections presented in this report follow a "what if" approach and results are bound with uncertainty. ([85])

Nevertheless, these projections can be very helpful for allowing policy makers to figure out the possible evolution of their public expenditure and the impact of the main underlying drivers of health care costs.

([82]) Public expenditure on health in this publication (with the exception of table II.2.1, which includes SHA category HC.3) is basically defined as the "core" health care categories (SHA categories (HC.1 to HC.9), excluding long-term nursing care category (HC.3), but including capital investment in health (HC.R.1). The data and methodology for running the long-term expenditure projections is explained in detail in the 2015 Ageing Report "Underlying assumptions and projection methodologies": http://ec.europa.eu/economy_finance/publications/european_economy/2014/pdf/ee8_en.pdf.

([83]) The averages presented in this Chapter are weighted according to GDP, as explained in the 2015 Ageing Report "Underlying assumptions and projection methodologies":

([84]) Health care markets may suffer from adverse selection (higher health risks have difficulty in obtaining affordable coverage), moral hazard (insured people have an incentive to over consume health care services as they do not bear the full cost) and asymmetric information (physicians have more information than patients, which could lead to supply-induced demand and economic rents, depending on the type of remuneration of physicians: capitation, fee-for-service, pay-for-performance). These market failures are the economic rationale for public sector involvement (financing and regulations) in health care markets based on efficiency and equity considerations.

([85]) Uncertainty relates to three factors. First, public expenditure on health care are determined by an interrelated play of numerous demand and supply-related factors, often not fully observed or quantifiable. Second, ad hoc policy reforms may change their relevance and impact upon future health care spending. Third, the long-term horizon of the projections increases the uncertainty of the results.

Box II.2.1: **Public health care expenditure through the last decades**

Public health care spending is a major and growing source of fiscal pressure, representing a significant and growing share of GDP in EU Member States. The governments of all EU Member States are heavily involved in the financing and often in the provision of health care services.

During the 1960s and 1970s, public (and private) health care expenditures rose rapidly, triggered by an increase in population coverage and improvements in the provision of the health services associated with higher populations' expectations and their willingness to pay more for better health care services. In the 1980s and 1990s, the growth of public expenditure on health slowed down, and even reversed in a few countries. This was largely due to budgetary consolidation efforts, as growth in health care expenditures was perceived as too strong. In the late 1990s and especially in the first decade of the 21st century, health expenditure growth picked up again, peaking around 2009, before the fiscal tightening brought on by the economic crisis led to a reversal of the trend with slower growth and falls in spending in some countries. This reversal may however be temporary. Health expenditure has reached an average level of 7.8% of GDP in 2012 in the EU, though ranging from less than 3% of GDP in Cyprus to 9.4% of GDP in Denmark.

As far as the share of public in total health expenditures is concerned, there seem to be two divergent movements: in general, the share of public spending in EU15 Member States has increased in the last decade, whilst in New Member States (NMS) private financing has increased as a source of total health care funding. Moreover, health care has gained prominence relative to other government expenditures. Although overall the share of health care in total government expenditures has increased, it has fallen for many member states, reflecting reforms in the health care system. Public spending on health care now accounts on average for 14.9% of total government spending in the EU, ranging from 7.2 to 20.1%.

Table II.2.1: **Public health care expenditures (including long-term nursing care) in EU Member States, 1970-2012**

	Public health care expenditure as % of												
	GDP					total health expenditure					total government expenditure		
	1970	1980	1990	2003	2012	1970	1980	1990	2003	2012	1990	2003	2012
BE	:	:	:	7	8.2	:	:	:	73.1	75.2	10	13.7	14.7
BG	:	:	5.2	4.7	4.1	:	:	100	62.1	58.5	:	13.6	12.9
CZ	:	:	4.6	6.4	6.3	:	:	98	89.8	84	:	14.8	17.5
DK	:	7.9	6.9	8	9.4	:	89	83.2	84.5	85.8	11.9	12.9	14.5
DE	4.4	6.6	6.3	8.6	8.6	73.3	78.9	76.1	78.5	76.7	:	14.4	15.7
EE	:	:	:	3.8	4.6	:	:	:	76.7	78.7	:	11.8	12.9
IE	4.1	6.8	4.4	5.6	6	80.4	82	72	76.7	67.6	:	19.3	16.7
EL	2.3	3.3	3.5	5.4	6.2	42.6	55.9	53	59.8	67.1	:	11.6	10.8
ES	2.3	4.2	5.1	5.7	6.7	65.7	79	79.1	70.2	71.7	:	13.5	13
FR	4.1	5.6	6.4	8.4	9	75.9	80.4	78	77.9	77.4	:	14.2	14.7
HR		:	:	5.3	5.7	:	:	:	:	73.1	:	:	20.1
IT	:	:	6.1	6.2	7.1	:	:	79.2	76.2	77.3	11.7	13.3	14.4
CY	0.9	1.5	1.8	3.1	2.5	33.3	53.6	40	45.2	42.2	:	7.6	7.2
LV	:	:	2.5	3.2	4.1	:	:	100	52.5	59.5	:	9.7	10.7
LT	:	:	3	4.8	4.7	:	:	90.9	73.8	69.2	:	14.8	16.3
LU	2.8	4.8	5	6.5	6	90.3	92	93	84.2	84	11.1	11.5	11.5
HU	:	:	:	6.1	5	:	:	:	71.1	62.6	:	11.5	10.9
MT	:	:	:	6	5.5	:	:	:	75	64.6	:	12.5	13.5
NL	:	5.1	5.4	5.8	7.4	:	69	68	59.3	67.3	:	12.1	17.7
AT	3.3	5.1	6.1	7.7	8.4	63.5	69.2	73	74.5	75.9	:	14.8	15.3
PL	:	:	4.4	4.4	4.7	:	:	92.1	69.9	69.2	:	9.6	10.9
PT	1.5	3.4	3.8	6.7	6.7	60	64	64	68.7	65	:	15	12.9
RO	:	:	2.9	4.5	4.4	:	:	100	84.8	79.3	:	10.4	8.4
SI	4.2	4.4	5.6	6.3	6.7	100	100	100	72	71.5	:	14.1	14.6
SK	:	:	:	5.1	5.7	:	:	:	88.3	69.7	:	16.2	16.4
FI	4.1	5	6.2	5.9	6.8	74.5	79	81.3	72.8	75	12.1	12.9	14.5
SE	5.8	8.2	7.4	7.6	7.8	85.3	92.7	90.4	82	81.3	:	12.6	13.7
UK	3.9	5	4.9	6.2	7.8	86.7	89.1	83.3	79.3	84	12.1	15.1	16.6
NO	4	5.9	6.3	6.9	7.9	:	:	83	83	84.1	12.6	16.3	16.9
EU28	:	:	:	7	7.8	:	:	:	76	77.4	:	13.9	14.9
EU15	:	:	:	7.1	8	:	:	:	76	77.2	:	14.1	15.1
NMS	:	:	:	5.1	5.2	:	:	:	75.2	73.1	:	11.7	12.3
EA	:	:	:	7.3	7.9	:	:	:	75	82.1	:	13.9	14.8

(1)The EU and EA averages are weighted according to GDP.
Source: Eurostat; United Nations Statistics Division; Commission services; 2012 or latest data used.

2.2. DETERMINANTS OF HEALTH CARE EXPENDITURE

Public expenditure on health care is driven by a series of factors that affect both demand for and supply of health care goods and services. Population size and structure, its health status, the individual and national income and provisions regulating access to health care goods and services are seen as key determinants of demand. Supply side determinants include the availability and distance to health care services, technological progress and the framework regulating the provision of those goods and services (institutional settings). The next sections briefly describe the relation between these factors and public spending on health care.

2.3. DEMOGRAPHIC STRUCTURE OF THE POPULATION

The demand for health care goods and services depends on the number of people in need of care. This depends not only on the size but also on the health status of the population, which is linked to the age and gender structure of the population and notably with the share of elderly people in the overall population. This is because older people often develop multi-morbidity conditions, which require costly medical care.

The relationship between the age of an individual and his/her use of health care is well displayed by the so-called "age-related expenditure profiles" shown in Graph II.2.1. The graph plots average public per capita spending on health care (as % of GDP per capita) against the age of individuals in each country of the EU. Spending generally increases with the age of a person, notably from the ages of 55 and more for men and 60 and more for women, coinciding naturally with higher morbidity at older age. The demand for health care is also high at very young ages and during maternity years for women. Consequently, population structure, and ageing in particular, is one of the drivers of increasing health care expenditures.

Population ageing may pose a risk for the sustainability of health care financing in two ways.

Firstly, increased longevity, without an improvement in health status, leads to increased demand for services over a longer period of lifetime, increasing total lifetime health care expenditures and overall health care spending (Breyer et al. 2010, Zweifel et al. 2005). It is often argued that new medical technologies have been successful in saving life from a growing number of fatal diseases, but have been less successful in keeping people in good health. Secondly, in many EU Member States, public health care is largely financed by social security contributions of the working population. Ageing leads to an increase in the old age dependency ratio i.e. fewer contributors to the recipients of services. The old age dependency ratio is projected to increase from 27.8% in 2014 to 50.1% in 2060 (EUROPOP2013). Consequently, in the future far fewer people will contribute to finance public health care, while a growing share of older people may require additional health care goods and services.

Longer working lives accompanied by a healthier working population can mitigate the impact of ageing. ([86]) In addition, many researchers have shown that ageing has contributed much less than widely thought to the observed growth in expenditure and in many Member States an actual reduction in per capita spending at very old age (85+) can be observed. This is because alongside real needs, social, economic and cultural considerations determine the allocation of resources to the sector and use of resources across different age groups. Therefore, ageing should be analysed in conjunction with other determinants of expenditure, such as health status, income and non-demographic factors as explained next.

([86]) See e.g. Christine de la Maisonneuve & Joaquim Oliveira Martins, 2013. "Public Spending on Health and Long-term Care: A new set of projections," OECD Economic Policy Papers 6, OECD Publishing.

Box II.2.2: **Income elasticity of health care demand, a short literature survey**

There is no consensus on a precise estimate of the income elasticity on health care expenditure. Time-series and cross-country evidence usually suggest income elasticities above one. Older, purely cross-sectional studies find higher income elasticities, such as Newhouse (1977) with a point estimate of around 1.35 for 30 OECD countries or Leu (1986) for 19 OECD countries with an estimate of 1.2.

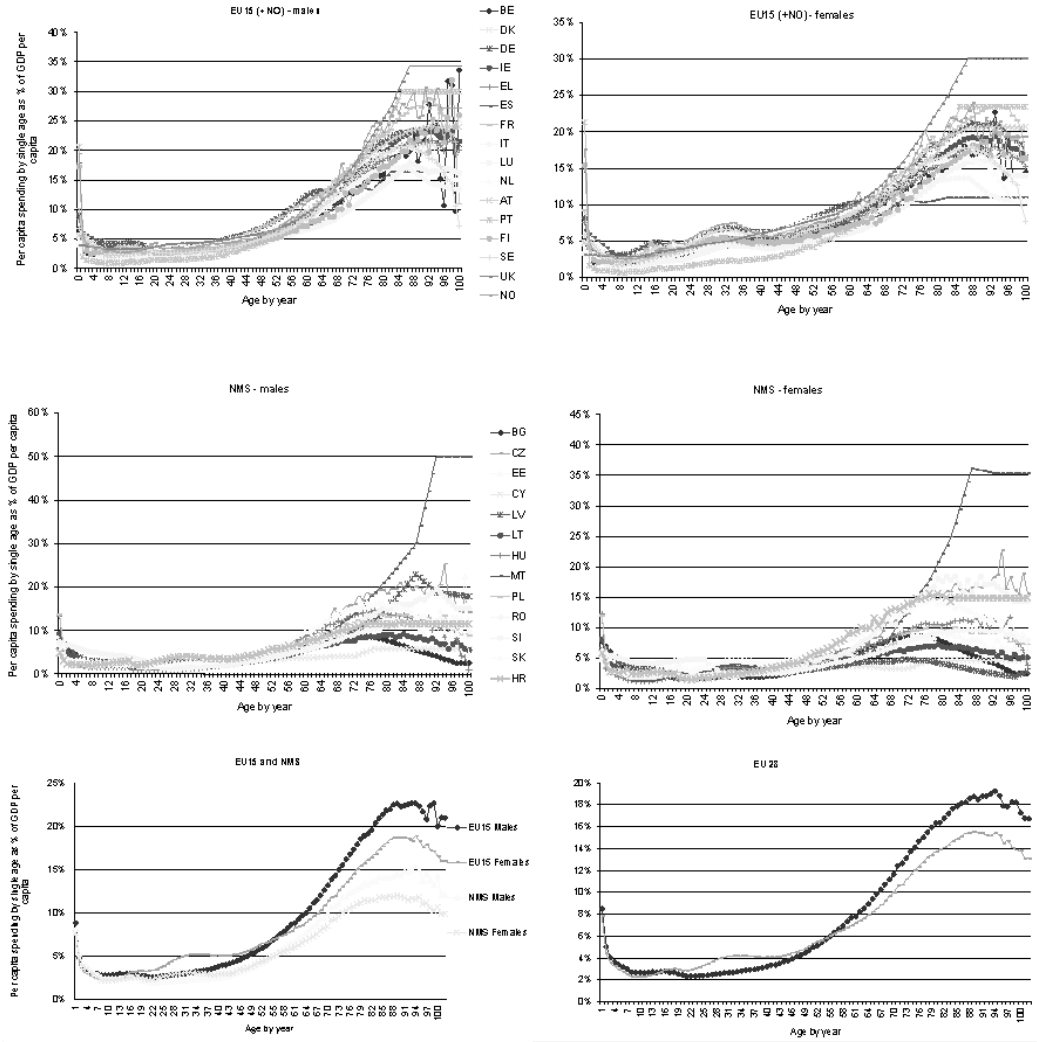
Studies based on panel data find in general lower income elasticities around or below one, e.g. Gerdtham et al. (1991) and (1995); Mahieu (2000), Bac et al. 2002; Azizi et al. (2005), or, more recently, Medeiros and Schwierz (2013). For an overview, see Clements et al., (2012).

A general critique is that the estimated elasticities are likely to be biased when other relevant factors are not included in the model, i.e. that the increase in health care spending is not determined by income alone but by other factors that happen to be correlated with income.

Moreover, the estimates are probably affected by misspecification and endogeneity problems: health – and therefore also health care spending – is likely to affect economic growth. Acemoglu et al. (2009) attempt to overcome these problems and estimate the causal effect of income on health care expenditures. They find an income elasticity of 0.72 with an upper value of 1.13.

Cross-sectional studies on individual income show small or even negative elasticities (Newhouse et al. 1993). For an overview see also Getzen (2000).

Graph II.2.1: **Age-related expenditure profiles of health care provision (spending per capita as % of GDP per capita)**



(1) Greece, Ireland and Romania did not provide age-cost profiles and so the profile was imputed as the average cost profile of the EU15 (for Ireland and Greece) and NMS (for Romania).
Source: Commission services, EPC

2.4. HEALTH STATUS

Falling mortality rates at all ages, including for older people, is contributing to increasing life expectancy. However, in some cases mortality has decreased at the expense of increased morbidity, meaning that more years are spent with chronic illnesses. If increasing longevity goes in line with an increasing number of healthy life years, then ageing may not necessarily translate into rising health care costs. Better health goes along with lower health care needs and may drive down health services use and health expenditure (Rechel et al. 2009). Therefore, it is crucial to understand if longevity is accompanied by more or less good health.

Projecting the future evolution in the health status of the population is challenging due to the difficulties associated with predicting the changes in morbidity and measuring ill-health. While the

evolution in mortality rates and life expectancy can be estimated on the basis of administrative information (censuses, surveys, etc.), epidemiological data is subject to much higher uncertainty. Three different hypotheses have been put forward to predict a possible future interaction between evolution in life expectancy and changes in the prevalence of disability and ill-health:

- The "expansion of morbidity" hypothesis (Gruenberg, 1977; Verbrugge, 1984; Olshansky et al., 1991) claims that the decline in mortality is largely due to a decreasing fatality rate of diseases, rather than due to a reduction in their prevalence/incidence. Consequently, falling mortality is accompanied by an increase in morbidity and disability.

- The "compression of morbidity" hypothesis (Fries, 1980, 1989) suggests that disability and ill-health is compressed towards the later period of life at a faster pace than mortality. Therefore, people are expected to live not only longer, but also in better health.

- The "dynamic equilibrium" hypothesis (Manton, 1982) suggests counterbalancing effects of two phenomena: decreasing prevalence/incidence of chronic diseases on the one hand, and decreasing fatality rates of diseases leading to longer prevalence of disability, on the other.

Recent empirical evidence has not come to a clear conclusion regarding these hypotheses. International evidence is mixed ([87]) and, while health may continue to improve, some causes of disability may at the same time become more prominent. For example, higher levels of some disabling conditions (dementia, musculoskeletal diseases) go along with decreasing rates of prevalence of others (cardiovascular and chronic respiratory diseases). Consequently, it remains very difficult to predict the levels of morbidity and therefore potential demand for health services, even in the near future.

([87]) See Cutler et al (2013) "Evidence for Significant Compression of Morbidity In the Elderly U.S. Population" and Salomon et al (2012) "Healthy life expectancy for 187 countries, 1990—2010: a systematic analysis for the Global Burden Disease Study 2010".

It has been argued by other authors that better health throughout a lifetime can induce savings overall because proximity to death is a more important determinant of health expenditure than ageing per se: a large share of lifelong expenditures on health occurs at the last year before death and even in the last few weeks before dying. It is shown in Graph II.2.1 that the per capita cost of health care can be lower at very old ages than in childhood, youth or working ages. ([88]) Living longer, dying at an older age and being healthy for much of a lifetime would therefore lead to savings.

2.4.1. Individual and national income

Another important factor affecting health care expenditure is income. A significant relationship between income and health care spending is observable at both individual and national level. At the individual level, spending on health care depends in particular on whether a health care intervention is covered by public or private insurance and to what extent. If an individual is fully covered by health insurance, health care demand is independent of individual income, i.e. the income elasticity on health care spending is zero. However, if a health care intervention is not or only partially covered by insurance, demand will depend on the individual income. All other things equal, increasing health insurance coverage reduces the sensitivity of changes of income on changes on demand.

([88]) The reduction in per capita spending at the very old age can be explained by three different phenomena: health care rationing for utilitarian (devoting limited resources to the treatment of younger age cohorts) or professional reasons (less knowledge about the treatment of the elderly); voluntary restraining from receiving health care by older people who find the investment in health will not pay back any more; generation effect which reflects differences in perceived needs, mentality and habits between older and younger generations.

Box II.2.3: **Excess cost growth in health care expenditures, a short literature survey**

In the Ageing Report 2015 the impact of non-demographic drivers on health care expenditure is used in some scenarios. Non-demographic drivers are also sometimes referred to as excess cost growth (Smith et al. 2009). The literature on excess cost growth estimates the excess of growth in per capita health expenditures over the growth in per capita GDP after controlling for the effect of demographic change. Thus, whereas the income elasticity (see Box 2) should capture changes in health care expenditure due to changes in income only, excess cost growth estimates may also capture effects due to other factors than income, for instance technological change, health policies, institutional settings and Baumol's cost disease.

The literature generally finds that health care expenditure grow 1-2 percent faster than GDP per capita. The IMF (2010), for instance, estimate an excess cost growth of 1.2 percent for 27 advanced economies over the period 1980-2008, while Hagist and Kotlikoff (2009) estimate an excess cost growth of about 1.5 percent over 1970-2002 for ten OECD countries. See also Medeiros and Schwierz (2013) and OECD (2006). However, the excess cost growth rates vary considerably across countries. IMF (2010), for instance, finds excess cost growth rates in Europe that vary between -0.9 percent (the Czech Republic) and 2.4 percent (Luxembourg). On average, however, their findings are consistent with the 1.4 elasticity estimate used in this report for the scenario on non-demographic drivers and the AWG risk scenario.

Innovations in medical technology are generally believed to be the primary driver of health care spending. Recent estimates suggests that medical technology explains 27-48 percent of health care spending growth since 1960 (Smith et al (2009)). Earlier studies found that technology explained a somewhat larger fraction of the increase, 50-75 percent. See eg. Newhouse (1992); Cutler (1995); Okunade and Murthy (2002), Oliveira Martins and de la Maisonneuve (2005) and Willemé and Dumont (2014).

At the national level, spending is driven by different considerations. On the one hand, spending must be covered by revenues at an aggregate level. This is why the correlation between health care spending and income is stronger at the national than at the individual level (in the presence of insurance). On the other hand, policy measures to control spending and political priorities to devote less or more resources to different areas of public spending may reduce the link between public expenditure on health care and national income. Therefore, while it is generally agreed that the growth in per capita income brings about an increase in health spending, the strength of this relationship, i.e. the value of the income elasticity of health services demand, remains uncertain.

A number of empirical studies attempted to estimate the correlation between income and health expenditure. Most of the earlier studies led to the conclusion that health care is an individual necessity and a national luxury good. In other words, health spending is highly inelastic at an individual level, but at the national level its elasticity with respect to income exceeds unity. However, the earlier empirical literature is subject to methodological problems and more recent estimates attempt to overcome these problems by estimating the real causal effect of income on demand of health services (Box II.2.2). The general implication, however, remains that as national income or wealth increases, expectations will rise and health spending will rise too, regardless of changes in needs.

2.4.2. Health technology

Growth in health care expenditure has been much faster than what is suggested by changes in demographic structure, morbidity and income (see above discussion on income elasticity). Empirical research suggests that health technology has been a major driver of health-care expenditures. Different authors attribute from 27% up to 75% of health expenditure growth in the industrialised countries to technological change (Box II.2.3).

Whether a particular technological development increases or decreases costs depends on its impact on unit cost, its level of use and whether the treatment complements or replaces the existing methods. If technological development leads to a more cost-efficient treatment of previously treated medical conditions, the new technology is likely to replace the old one reducing the unit cost of treatment. This effect is called the substitution effect: replacing less by more efficient treatments.

If this is also accompanied by no changes in the number of individuals treated, the overall cost is reduced. However, if treatment with the new technology becomes more frequent, expenditure may increase.

If medical innovations allow for treating conditions which were not treated previously, then expenditures may rise. This is called the expansion or extension mechanism: extending health care procedures to previously untreated medical conditions for scientific reasons (the methods of treatment were simply unknown) or economic reasons (previous methods of treatment were known, but not affordable). In other words, the supply of new products matches with previously unmet demand. As such, the health sector is similar to other expanding sectors of the economy, e.g. such as those producing ICT-related products.

The currently prevalent view is that technological change is an important driver of health care expenditures (Box II.2.3). This is despite the measurement problems of technological change on expenditures and health restoring or life-saving effects. It is to be kept in mind that new inventions have been used in areas judged necessary from the societal point of view such as in palliative care, where ethical consideration are of considerable importance.

2.4.3. Legal and institutional setting

In addition to the above factors, public expenditure on health care is strongly influenced by the legal setting and institutional arrangements according to which health care is provided and financed. These factors play an important role in delineating provision and use of health care services and therefore health care costs. Institutional settings may or not limit the introduction, coverage and use of services and new technology, through the set of incentives patients and providers face. Legal provisions, such as strict spending constraints defined by public authorities may curb the provision and use of health care services.

A number of such variables have been tested in the literature for assessing their impact on health expenditure. These include the role of general practitioners (GPs) as an independent entity and gatekeeper, the type of remuneration of physicians or type of system financing. Despite such studies it is not feasible to draw unequivocal conclusions.

2.4.4. Human and physical capital

The provision of health care is highly labour-intensive, more than many other sectors of society. Health professionals are vital to the provision of health services and goods. As a result, changes associated with the health workforce have an impact on provision and therefore expenditure. For example, the ageing of the workforce could have an impact on expenditure through reducing staff numbers and increasing wages for example. On the other hand, an over-supply of physicians may induce an over-supply of health care services.

In addition, human and physical capital resources devoted to the health care sector are determined by policy decisions (e.g. qualitative limits and qualitative requirements on the access to medical schools or professional certificates, decisions on the location of facilities, legal regulations on the density of health care staff per number of population, etc.). A number of studies have attempted to find statistical correlation between the size of medical staff and health expenditure, but the results are not conclusive.

2.5. SHORT OVERVIEW OF THE PROJECTION METHODOLOGY

2.5.1. The model

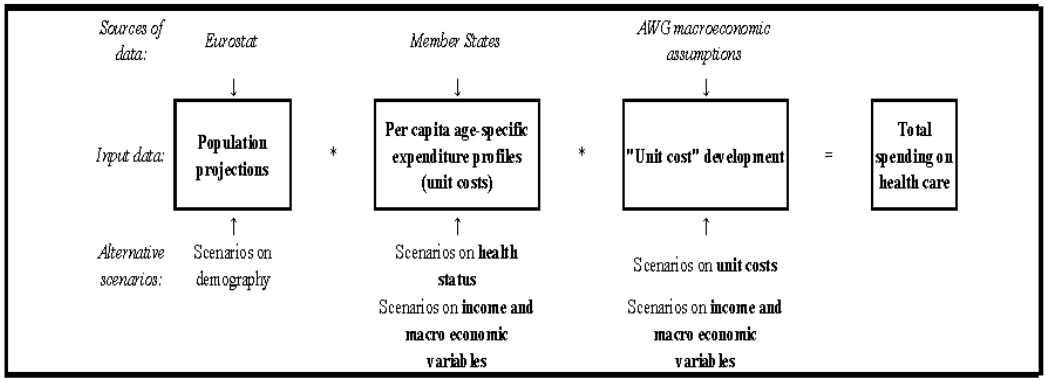
On the basis of the description just presented, a series of so-called scenarios test the potential impact of the different determinants of public spending on health care. The impact of each determinant is calculated separately on the basis of hypothetical assumptions (a "what if" situation). This can indicate how each determinant may contribute to the evolution of public health care over the next 50 years. This analysis may help inform future policy decisions, which aim at improving the sustainability of health care spending.

It is important to stress that future levels of public health care spending are modelled to a large extent exogenously. Future health policy reforms and behavioural changes by individuals are not taken into account. In many scenarios, the adjustments

observed relate solely to health care provision adjusting automatically to the needs that result from changes in population structure, health status and changes in income. As such, most scenarios should be considered as "no-policy change" scenarios.

The basic setup of the model used to project future expenditure on health care is a traditional simulation model whereby the overall population is disaggregated into a number of groups having a common set of features, such as age and sex. As the number of individuals in each group changes over time, so do the aggregate values of the endogenous variables. The schematic methodology to project health care expenditure is presented in Graph II.2.2 above. The common elements of all scenarios are the labour force and macroeconomic assumptions agreed by the Commission services (DG ECFIN) and the Economic Policy Committee (AWG) and the population projections provided by Eurostat (EUROPOP2013). The age and gender-specific per capita public expenditure (on health care) profiles are provided by Member States. They are combined with the demographic projections provided by Eurostat in order to calculate nominal spending on health care.

Table II.2.2: **Graph II.2.2: Schematic presentation of the projection methodology**



Source: Commission services, EPC

The adjustments reflecting the effects of different factors on health care spending are applied by correspondingly changing one of three main inputs: 1) the demographic/population projections, 2) the age-related expenditure profiles (capturing unit costs) and 3) assumptions regarding the development of unit costs over time, as driven by the macroeconomic variables or assumptions on the evolution of the population's health status.

2.5.2. Scenarios

Different scenarios simulate changes in the demographic structure, life expectancy and health status of the population, the importance of health care costs in the last years of life (*death-related costs*), an income elasticity of demand for health care higher than one but converging to 1 at the end of the projection period, different patterns of unit cost evolution and the cost-convergence of age profiles across the EU28 Member States. The ideas behind the different scenarios are presented in Table II.2.3. ([89])

All scenarios are described in more detail in the following. ([90])

1. The ***"demographic scenario"*** attempts to isolate the 'pure' effect of an ageing population on health care spending. It assumes that age-specific morbidity rates do not change over time. This implies that age-related public health care spending per capita (considered as the proxy for morbidity rate ([91])) remains constant in real terms over the projection period.

As constant health status is accompanied by a gradual increase in life expectancy (EUROPOP 2013), all gains in life expectancy are assumed to be spent in bad health. As such, this scenario reflects the *expansion of morbidity* hypothesis explained above. It is further assumed that the costs, and therefore expenditure per capita, evolve in line with GDP per capita. This implies that without a change in the age structure of the population and in life expectancy, the share of health care spending in GDP would remain constant over the projection period.

2. The ***"high life expectancy scenario"*** is a variant to the "*demographic scenario*". It tries to measure the impact of an alternative assumption on mortality rates. It assumes, as in the sensitivity tests used for pension projections, that life expectancy at birth in 2060 is higher, by one year,

([89]) A detailed account of the projection methods is given in European Commission –Economic Policy Committee (2014), "The 2015 Ageing Report: Underlying Assumptions and Projection Methodologies": http://ec.europa.eu/economy_finance/publications/european_economy/2014/pdf/ee8_en.pdf.

([90]) Most of the scenarios were already included in the 2012 Ageing Report. However, three scenarios have been updated methodologically and one new scenario has been added. First, the parameters used in the "non-demographic determinants scenario" have been refined using a more sophisticated econometric estimation method. Second, the "death-related costs scenario" now allows cost profiles to vary over time.

([91]) Strictly speaking, age-expenditure profiles are not a measure of health status or morbidity. However, given the lack of a reliable and comparable data on the latter, it is plausible to assume that the shape of the profiles follows the evolution of health status over the lifespan.

than the projected life expectancy used in the "*demographic scenario*". In comparison to the "*demographic scenario*", alternative demographic and macroeconomic data are used as a different demographic structure impacts on several variables including GDP. ([92])

3. The ***"constant health scenario"*** is inspired by the *dynamic equilibrium* hypothesis and captures the potential impact of improvements in the health status, should this occur in parallel with projected declines in mortality rates. It assumes that the number of years spent in bad health remains constant over the whole projection period, i.e. all future gains in life expectancy are spent in good health. To generate a fall in morbidity rate in line with the decline in the mortality rate, this scenario is modelled by assuming that per capita age profiles observed in the base year are shifted outwards, in direct proportion to the projected gains in age and gender specific life expectancy. ([93])

4. The ***"death-related costs scenario"*** employs an alternative method to project health care spending, taking into account a probable postponement in health care spending resulting from the evolution of mortality rates. There is empirical evidence that a large share of total spending on health care during a person's life is concentrated in its final years (Palangkaraya and Yong 2009). ([94]) Therefore, as mortality rates at relatively younger age decline and a smaller share of each age cohort is in its terminal phase of life, the health care expenditure calculated using constant expenditure profiles may be overestimated. To run this scenario, profiles of *death-related costs* by age have been supplied by some Member States, where unit costs are differentiated between decedents and survivors. ([95]) The 2012 methodology was based on the assumption that the ratio between the per capita cost of decedents and that of survivors was to be kept constant over the forecast period, regardless of possible changes in longevity. The methodology has now been updated to allow the cost profile to change over the projection period and take this into account, acknowledging to that the ratio of the health costs of decedents and those of survivors is linked to life expectancy rather than to age per se.

5. The ***"income elasticity scenario"*** shows the effect of income elasticity of demand exceeding unity on the evolution of public spending on health care. The impact of income growth on health care expenditure may incorporate the effects of a number of factors: higher living standards, growing expectations and social pressure to catch-up with the quality and coverage of health care provided to the populations in the neighbouring countries and possibly the development of medical knowledge and technologies. In practical terms, the scenario is identical to the *"demographic scenario"* except that the income elasticity of demand is equal to 1.1 in the base year and converges to 1 by the end of projection horizon in 2060.

6. The ***"EU28 cost convergence scenario"*** is meant to capture the possible effect of a convergence in real living standards (which emerges from the macroeconomic assumptions) on health care spending. The "*cost convergence scenario"* considers the convergence of all EU28 countries that are below the EU28 average of per capita public expenditure relative to GDP per capita (i.e. per capita public expenditure as a share of GDP per capita) to that EU28 relative average. This means that the country-specific age/gender per capita public expenditure profiles as a share of GDP per capita which are below the corresponding EU28 profiles in the base year (i.e. 2013) are assumed to increase to the EU28 relative average up to 2060. The convergence speeds for all the countries below the EU28 relative average differs,

([92]) Since GDP data also captures the impact of changes in life expectancy through their impact on labour forces.

([93]) The method is applied to those age/gender groups where expenditure per capita is growing. As in the previous scenarios and in practical terms, it is assumed that age/gender specific expenditure profiles proxy health status (i.e. morbidity). In other words, higher expenditure captures higher morbidity. For the young and the oldest old, the reference age/gender and therefore age/gender per capita public expenditure profile remains the same over the whole projection period.

([94]) The authors find that population ageing does not add anything to growth in health expenditure once proximity to death is accounted for. As a consequence, the effects of ageing on health expenditure growth might be estimated as too high, whilst the high costs of medical care at the end of life are probably underestimated.

([95]) Data was provided by 16 Member States: Belgium, Bulgaria, Czech Republic, Denmark, Germany, Spain, France, Italy, Netherlands, Austria, Poland, Slovenia, Slovakia, Finland, Sweden and the UK. For countries that did not provide this data, no projections for this scenario were done.

as they take into account the differences in the initial situation, i.e. the extent of the initial gap between country-specific and EU28 relative average profile.

7. The ***"labour intensity scenario"*** is an attempt to estimate the evolution in health care expenditure under the assumption that unit costs are driven by changes in labour productivity, rather than growth in the national income, as health care is a highly labour-intensive sector. This assumption implies as well that, contrary to the *"demographic scenario"*, the cost of public provision of health care is supply rather than demand driven. This scenario is similar to the "*demographic scenario"* except that costs are assumed to evolve in line with the evolution of GDP per worker. As wages are projected to grow in line with productivity (generally faster than GDP per capita), this scenario provides an insight into the effects of unit costs in the health care sector being driven mostly by increases in wages and salaries.

8. The ***"sector-specific composite indexation scenario"*** aims at capturing the relative importance and different past trends of most relevant health care expenditure drivers: wages, pharmaceuticals, therapeutic appliances, capital investment, prevention related health care services, as well as a residual factor.

Given the special character of the health care sector (high level of government regulation, investment in new technologies, high labour intensity) considering health care sector-specific rather than economy-wide determinants of unit costs is particularly informative. In this scenario, the growth rate of each item is estimated separately, based on past trends, thus creating a sort of composite indexation for "unit cost development". As such, their relative contribution to future changes in health care spending can be traced over time.

9. The ***"non-demographic determinants scenario"*** is an attempt to estimate the impact of non-demographic drivers (NDD) on health care expenditure, i.e. income, technology, institutional settings. It is also referred to as *excess cost growth (*Smith, et al. 2009). Ignoring the effect of NDD on health care expenditure would imply making the assumption that past trends of health care expenditure related to these drivers will disappear in the future. In practice, the effect of demographic changes – captured using the above mentioned econometric analysis – is subtracted from the total increase in expenditure and the remaining part (i.e. the residual) is attributed to the impact of NDD.

10. The "***AWG reference scenario***" is used as the central scenario when calculating the overall budgetary impact of ageing. It is the point of reference for comparisons with the 2012 Ageing Report. In this scenario health care expenditures are driven by the assumption that half of the future gains in life expectancy are spent in good health and an income elasticity of health care spending converging from 1.1 in 2013 to unity in 2060.

Table II.2.3: **Overview of different scenarios used to project health care spending**

	Demographic scenario	High life expectancy scenario	Constant health scenario	Death-related costs scenario	Income elasticity scenario	EU28 cost convergence scenario	Labour intensity scenario	Sector-specific composite indexation scenario	Non-demographic determinants scenario	AWG reference scenario	AWG risk scenario	TFP risk scenario
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Population projection	EUROPOP2013	Alternative higher life expectancy scenario (+1 year)	EUROPOP2013	EUROPOP2013	EUROPOP2013	EUROPOP2013	EUROPOP2013	EUROPOP2013	EUROPOP2013	EUROPOP2013	EUROPOP2013	EUROPOP2013
Age-related expenditure profiles	2012 profiles held constant over projection period	2012 profiles held constant over projection period	2012 profiles shift in line with changes in age-specific life expectancy	2012 profiles split into profiles of decedents and survivors and adjusted in line with changes in age-specific life expectancy	2012 profiles held constant over projection period	Individual EU28 profiles converging to the EU28 average profile over the projection period	2012 profiles held constant over projection period	2012 profiles held constant over projection period	2012 profiles held constant over projection period	Intermediate between scenarios I and III, whereby 2012 profiles shift by half the change in age-specific life expectancy	Intermediate between scenarios I and III, whereby 2012 profiles shift by half the change in age-specific life expectancy	Intermediate between scenarios I and III, whereby 2012 profiles shift by half the change in age-specific life expectancy
Unit cost development	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per hours worked	Input-specific indexation	GDP per capita	GDP per capita	GDP per capita	GDP per capita
Elasticity of demand	1	1	1	1	Income elasticity of 1.1 in 2013 converging to 1 by 2060	1	1	1	Cost sensitivity of 1.4 in 2013 converging to 1 by 2060	Cost sensitivity of 1.1 in 2013 converging to 1 by 2060	Cost sensitivity of 1.4 in 2013 converging to 1 by 2060	Cost sensitivity of 1.1 in 2013 converging to 1 by 2060

(1) In the TFP risk scenario, total factor productivity converges to 0.8%

Source: Commission services, EPC

11. The ***"AWG risk scenario"***, as the AWG reference scenario, keeps the assumption that half of the future gains in life expectancy are spent in good health but attempts to take into account technological changes and institutional mechanisms which have stimulated expenditure growth in recent decades. In the 2012 Ageing Report, the non-demographic and risk scenarios assumed an income elasticity of healthcare spending converging from 1.3 in 2010 converging to 1.0 in 2060. In order to incorporate relevant non-demographic drivers in the projection exercise and to avoid the risk of systematically underestimating future healthcare expenditure trends, and on the basis of recent research, ([96]) the Commission proposed and the Ageing Working Group endorsed the use of a proxy for the non-demographic costs (NDC). The estimated residual is translated into an EU average elasticity of 1.4 (versus 1.3 in the 2012 AR) converging to 1 until the end of the projection period. ([97]) This elasticity is added to the effect of ageing as modelled in the "demographic scenario".

As such, it remains bounded in a longer term perspective, as the projected excess growth of health care spending eventually approaches zero (by 2060). Together with the AWG reference scenario, this scenario is part of a range of possible outcomes.

12. ***"Total factor productivity risk scenario"*** explores the risk that Total Factor Productivity growth may decline in the future below the assumptions of the AWG reference scenario. This is plausible in light of the trend decline of TFP growth performance over the last decades. This scenario assumes that TFP converges to a growth rate of 0.8% (vs 1% for the baseline scenario). In both cases, allowance for higher TFP growth for countries with below average GDP per capita is factored in for a period of time, as in the previous projection exercise, to reflect the potential that these countries have for a catching-up with the rest.

2.6. PROJECTION RESULTS

As mentioned above, projection results are not meant to be spending forecasts, but a useful analytical tool to raise awareness on the possible future trends in public health care spending, the role played by some of the major drivers and their potential impact on long-term sustainability of public finances. Therefore, the projected health care spending levels should be interpreted prudently. The projections of the demographic scenario are assessed against eight other scenarios with different features.

2.6.1. Country-Specific policy reforms

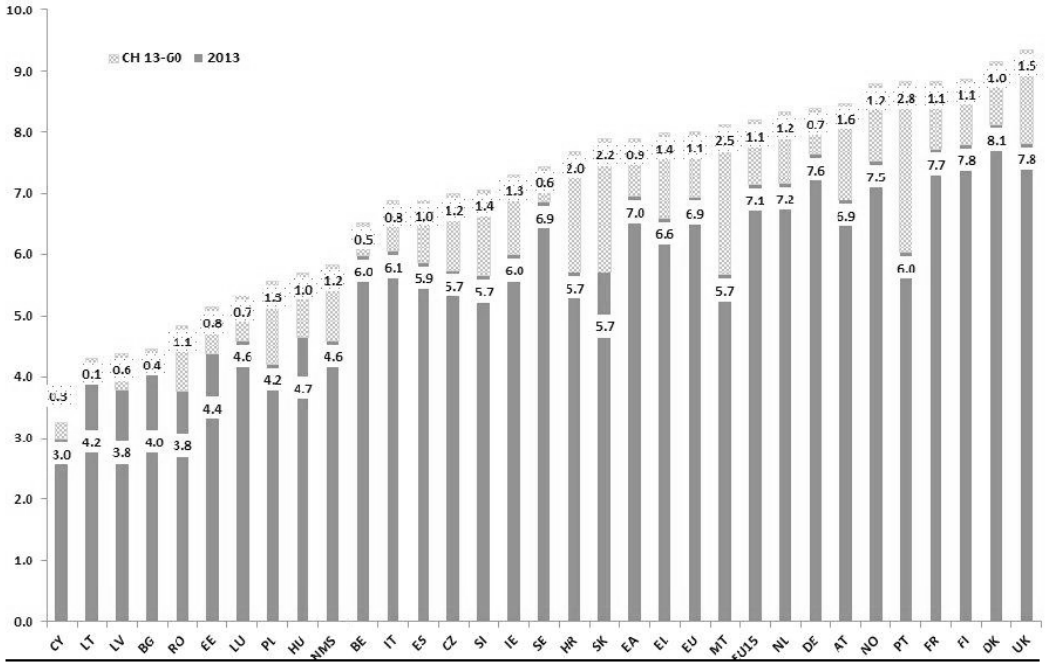
In the past years, many countries have undertaken policy reforms in HC. The fiscal impact of some of those reforms is not easy to estimate. However, as far as budgeted changes in long-term care spending are concerned, many countries have estimated potential budgetary effects on HC spending triggered by legislated HC reforms. In all cases, the impact of reforms was modelled as a percentage change of health care expenditure relative to the base year of projections, upon agreement with the respective Member States.

Where possible, reforms have been distinguished by their impact on the payroll in the health care sector, pharmaceutical expenditure, expenditure on therapeutical appliances and other durables, capital formation and prevention and public health services. Countries such as Austria and Belgium have legislated a ceiling on health expenditure and/or its future growth. Wage adjustments or freezes are legislated in Czech republic, Estonia, Italy, Romania, Slovakia and Slovenia (Table II.2.4).

([96]) Medeiros J. and Schwierz C. (2013), "Estimating the drivers and projecting long-term public health expenditure in the European Union: Baumol's 'cost disease' revisited", European Economy, Economic Papers No. 507.

([97]) The reason for the convergence of the elasticity is that we expect only a partial continuation of past trends related to NDD in the future. In the past, extensions of insurance to universal coverage of the population were an important trigger of increases in public health expenditures. As universal coverage is nearly reached in the EU, this one-time shock will not occur again in the future. It should however be noted that the roll-out of "high" coverage in many Member States happened a long time ago, and are therefore not captured by the estimates of the excess growth of health care costs. Ideally, in order to identify the impact of NDD on health care expenditure one should also control for other variables, such as the health status, relative prices, and institutional variables. However, limitations on data and methodological concerns prevent the use of a broader set of regressors.

Graph II.2.2: **Projected increase in public expenditure on health care due to demographic change over 2013-2060, as % of GDP**



(1) The EU15 and NMS averages in all result tables are weighted according to GDP. The level of expenditures in 2013 is the first year of projected expenditures based on latest available data. Health care expenditure exclude long-term nursing care.
The aggregate of health care expenditure utilized for projections is based on OECD SHA/health data definition based on ESA 95, while GDP and other expenditure items have been revised according to ESA 2010. A revision of health expenditure data based on ESA 2010 may change the reported level of expenditure.
Source: Commission services, EPC.

2.6.2. Accounting for institutional specificities

In Germany, in 2013 only 86% of the population was insured by social health insurance (SHI), with the remainder insured by mandatory substitutional private health insurance (PHI) schemes. Previous projections did not account for this specificity and assumed that the whole financial burden of population ageing has to be covered by the SHI scheme. To account for the existence of PHI, the population projections used in our model are adjusted downwards to equal the number of people insured in SHI in the base year of projections.

In addition, it can be assumed that given the younger age structure of PHI and the current legislative set-up, which heavily restricts opting out from PHI to SHI, ageing will be more pronounced in PHI than SHI. This implies a reduced burden of ageing within the SHI scheme in future. Therefore, as the share of the privately insured among the total population will increase faster than the share of the insured under the public insurance scheme, population projections are further adjusted by the estimated reduced ageing effect of the population covered by SHI. Together, these assumptions imply a reduction of the population figures to roughly 86% ([98]) (those covered by SHI) in 2013, and a further reduction to 82% by 2060, with a more relatively pronounced decrease in older age groups.

([98]) It should be noted that the reduction of SHI coverage should also be expected in the projection of future social security contributions.

Table II.2.4: **Health care reforms with direct budget impact taken into account in the projections**

Country	Policy reform
Austria	Legislated ceiling on health care expenditure
Belgium	Growth ceiling on health care expenditure according to growth norm of public health expenditure
Bulgaria	Additional capital investments and savings in pharmaceutical expenditure
Croatia	Additional budget allocation to public health facilities
Czech Republic	Wage adjustments of health personnel, budget rectification, shift from private co-payments to public financing
Estonia	Wage adjustments of health personnel
Italy	Wage freeze in public sector
Netherlands	Budgeted decrease in health expenditure
Poland	Pharmaceutical reforms with direct budgetary impact and budgeted health expenditure decrease
Romania	Wage adjustments of health personnel and budget rectifications
Greece	Decrease in health expenditure and budget freeze
Portugal	Budgeted decrease in health expenditure
Slovakia	Wage adjustments of health personnel and pharmaceutical reforms with direct budgetary impact
Slovenia	Reduction in wages of employees in the general government sector
United Kingdom	Specific budget adjustment by area of health care spending

Source: Commission services, EPC.

2.6.3. Changes in demography and health status

According to the "demographic scenario", public health care expenditure in the EU28 is projected to increase by 1.1 pp. of GDP i.e. from 6.9% to 8% of GDP from 2013 to 2060. For half of the countries the expenditure increase lies between 1.0 and 1.6 pp. of GDP over the whole projection period.

Expenditures are expected to increase by a slightly greater amount in the New Member States (NMS) (1.2 pp. of GDP from the initial level of 4.6% of GDP in 2013) than in the EU15 (1.1 pp. of GDP from an initial 7.1% of GDP). The impact of ageing on health care spending in each country is shown in Graph II.2.2 (where the solid colour bars show current expenditure over the GDP in 2013 and the shaded bars above them the expected increase in percentage points up to 2060) and Table II.2.5.

Projections reflecting only demographic changes may turn out to be either optimistic or pessimistic, depending on whether living longer will go along with increasing or decreasing morbidity. The "high life expectancy scenario" provides a sensitivity test to assess the potential implication of future gains in life expectancy higher than those assumed in the population projections (EUROPOP2013). It provides an estimate of the budgetary impact of one extra years of life under the (pessimistic) view that this additional year is associated with one extra years in "bad health" (along the line of the "morbidity expansion" hypothesis). Under this assumption, an extra year of life-expectancy leads to an increase of 0.3 pp. of GDP relative to the demographic scenario (Table II.2.6).

Table II.2.5: **Demographic scenario - projected increase in public expenditure on health care over 2013-2060, as % of GDP**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.5	0.5	9%
BG	4.0	4.5	0.4	10%
CZ	5.7	7.0	1.2	22%
DK	8.1	9.2	1.0	12%
DE	7.6	8.4	0.7	10%
EE	4.4	5.1	0.8	17%
IE	6.0	7.3	1.3	22%
EL	6.6	8.0	1.4	21%
ES	5.9	6.9	1.0	17%
FR	7.7	8.8	1.1	14%
HR	5.7	7.7	2.0	35%
IT	6.1	6.9	0.8	14%
CY	3.0	3.3	0.3	9%
LV	3.8	4.4	0.6	15%
LT	4.2	4.3	0.1	3%
LU	4.6	5.3	0.7	16%
HU	4.7	5.7	1.0	22%
MT	5.7	8.1	2.5	43%
NL	7.2	8.3	1.2	16%
AT	6.9	8.5	1.6	23%
PL	4.2	5.6	1.3	32%
PT	6.0	8.8	2.8	46%
RO	3.8	4.8	1.1	28%
SI	5.7	7.1	1.4	25%
SK	5.7	7.9	2.2	38%
FI	7.8	8.9	1.1	14%
SE	6.9	7.4	0.6	9%
UK	7.8	9.4	1.5	20%
NO	7.5	8.8	1.2	17%
EA	7.0	7.9	0.9	14%
EU	6.9	8.0	1.1	15%
EU15	7.1	8.2	1.1	15%
NMS	4.6	5.8	1.2	26%

(1) The EU, EA and NMS averages in all result tables are weighted according to GDP. The level of expenditures in 2013 is the first year of projected expenditures based on latest available data. Health care expenditure excludes long-term nursing care.
Source: Commission services, EPC.

Table II.2.6: **High life expectancy scenario - projected increase in public expenditure on health care over 2013-2060, as % of GDP.**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.8	0.8	14%
BG	4.0	4.6	0.6	14%
CZ	5.7	7.3	1.6	28%
DK	8.1	9.5	1.4	17%
DE	7.6	8.8	1.2	15%
EE	4.4	5.3	1.0	22%
IE	6.0	7.6	1.6	27%
EL	6.6	8.4	1.8	27%
ES	5.9	7.2	1.3	22%
FR	7.7	9.2	1.5	19%
HR	5.7	8.0	2.3	41%
IT	6.1	7.2	1.1	18%
CY	3.0	3.3	0.3	11%
LV	3.8	4.6	0.8	21%
LT	4.2	4.5	0.3	7%
LU	4.6	5.5	0.9	20%
HU	4.7	5.9	1.3	27%
MT	5.7	8.7	3.0	53%
NL	7.2	8.7	1.5	21%
AT	6.9	8.9	2.0	29%
PL	4.2	5.8	1.6	37%
PT	6.0	9.4	3.4	56%
RO	3.8	5.1	1.3	34%
SI	5.7	7.4	1.7	31%
SK	5.7	8.2	2.5	44%
FI	7.8	9.3	1.5	19%
SE	6.9	7.7	0.8	12%
UK	7.8	9.8	2.0	26%
NO	7.5	9.1	1.6	21%
EA	7.0	8.2	1.3	19%
EU	6.9	8.4	1.4	21%
EU15	7.1	8.6	1.4	20%
NMS	4.6	6.1	1.5	32%

Source: Commission services, EPC.

Table II.2.7: **Constant health scenario - projected increase in public expenditure on health care over 2013-2060, as % of GDP**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	5.6	-0.3	-6%
BG	4.0	3.9	-0.1	-3%
CZ	5.7	6.1	0.3	5%
DK	8.1	8.3	0.1	1%
DE	7.6	7.6	0.0	0%
EE	4.4	4.4	0.1	1%
IE	6.0	6.6	0.6	10%
EL	6.6	7.2	0.6	10%
ES	5.9	6.4	0.6	10%
FR	7.7	8.0	0.3	3%
HR	5.7	6.7	1.0	18%
IT	6.1	6.3	0.2	4%
CY	3.0	3.1	0.1	3%
LV	3.8	3.9	0.1	4%
LT	4.2	3.9	-0.3	-8%
LU	4.6	4.8	0.2	4%
HU	4.7	4.8	0.1	3%
MT	5.7	7.0	1.4	24%
NL	7.2	7.6	0.4	5%
AT	6.9	7.6	0.7	10%
PL	4.2	4.9	0.7	16%
PT	6.0	7.7	1.6	27%
RO	3.8	4.3	0.5	13%
SI	5.7	6.3	0.6	11%
SK	5.7	6.7	1.0	18%
FI	7.8	7.9	0.1	2%
SE	6.9	6.7	-0.1	-2%
UK	7.8	8.4	0.6	7%
NO	7.5	7.8	0.2	3%
EA	7.0	7.2	0.2	3%
EU	6.9	7.2	0.3	4%
EU15	7.1	7.4	0.3	4%
NMS	4.6	5.1	0.5	10%

Source: Commission services, EPC

In line with the (optimistic) assumptions of the "dynamic equilibrium hypothesis", assuming a constant number of years in bad health, whatever the future longevity gains, the "constant health scenario" assumes that all future gains in life expectancy are spent in good health. Comparison of the demographic (or high life expectancy scenario) with the "constant health scenario" illustrates how shifts in the health status of the population can impact on health expenditure.

As expected, in the "constant health scenario" increases in public expenditure on health care are significantly lower than those obtained in the "demographic scenario".

Table II.2.8: **Death-related costs scenario - projected increase in public expenditure on health care over 2010-2060, as % of GDP**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.4	0.4	7%
BG	4.0	4.5	0.4	10%
CZ	5.7	6.6	0.8	14%
DK	8.1	8.8	0.7	9%
DE	7.6	8.2	0.5	7%
ES	5.9	6.8	0.9	16%
FR	7.7	8.6	0.8	11%
IT	6.1	6.7	0.7	11%
NL	7.2	8.1	0.9	12%
AT	6.9	8.2	1.3	19%
PL	4.2	5.3	1.1	26%
SI	5.7	6.9	1.3	22%
SK	5.7	7.6	1.9	33%
FI	7.8	8.7	0.8	11%
SE	6.9	7.2	0.3	5%
UK	7.8	9.1	1.2	16%

Source: Commission services, EPC.

The ageing effect on expenditure growth is reduced to only a third compared to the "demographic scenario". For the EU28 a 0.3 pp. of GDP increase is expected over the overall projection period (Table II.2.7). Most of the Member States can expect an expenditure growth of below 1 pp. of GDP and four countries even experience a decrease. Therefore improvements in health status may be crucial for keeping expenditure on health care under control in future.

The *"death-related costs scenario"* follows a similar logic to the constant health scenario: the years spent with ill health are compressed towards the later period of life. However, a different methodological approach and different features of the data used lead to results varying considerably between the two scenarios. Note that data on death-related costs was provided only by 16 Member States. ([99])

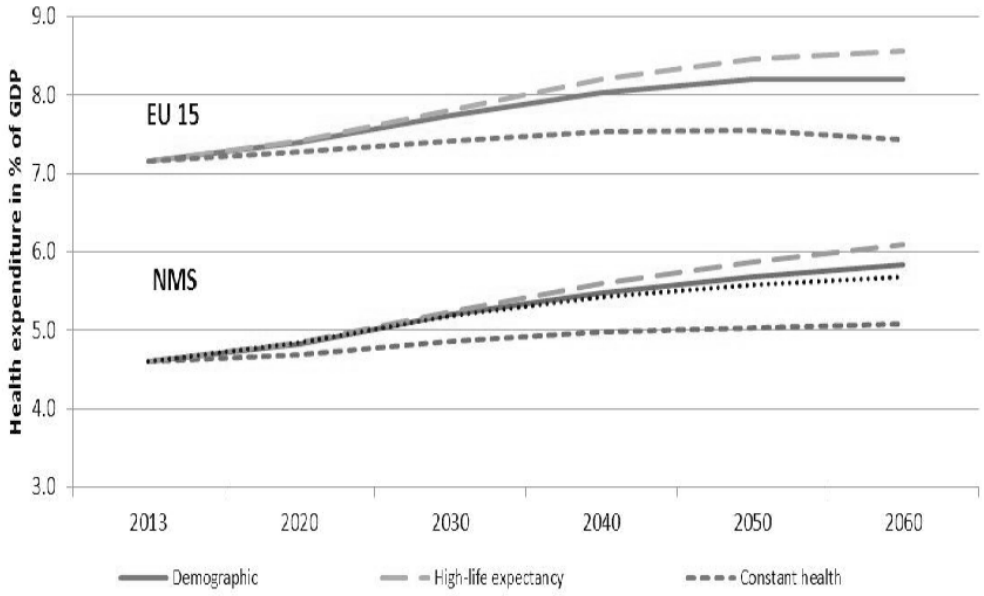
Incorporating the concept of death-related costs in the projection methodology leads to a reduction in the projected health care expenditure relative to the "*demographic scenario*" for most of the countries (Table II.2.8). ([100]) The projected increase in public expenditure ranges from 0.3 pp. of GDP for Sweden to 1.9 pp. of GDP for Slovakia.

Graph II.2.3 shows a comparison of the results of the three scenarios related to the future evolution of health status. The comparison between the shapes of the curves for EU15 and NMS highlights the more pronounced growing path of the "*demographic scenario"* in the NMS. This is likely driven by faster demographic developments i.e. faster ageing, but also faster national income growth.

([99]) Note that in the current projections exercise the methodology behind the death-related costs scenario does not perfectly illustrate the underlying theoretical concept. In particular, the period of time defined as 'close to death' is limited to one year, while several studies argue that the health care costs of decedents are higher than those of survivors up to six years before death. This is due to the fact that, with the exception of one Member State, all Member States reported expenditure for the last year of life only.

([100]) In fact, using this methodological approach does not reduce the overall amount of expenditure devoted to health care. Instead, it spreads the costs of health care over time by assuming that with a decline in mortality rate the share of decedents in each age cohort is decreasing.

Graph II.2.3: **Impact of demography and health status - Comparison between scenarios in EU15 and NMS**



Source: Commission services, EPC

2.6.4. Changes in income and macroeconomic variables

The "demographic scenario" assumes that per capita spending grows in line with national income per capita. The effect is that without population ageing, the share of health spending in % of national income would stay constant.

However, empirical research shows that growth in both public and total health care spending may exceed the growth rate of national income, be it because of rising expectations towards more and better health care and a higher willingness to pay for health care services.

Consequently, the "demographic scenario" may substantially underestimate health spending growth. One way to address this concern is to assume that trends in health spending exceed the growth rate of national income.

Assuming a slightly higher growth in spending relative to national income (i.e. an income elasticity of 1.1) adds an extra 0.2 pp. of GDP to health expenditure (Table II.2.9). The additional impact is similar for EU15 and NMS.

Table II.2.9: **Income elasticity scenario (public spending on health care, as % of GDP)**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.7	0.7	11%
BG	4.0	4.7	0.7	16%
CZ	5.7	7.3	1.5	26%
DK	8.1	9.5	1.3	17%
DE	7.6	8.6	1.0	13%
EE	4.4	5.4	1.0	23%
IE	6.0	7.6	1.6	26%
EL	6.6	8.3	1.7	25%
ES	5.9	7.2	1.3	22%
FR	7.7	9.1	1.3	17%
HR	5.7	8.0	2.3	40%
IT	6.1	7.0	1.0	16%
CY	3.0	3.4	0.4	12%
LV	3.8	4.7	0.9	23%
LT	4.2	4.6	0.4	9%
LU	4.6	5.4	0.8	18%
HU	4.7	5.9	1.3	28%
MT	5.7	8.4	2.7	48%
NL	7.2	8.5	1.4	19%
AT	6.9	8.7	1.8	26%
PL	4.2	5.9	1.6	39%
PT	6.0	9.2	3.1	52%
RO	3.8	5.1	1.3	34%
SI	5.7	7.3	1.6	29%
SK	5.7	8.3	2.6	46%
FI	7.8	9.1	1.3	16%
SE	6.9	7.7	0.8	12%
UK	7.8	9.6	1.8	23%
NO	7.5	9.0	1.5	20%
EA	7.0	8.1	1.2	17%
EU	6.9	8.2	1.3	19%
EU15	7.1	8.4	1.3	18%
NMS	4.6	6.1	1.5	33%

Source: Commission services, EPC

Table II.2.10: **The EU28 cost convergence scenario (public spending on health care, as % of GDP)**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.7	0.7	11%
BG	4.0	7.1	3.1	76%
CZ	5.7	7.2	1.5	26%
DK	8.1	9.2	1.0	13%
DE	7.6	8.4	0.8	10%
EE	4.4	7.0	2.6	59%
IE	6.0	7.3	1.3	22%
EL	6.6	8.0	1.4	21%
ES	5.9	7.5	1.6	28%
FR	7.7	8.9	1.1	15%
HR	5.7	8.6	2.9	51%
IT	6.1	7.2	1.2	19%
CY	3.0	6.5	3.5	117%
LV	3.8	6.7	2.9	77%
LT	4.2	6.3	2.1	51%
LU	4.6	6.1	1.5	33%
HU	4.7	7.0	2.4	51%
MT	5.7	8.8	3.1	54%
NL	7.2	8.4	1.2	17%
AT	6.9	8.5	1.6	24%
PL	4.2	7.2	3.0	71%
PT	6.0	9.5	3.4	56%
RO	3.8	7.1	3.3	87%
SI	5.7	7.7	2.1	37%
SK	5.7	8.2	2.5	45%
FI	7.8	9.1	1.3	17%
SE	6.9	7.5	0.6	9%
UK	7.8	9.4	1.6	20%
NO	7.5	8.8	1.2	17%
EA	7.0	8.1	1.1	16%
EU	6.9	8.3	1.3	19%
EU15	7.1	8.4	1.2	17%
NMS	4.6	7.3	2.7	58%

Source: Commission services, EPC

The cost convergence scenario, performed solely for those Member States with shares of GDP per capita spending below the EU28 average, captures the possible effect of a convergence in real living standards across EU countries on public expenditure on health care. ([101])

([101]) Please note that the "cost convergence" scenario does not assume convergence in absolute costs but in relative costs, that is in per capita public expenditure relative to GDP per capita.

Table II.2.11: **Labour intensity scenario (public spending on health care, as % of GDP)**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	7.0	1.0	16%
BG	4.0	4.8	0.7	18%
CZ	5.7	7.8	2.0	35%
DK	8.1	9.2	1.1	13%
DE	7.6	9.6	2.0	26%
EE	4.4	5.6	1.2	27%
IE	6.0	7.1	1.1	19%
EL	6.6	7.2	0.5	8%
ES	5.9	6.6	0.8	13%
FR	7.7	8.9	1.2	15%
HR	5.7	7.9	2.2	38%
IT	6.1	7.1	1.0	17%
CY	3.0	3.2	0.2	7%
LV	3.8	4.6	0.8	20%
LT	4.2	4.6	0.4	9%
LU	4.6	6.0	1.4	30%
HU	4.7	6.1	1.5	32%
MT	5.7	8.2	2.6	45%
NL	7.2	8.5	1.4	19%
AT	6.9	9.3	2.4	34%
PL	4.2	6.5	2.3	54%
PT	6.0	9.3	3.2	53%
RO	3.8	5.8	2.0	53%
SI	5.7	8.0	2.4	42%
SK	5.7	9.1	3.4	60%
FI	7.8	9.8	2.0	25%
SE	6.9	7.8	0.9	14%
UK	7.8	9.6	1.7	22%
NO	7.5	9.7	2.2	29%
EA	7.0	8.3	1.3	19%
EU	6.9	8.4	1.5	21%
EU15	7.1	8.6	1.4	20%
NMS	4.6	6.6	2.0	43%

Source: Commission services, EPC.

Cost convergence can be a costly process, especially for the NMS. Depending on the current expenditure profile, governments would, on average, need to spend up to 3 ½ pp. of GDP more over the next five decades (Table II.2.10). For the NMS, achieving by 2060 the level of relative health care provision per person equal to that of the EU28 would necessitate an average rise in expenditures by 2.7 pp. of GDP (EU15: 1.2 pp.). However, these results are quite sensitive to the convergence process simulated. ([102]) An alternative perspective of unit costs evolution is illustrated by the "labour intensity scenario". For most of the Member States, the productivity (and therefore real wages) grows faster than per capita income (as explained in section 2.5.2). The effect of productivity replacing income as the driver of unit costs of health care provision in the projections leads to an additional spending of 0.3 pp. of GDP relative to the "demographic scenario" (Table II.2.11). Given the assumed catching-up in terms of labour productivity, the effect is stronger (0.8 pp.) in the new Member States.

The "sector-specific composite indexation scenario" in which future expenditure of each different driver evolves in line with their specific past trends (Table II.2.12), leads to an average projected increase 0.5 pp. of GDP lower than in the "demographic scenario".

Table II.2.13 presents the projection results under the non-demographic drivers (NDD) scenario. Following econometric analysis, ([103]) an average elasticity of 1.4 converging to 1 in 2060 is applied to the age-gender expenditure profiles. On average, the increase in public expenditure on health care is projected to be 2.6 pp. of GDP (compared to the 1.1 pp. projected under the demographic scenario). The results highlight the potential impact of non-demographic drivers on health care expenditure, such as innovations in medical technology, institutional settings and individual behaviour. Such upward risk on the future evolution of public expenditure on health care is not captured in the "*demographic scenario*".

The joint analysis of the five scenarios based on income and macroeconomic variables in comparison with the "*demographic scenario*" allows us to draw some important conclusions. First, supply-side factors, whose impact remains still relatively unknown and difficult to quantify, appear to push health care spending up to a considerably higher degree than relatively well specified and quantified demographic and demand-side factors. In this sense, the projected increase in public spending in a pure demographic scenario can be considered as on the low side.

([102]) See comparison of results between the Ageing Report 2012 and 2015 in Section 2.9

([103]) For details see Medeiros and Schwierz (2014) as well as the EC-EPC (2014), "2015 Ageing Report "Underlying assumptions and projection methodologies" http://ec.europa.eu/economy_finance/publications/european_economy/2014/pdf/ee8_en.pdf

Table II.2.12: **Sector-specific composite indexation scenario (public spending on health care, as % of GDP)**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.6	0.6	10%
BG	4.0	4.0	-0.1	-1%
CZ	5.7	6.8	1.1	19%
DK	8.1	8.7	0.6	7%
DE	7.6	7.7	0.1	1%
EE	4.4	4.9	0.6	13%
IE	6.0	6.6	0.6	10%
EL	6.6	7.5	0.9	14%
ES	5.9	6.9	1.1	18%
FR	7.7	8.3	0.6	8%
HR	5.7	7.4	1.7	30%
IT	6.1	6.2	0.1	2%
CY	3.0	3.2	0.2	8%
LV	3.8	4.3	0.5	14%
LT	4.2	3.7	-0.5	-11%
LU	4.6	5.3	0.7	16%
HU	4.7	4.9	0.3	6%
MT	5.7	7.3	1.6	28%
NL	7.2	7.8	0.7	9%
AT	6.9	7.9	1.0	14%
PL	4.2	4.7	0.5	11%
PT	6.0	7.9	1.8	30%
RO	3.8	4.3	0.5	13%
SI	5.7	6.5	0.9	16%
SK	5.7	7.1	1.4	24%
FI	7.8	9.0	1.2	15%
SE	6.9	6.8	-0.1	-1%
UK	7.8	9.3	1.5	19%
NO	7.5	8.2	0.6	8%
EA	7.0	7.4	0.5	7%
EU	6.9	7.6	0.6	9%
EU15	7.1	7.8	0.7	9%
NMS	4.6	5.2	0.6	13%

Source: Commission services, EPC.

Table II.2.13: **Non-demographic drivers scenario - projected increase in public expenditure on health care over 2013-2060, as % of GDP**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	7.5	1.5	25%
BG	4.0	6.0	1.9	48%
CZ	5.7	8.6	2.9	50%
DK	8.1	11.3	3.1	38%
DE	7.6	9.9	2.2	29%
EE	4.4	6.6	2.3	52%
IE	6.0	8.8	2.8	47%
EL	6.6	9.8	3.2	48%
ES	5.9	8.6	2.7	46%
FR	7.7	10.4	2.7	35%
HR	5.7	9.7	4.0	71%
IT	6.1	8.0	1.9	32%
CY	3.0	4.0	1.0	32%
LV	3.8	6.1	2.3	60%
LT	4.2	5.9	1.7	41%
LU	4.6	6.0	1.4	30%
HU	4.7	7.3	2.6	56%
MT	5.7	9.9	4.2	75%
NL	7.2	9.7	2.6	36%
AT	6.9	9.9	3.0	44%
PL	4.2	7.4	3.1	75%
PT	6.0	10.9	4.9	80%
RO	3.8	6.3	2.5	67%
SI	5.7	8.5	2.8	50%
SK	5.7	10.5	4.7	83%
FI	7.8	10.3	2.5	31%
SE	6.9	9.0	2.1	31%
UK	7.8	10.9	3.1	40%
NO	7.5	10.4	2.8	38%
EA	7.0	9.4	2.4	35%
EU	6.9	9.5	2.6	37%
EU15	7.1	9.7	2.6	36%
NMS	4.6	7.5	2.9	64%

Source: Commission services, EPC.

It possibly underestimates the future budgetary pressure coming from the technical and economic process of producing and providing ever more sophisticated health care services. Still, methodological uncertainties with regard to estimating the impact of non-demographic drivers on health care expenditure make continuous improvements of the estimation methodology desirable.

Table II.2.14: **AWG reference scenario - projected increase in public expenditure on health care over 2013-2060, as % of GDP**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.1	0.1	2%
BG	4.0	4.4	0.4	9%
CZ	5.7	6.7	1.0	17%
DK	8.1	9.0	0.9	11%
DE	7.6	8.2	0.6	7%
EE	4.4	5.0	0.6	13%
IE	6.0	7.2	1.2	20%
EL	6.6	7.9	1.3	19%
ES	5.9	6.9	1.1	18%
FR	7.7	8.6	0.9	11%
HR	5.7	7.5	1.7	31%
IT	6.1	6.7	0.7	11%
CY	3.0	3.3	0.3	9%
LV	3.8	4.4	0.6	16%
LT	4.2	4.3	0.1	2%
LU	4.6	5.1	0.5	11%
HU	4.7	5.4	0.8	17%
MT	5.7	7.8	2.1	38%
NL	7.2	8.1	1.0	13%
AT	6.9	8.2	1.3	19%
PL	4.2	5.5	1.2	29%
PT	6.0	8.5	2.5	41%
RO	3.8	4.8	1.0	26%
SI	5.7	6.8	1.2	21%
SK	5.7	7.7	2.0	35%
FI	7.8	8.5	0.7	9%
SE	6.9	7.3	0.4	7%
UK	7.8	9.1	1.3	16%
NO	7.5	8.5	0.9	12%
EA	7.0	7.7	0.8	11%
EU	6.9	7.8	0.9	13%
EU15	7.1	8.0	0.9	12%
NMS	4.6	5.7	1.1	23%

Source: Commission services, EPC.

Second, in some countries future spending may be substantially driven by the possible convergence in health care provision across countries. Governments of countries where the current provision of health care is seen as less than that of other EU countries (mainly, though not only, NMS countries) may face increasing pressure from their citizens to substantively increase the level of spending in order to reach – at least over the long term – the coverage and standards guaranteed already today to the citizens of the richest EU countries.

2.7. AWG REFERENCE SCENARIO

The "AWG reference scenario", used as the baseline scenario is the point of reference for comparisons with the 2012 Ageing Report. In this scenario health care expenditures are driven by the assumption that half of the future gains in life expectancy are spent in good health and an income elasticity of health care spending converging from 1.1 in 2013 to unity in 2060.

The joint impact of those factors is a projected increase in spending of about 0.9 pp. of GDP in the EU28 by 2060 (Table II.2.14). Individual countries' results range between 0.1 (Belgium and Lithuania) and 2.5 pp. of GDP (Portugal). The estimated increases in spending are 0.2 pp. of GDP lower for the EU15 and 0.1 pp. for the NMS than in the demographic scenario.

Table II.2.15: **AWG risk scenario - projected increase in public expenditure on health care over 2013-2060, as % of GDP**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.5	0.5	9%
BG	4.0	5.2	1.1	28%
CZ	5.7	7.5	1.7	30%
DK	8.1	10.0	1.9	23%
DE	7.6	8.9	1.3	17%
EE	4.4	5.7	1.3	30%
IE	6.0	7.9	1.9	32%
EL	6.6	8.7	2.1	32%
ES	5.9	7.8	1.9	33%
FR	7.7	9.4	1.6	21%
HR	5.7	8.4	2.7	47%
IT	6.1	7.2	1.2	19%
CY	3.0	3.6	0.6	20%
LV	3.8	5.3	1.5	40%
LT	4.2	5.1	0.9	22%
LU	4.6	5.4	0.8	18%
HU	4.7	6.2	1.5	33%
MT	5.7	8.7	3.0	53%
NL	7.2	8.8	1.6	22%
AT	6.9	8.9	2.0	29%
PL	4.2	6.4	2.2	52%
PT	6.0	9.6	3.5	58%
RO	3.8	5.5	1.7	45%
SI	5.7	7.5	1.9	33%
SK	5.7	9.0	3.3	58%
FI	7.8	9.1	1.3	17%
SE	6.9	8.0	1.2	17%
UK	7.8	9.8	2.0	25%
NO	7.5	9.2	1.7	22%
EA	7.0	8.4	1.5	21%
EU	6.9	8.5	1.6	23%
EU15	7.1	8.7	1.6	22%
NMS	4.6	6.5	1.9	42%

Source: Commission services, EPC.

Table II.2.16: **TFP risk scenario - projected increase in public expenditure on health care over 2013-2060, as % of GDP**

	2013	2060	Change 2013-2060	
			pp.	In %
BE	6.0	6.1	0.1	2%
BG	4.0	4.4	0.4	10%
CZ	5.7	6.7	1.0	18%
DK	8.1	9.0	0.9	11%
DE	7.6	8.2	0.6	8%
EE	4.4	4.9	0.5	11%
IE	6.0	7.2	1.2	20%
EL	6.6	7.8	1.2	18%
ES	5.9	6.9	1.0	17%
FR	7.7	8.6	0.9	12%
HR	5.7	7.4	1.7	30%
IT	6.1	6.7	0.6	10%
CY	3.0	3.3	0.3	10%
LV	3.8	4.4	0.6	16%
LT	4.2	4.3	0.1	2%
LU	4.6	5.1	0.5	11%
HU	4.7	5.4	0.7	15%
MT	5.7	7.8	2.1	37%
NL	7.2	8.1	0.9	13%
AT	6.9	8.2	1.3	19%
PL	4.2	5.4	1.2	29%
PT	6.0	8.5	2.5	42%
RO	3.8	4.7	0.9	24%
SI	5.7	6.8	1.1	19%
SK	5.7	7.7	2.0	35%
FI	7.8	8.5	0.7	9%
SE	6.9	7.3	0.4	6%
UK	7.8	9.0	1.2	15%
NO	7.5	8.4	0.9	12%
EA	7.0	7.7	0.7	10%
EU	6.9	7.8	0.9	13%
EU15	7.1	8.0	0.9	13%
NMS	4.6	5.7	1.1	24%

Source: Commission services, EPC

2.8. COMPARING RESULTS OF THE 2015 WITH THE 2012 AGEING REPORT

It is interesting to compare the current results with the projections of the 2012 Ageing Report. Differences across the two waves of projections may arise from different demographic assumptions (faster/slower ageing of population) or changes in the age-gender expenditure profiles. However, when making these comparisons, it has to be kept in mind that there are many reasons why differences in results may not simply reflect changes in the underlying ageing process. Differences may stem from a different base-year for starting the projections, updated macroeconomic assumptions resulting in different GDP per capita growth rates and GDP levels for the period under analysis and changes in scenario assumptions.

In what follows we concentrate on the two major sources of differences, GDP growth and expenditure profiles.

In terms of the former, the 2013 level of public expenditure on health care in the EU is 0.2 pp of GDP lower in the current Ageing Report than in the 2012 projections. The impact ranges from an increase of 1.1 pp of GDP in Greece to a decrease of 1.1 pp of the UK and Finland. In aggregate, EU countries now start from a lower level of spending. Ceteris paribus, this shift results in lower increases in projected levels of health spending.

Changes in the age cost profiles have increased by 0.1 pp of GDP overall. However, this aggregate impact masks a wide range of variation across Member States, from an increase of 0.9 for PT to a decrease of 0.3 for Spain or Cyprus.

The reason for these changes is due to the fact that in most cases age-cost profiles have been updated, resulting in different dynamics of ageing costs for many countries. In many cases this also reflects an improvement in the quality of data used and in the construction of the profiles.

It should also be noted that the new ESA 2010 accounting has implied an upward revision of GDP levels in the base year. For the EU, GDP is increased by about 3.5% in 2013.

Graph II.2.4 shows the age-gender expenditure profiles as % of GDP for all ages. There is a significant evolution here. In the EU15, the profiles for males are not too far from 2012 profiles. However, for females, the expenditure profiles in the current report are lower than those of the 2012 Ageing Report starting roughly from age of 40. In the NMS, there is a similar evolution as for the latter, although for males the new expenditure profiles are higher than those from 2012 for ages 95 and above. These changes in the profiles may explain a larger increase in public expenditure on health care as compared to the 2012 Ageing Report.

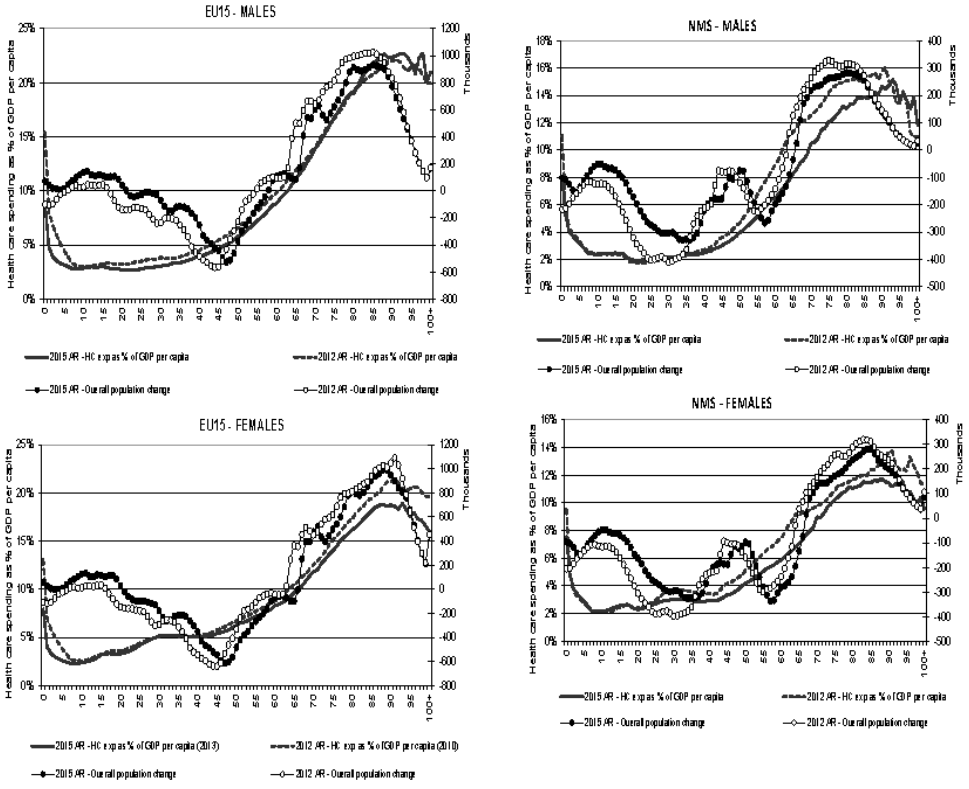
Table II.2.17: **Decomposing the impact of drivers on differences in spending growth in health care expenditures between the 2015 and 2012 Ageing reports, in pp. of GDP**

		Determinants of change behind 2015 AR Health care expenditure as % of GDP compared to 2012 AR projections (Demographic scenario in 2060)						
	Difference in spending growth between the 2015 and 2012 Ageing Reports	Due to:						
		Change in age-cost profiles	Change related to GDP growth	Change in demographic projections	Interaction effect*	Change in all drivers**	Base-year effect***	
BE	-0.4	0.0	-1.0	0.6	0.1	-0.3	-0.2	BE
BG	-0.2	-0.1	-0.1	0.0	0.0	-0.2	0.0	BG
CZ	-0.6	0.3	-0.5	0.1	0.1	0.0	-0.5	CZ
DK	-0.1	0.0	-0.7	0.5	0.1	-0.2	0.1	DK
DE	-0.8	0.0	-0.7	0.5	0.1	-0.1	-0.6	DE
EE	-0.4	-0.2	0.2	-0.4	0.0	-0.4	0.0	EE
IE	-0.2	0.1	1.5	-2.0	0.3	-0.1	-0.1	IE
EL	0.0	0.0	1.7	-2.0	0.8	0.4	-0.4	EL
ES	-0.6	-0.3	0.8	-1.1	0.2	-0.4	-0.2	ES
FR	-0.3	0.0	-0.3	0.0	0.0	-0.3	-0.1	FR
HR	:	0.0	0.0	0.0	:	0.0	:	HR
IT	-0.1	0.2	-0.3	0.1	0.0	0.0	0.0	IT
CY	-0.2	-0.3	0.2	-0.2	0.0	-0.3	0.1	CY
LV	0.0	0.4	0.3	-0.9	0.2	-0.1	0.1	LV
LT	-0.6	0.0	1.2	-2.0	0.2	-0.6	0.0	LT
LU	-0.5	-0.2	-2.8	1.6	0.7	-0.8	0.3	LU
HU	-0.4	0.0	-0.2	-0.1	0.0	-0.3	-0.2	HU
MT	-0.5	0.0	-2.2	0.9	0.3	-0.9	0.4	MT
NL	0.0	0.0	-0.1	0.1	0.0	0.0	0.0	NL
AT	-0.1	0.1	-0.9	0.6	0.1	-0.1	0.0	AT
PL	-0.6	-0.1	-0.1	0.0	0.0	-0.2	-0.4	PL
PT	0.7	0.9	1.6	-1.6	0.2	1.0	-0.3	PT
RO	-0.2	0.1	-0.5	-0.2	0.0	-0.7	0.5	RO
SI	0.2	0.5	0.0	-0.2	0.0	0.4	-0.2	SI
SK	0.1	0.1	0.7	-0.6	0.1	0.3	-0.2	SK
FI	0.1	-0.1	-0.8	0.6	0.0	-0.2	0.3	FI
SE	-0.3	0.0	-1.3	0.7	0.2	-0.3	0.1	SE
UK	0.5	0.3	-0.2	0.1	0.0	0.2	0.2	UK
NO	-0.2	-0.4	-2.4	1.5	0.5	-0.9	0.7	NO
EA	-0.3	0.0	-0.2	0.0	0.1	-0.1	-0.2	EA
EU	-0.2	0.1	-0.3	0.0	0.1	-0.1	-0.1	EU
EU15	-0.2	0.1	-0.3	0.1	0.1	-0.1	-0.1	EU15
NMS	-0.4	0.0	-0.1	-0.2	0.0	-0.2	-0.2	NMS

(1) *The interaction effect is the unexplained difference between the change in all drivers and the sum of the effects of the individual drivers.
** The change in all drivers is estimated by replacing the current data with the 2012 Ageing Report data for all drivers at once.
*** the base-year effect is the difference between column 1 and column 6.
Source: Commission services, EPC.

A quantitative decomposition of drivers is proposed in Table II.2.17. The decomposition aims at quantifying which factors are driving the differences in projected spending between the 2012 and the 2015 projection exercises. The considered drivers are the age-cost profiles, GDP per capita growth, population, an interaction and a base-year effect. Basically, departing from the level of expenditure in 2010 each driver's impact is estimated by replacing *ceteris paribus* its current value with the 2012 Ageing Report data. This is done subsequently for the age-cost profiles, GDP per capita growth and population data. As for the results at the level of the EU28, the new age-cost profiles have increased spending by 0.1 pp of GDP, whereas GDP per capita growth projections have driven down the results by roughly 0.2 pp. of GDP, whilst new demographic data has, in general, driven down spending projections slightly. However, there is considerable variation between countries.

Graph II.2.4: **Age-gender expenditure profiles and population changes in the 2015 and 2012 Ageing Reports**



Source: Commission services, EPC.

2.9. CONCLUSIONS

Public health expenditure in EU28 was at 7.8% of GDP in 2012, the projections show that expenditure may grow to 8 % of GDP in 2060 only on accounts of demographic ageing– and to higher levels when other push up factors are accounted for as in the other scenarios presented in this report. Growing public health care expenditure raises concerns about its long-term sustainability. This report takes into account the possibility that alternative scenarios materialize in a context subject to considerable uncertainty.

The "demographic scenario" assumes that per capita spending grows in line with national income per capita. The effect is that without population ageing, the share of health spending in % of national income would stay constant. However, on the one hand empirical research shows that growth in both public and total health care spending may exceed the growth rate of national income, be it because of rising expectations towards more and better health care and a higher willingness to pay for health care services. On the other hand, the scenario assumes that all future gains in life expectancy are spent in bad health. Consequently, the "demographic scenario" may under- or overestimate health spending growth.

Indeed, the projections show that whilst ageing per se has a non-negligible effect on expenditure growth, it is rather moderate. In effect, much depends on whether gains in life expectancy are spent in good or bad health. Optimistically, if all additional life years are healthy life years, the additional cost burden from ageing can be lowered, as exemplified in the "*constant health scenario*".

Table II.2.18: **Overview of scenario results - increase in public expenditure on health care over 2013-2060, as p.p. of GDP**

	Demo-graphic scenario	High life expectancy scenario	Constant health scenario	Death-related costs scenario	Income elasticity scenario	EU28 cost convergence scenario	Labour intensity scenario	Sector-specific composite indexation scenario	Non-demographic determinants scenario	AWG reference scenario	AWG risk scenario	TFP risk scenario	
BE	0.5	0.8	-0.3	0.4	0.7	0.7	1.0	0.6	1.5	0.1	0.5	0.1	BE
BG	0.4	0.6	-0.1	0.4	0.7	3.1	0.7	-0.1	1.9	0.4	1.1	0.3	BG
CZ	1.2	1.6	0.3	0.8	1.5	1.5	2.0	1.1	2.9	1.0	1.7	0.9	CZ
DK	1.0	1.4	0.1	0.7	1.3	1.0	1.1	0.6	3.1	0.9	1.9	0.8	DK
DE	0.7	1.2	0.0	0.5	1.0	0.8	2.0	0.1	2.2	0.6	1.3	0.5	DE
EE	0.8	1.0	0.1	:	1.0	2.6	1.2	0.6	2.3	0.6	1.3	0.6	EE
IE	1.3	1.6	0.6	:	1.6	1.3	1.1	0.6	2.8	1.2	1.9	1.2	IE
EL	1.4	1.8	0.6	:	1.7	1.4	0.5	0.9	3.2	1.3	2.1	1.2	EL
ES	1.0	1.3	0.6	0.9	1.3	1.6	0.8	1.1	2.7	1.1	1.9	1.0	ES
FR	1.1	1.5	0.3	0.8	1.3	1.1	1.2	0.6	2.7	0.9	1.6	0.8	FR
HR	2.0	2.3	1.0	:	2.3	2.9	2.2	1.7	4.0	1.7	2.7	1.7	HR
IT	0.8	1.1	0.2	0.7	1.0	1.2	1.0	0.1	1.9	0.7	1.2	0.6	IT
CY	0.3	0.3	0.1	:	0.4	3.5	0.2	0.2	1.0	0.3	0.6	0.3	CY
LV	0.6	0.8	0.1	:	0.9	2.9	0.8	0.5	2.3	0.6	1.5	0.6	LV
LT	0.1	0.3	-0.3	:	0.4	2.1	0.4	-0.5	1.7	0.1	0.9	0.1	LT
LU	0.7	0.9	0.2	:	0.8	1.5	1.4	0.7	1.4	0.5	0.8	0.5	LU
HU	1.0	1.3	0.1	:	1.3	2.4	1.5	0.3	2.6	0.8	1.5	0.8	HU
MT	2.5	3.0	1.4	:	2.7	3.1	2.6	1.6	4.2	2.1	3.0	2.1	MT
NL	1.2	1.5	0.4	0.9	1.4	1.2	1.4	0.7	2.6	1.0	1.6	0.9	NL
AT	1.6	2.0	0.7	1.3	1.8	1.6	2.4	1.0	3.0	1.3	2.0	1.3	AT
PL	1.3	1.6	0.7	1.1	1.6	3.0	2.3	0.5	3.1	1.2	2.2	1.2	PL
PT	2.8	3.4	1.6	:	3.1	3.4	3.2	1.8	4.9	2.5	3.5	2.5	PT
RO	1.1	1.3	0.5	:	1.3	3.3	2.0	0.5	2.5	1.0	1.7	0.9	RO
SI	1.4	1.7	0.6	1.3	1.6	2.1	2.4	0.9	2.8	1.2	1.9	1.2	SI
SK	2.2	2.5	1.0	1.9	2.6	2.5	3.4	1.4	4.7	2.0	3.3	2.0	SK
FI	1.1	1.5	0.1	0.8	1.3	1.3	2.0	1.2	2.5	0.7	1.3	0.7	FI
SE	0.6	0.8	-0.1	0.3	0.8	0.6	0.9	-0.1	2.1	0.4	1.2	0.4	SE
UK	1.5	2.0	0.6	1.2	1.8	1.6	1.7	1.5	3.1	1.3	2.0	1.2	UK
NO	1.2	1.6	0.2	:	1.5	1.2	2.2	0.6	2.8	0.9	1.7	0.9	NO
EA	0.9	1.3	0.2	:	1.2	1.1	1.3	0.5	2.4	0.8	1.5	0.7	EA
EU	1.1	1.4	0.3	:	1.3	1.3	1.5	0.6	2.6	0.9	1.6	0.8	EU
EU15	1.1	1.4	0.3	:	1.3	1.2	1.4	0.7	2.6	0.9	1.6	0.8	EU15
NMS	1.2	1.5	0.5	:	1.5	2.7	2.0	0.6	2.9	1.1	1.9	1.0	NMS

Source: Commission services, EPC.

With rising income and longevity, older people are willing to spend more on health care services. ([104]) Assuming a higher growth in spending relative to national income (i.e. income elasticity of 1.1) adds an extra 0.2 pp. of GDP to health expenditure. Rising income, in turn, drives technological innovations in the health sector, which have been confirmed in many studies to be crucial in explaining past increases in health expenditures. In addition, policy decisions to expand access and improve quality to health services especially for older people will inextricably mean that ageing remains at the core of public debates related to health expenditures.

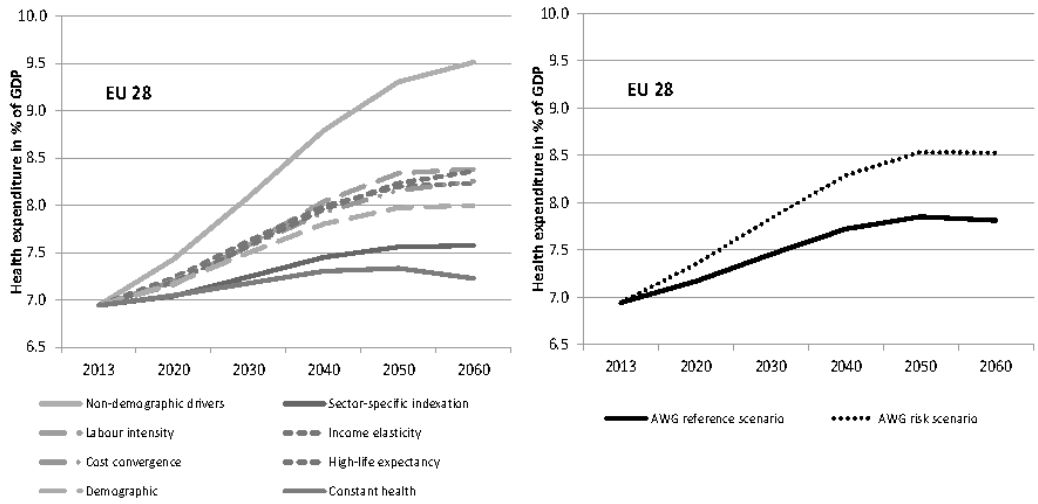
Non-demographic factors will be a key driving force of health expenditures, if past trends persist. Our projections show that - on the basis of an econometric estimate - when the impact of future income growth on the demand for more and better health care is taken into consideration, projected expenditure becomes much higher. This is reasonable, as increasing economic wealth puts governments at pressure to provide more health services and to improve the quality of care. Also, growing living standards change people's attitude towards their own health and raise their expectations on living a longer, healthier life.

Innovations can produce efficiency gains and thus be cost-saving. Furthermore, in medical care they have also expanded the possibilities of life-saving treatments. However, these have added to costs, both by adding extra expenditure to previously non-curable diseases and by saving peoples' lives at the cost of longer periods of morbidity, especially at old ages. Overall, this had a strong increasing and dominant effect on public spending. The currently prevalent consensus is that this will also be the case in the future. Still, extrapolating past trends may also mean overestimating the cost-increasing impact of non-demographic drivers and underestimating the cost-saving impact of technological progress in the future.

Expenditure on health care is also influenced by the productivity of the economy. The *"total factor productivity risk"* scenario assumes that the productivity of the economy will grow slower compared with the baseline in the future.

([104]) In the past decade there was an increase in the expenditure associated with old age diseases such as Alzheimer or dementia for example.

Graph II.2.5: **Range of results from different scenarios on health care in EU28**



Source: Commission services, EPC.

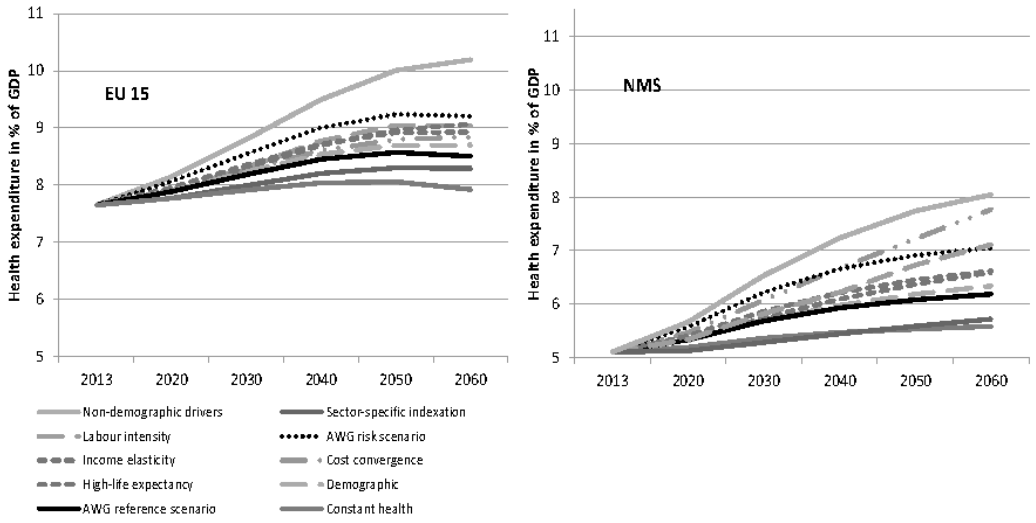
Other supply related drivers, such as the costs of wages, are a non-negligible component of health expenditures. Health care is highly labour-intensive and requires highly skilled medical personnel who have strong bargaining power in a number of countries. Assuming that wages grow in line with labour productivity (therefore exceeding growth in GDP per capita) - such as in the *labour intensity scenario* -, leads to an additional spending of 0.4 pp. of GDP relative to the "*demographic scenario*".

In addition to wages, medical products and health care infrastructure constitute large shares of total health care expenditure. Disentangling the contribution of the individual costs components and their contribution to changes in health care spending improves the understanding of the actual expenditure drivers (*sector-specific composite indexation scenario).* The "*sector-specific composite indexation scenario*" in which future expenditure of each different driver evolves in line with their specific past trends, leads to an average projected increase 0.4 pp. of GDP lower than in the "*demographic scenario"*. Two conclusions can be drawn from this scenario. First, wages and pharmaceuticals are very important drivers of expenditure growth. Second, whether the growth contribution is positive or negative is country specific.

Finally, growing convergence in citizens' income per capita and expectations towards benefitting from a similar basket of health services and goods across countries may push expenditures up for below EU average income countries (cost convergence scenario). In the "cost convergence scenario" Member States with shares of GDP per capita spending below the EU28 average converge in real living standards to the EU28 average.

Based on a combination of different scenarios, the AWG reference and the AWG risk scenarios show that spending in the EU28 may increase between 0.9 and 1.6 pp. of GDP. Different institutional and legal settings (financing mechanisms, ownership structure, organisation of health provision, etc.), as well as policy changes, which are not well reflected in the projections, further increase this range both at the low and high ends. Despite these uncertainties, all scenarios for almost all Member States point to considerable continuous pressures on public spending from the health care sectors – even under conservative assumptions.

Graph II.2.6: **Range of results from different scenarios on health care in EU15 and NMS**



Source: Commission services, EPC.

It is unlikely that these pressures will lead to a withdrawal from public financing of health care. Due to market failures in health care markets, public financing will remain a large share of health care provision. Private spending may play a more important role but will remain of a complementary character in many Member States, closing gaps in public financing and enabling treatment in areas not considered as lifesaving.

The challenges will likely be different for the two groups of Member States (EU15 and NMS) (Graph II.2.7). The current spending on health care is significantly higher in both absolute (as % of GDP) and relative (per capita) terms in the EU15. Moreover, the shape of the expenditure profile suggests large differences in the provision of health care due not only to the gap in life expectancy, but also to normative health and social policy considerations.

First, given the more profound demographic changes expected to be experienced by the new Member States, the demographic impact, quantified in the "demographic scenario" will be slightly stronger in the NMS than in the EU15.

Second, the health care spending in the NMS countries is also expected to be affected more profoundly by the changes linked to income growth and the effect of some supply-side factors. Given the current gap in the health care provision and the on-going process of convergence in terms of national income growth, a considerably faster growth in demand for health care is expected to occur in the decades to come as compared to EU15. The same observation applies to the supply-side factors. Growth in productivity and thus wages is expected to exceed for at least a few decades the increase in wages experienced in the EU15.

All in all, ageing as well as non-demographic drivers of health care expenditures will continue putting pressure on the long-term sustainability of public finances. Balancing the health care needs of the European population with spending resources, as well as continuous efforts to increase the efficiency and quality of health service delivery, will continue to be high on the political and economic reform agenda of Member States.