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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)

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

European Commission

Directorate-General for Economic and Financial Affairs

# The 2015 Ageing Report: Economic and budgetary projections for the EU28 Member States (2013-2060)

EUROPEAN ECONOMY

X/2015

## ACKNOWLEDGEMENTS

This report has been prepared in response to the mandate the Economic and Financial Affairs (ECOFIN) Council gave to the Economic Policy Committee (EPC) in 2012 to update and further deepen its common exercise of age-related expenditure projections by 2015, on the basis of a new population projection by Eurostat.

This is the fifth report with long-term projections of the budgetary impact of population ageing. It covers the 28 EU Member States and Norway over the period 2013–2060. In accordance with its normal practice, the EPC mandated a working group, the Ageing Working Group (AWG) under the chairmanship of Peter Part, to take forward the work needed to discharge this remit.

This report is presented by the EPC and the European Commission services (Directorate General for Economic and Financial Affairs - DG ECFIN) after full discussion on the basis of the AWG's comprehensive work. The Directorate-General for Economic and Financial Affairs provided the necessary analysis and calculations used in the report. The demographic projections (EUROPOP2013) were carried out by Eurostat.

The report was prepared under the supervision of Lucio Pench (Director in DG ECFIN), Jens Granlund (Chairman of the EPC), Peter Part (Chairman of the AWG), Giuseppe Carone (Head of Unit in DG ECFIN). The main contributors were Santiago Calvo Ramos, Per Eckefeldt, Luigi Giamboni, Veli Laine, Joao Medeiros, Stephanie Pamies, Etienne Sail, Christoph Schwierz and the members of the AWG (see list of Members below). The EPC and the Economic and Financial Affairs DG would like to thank all those concerned.

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## MANDATE AND BROAD PRINCIPLES

### **The 2015 long-term budgetary projection exercise: mandate and broad principles**

The ECOFIN Council gave a mandate to the Economic Policy Committee (EPC) to produce a new set of long-term budgetary projections by 2015, on the basis of a new population projection by Eurostat (EUROPOP2013).

In light of this mandate, the EPC and the Commission services (Directorate-General for Economic and Financial Affairs - DG ECFIN) agreed on a work programme with broad arrangements to organise the budgetary projections and reach agreement on its assumptions and methodologies.

With this release, the long-run economic and budgetary projections aimed at assessing the impact of ageing population have been published five times; the first report being released in 2001. This projection exercise updates and improves methodologically further the previous exercises so as to enhance overall accuracy, comparability across countries, consistency across expenditure items and the economic basis for the underlying assumptions. On the basis of these underlying demographic and macro-economic assumptions and projections, age-related expenditures covering pensions, health care, long-term care, education and unemployment benefits are projected and analysed.

The projections feed into a variety of policy debates at EU level, <sup>(1)</sup> including the overarching Europe 2020 strategy for smart, sustainable and inclusive growth. In particular, they are used in the context of the European Semester so as to identify policy challenges, in the annual assessment of the sustainability of public finances carried out as part of the Stability and Growth Pact and in the analysis on the impact of ageing populations on the labour market and potential economic growth.

This report is structured in two parts. The first one describes the underlying assumptions: the population projection, the labour force projection and the macroeconomic assumptions used. The second part presents the long-term budgetary projections on pensions, health care, long-term care, education and unemployment benefits. Statistical annexes give an overview of the projection results by area and by country.

### **Coverage and overview of the 2015 long-term projection exercise**

The economic and budgetary projections have been made by applying commonly agreed assumptions and methodologies uniformly to all Member States, as agreed by the EPC.

The starting point is the EUROPOP2013 population projection for the period 2013 to 2060 (see the Chart below). The EPC agreed upon a common set of assumptions and methodologies in order to make projections on a set of exogenous macroeconomic variables on the basis of proposals prepared by DG ECFIN, covering the labour force (participation, employment and unemployment rates), labour productivity and the real interest rate. These combined set of projections enabled the calculation of GDP for all Member States up to 2060. The macroeconomic assumptions on which this report is based were agreed in the first half of 2014 and published in November 2014; <sup>(2)</sup> the latest macroeconomic developments may thus not be fully captured.

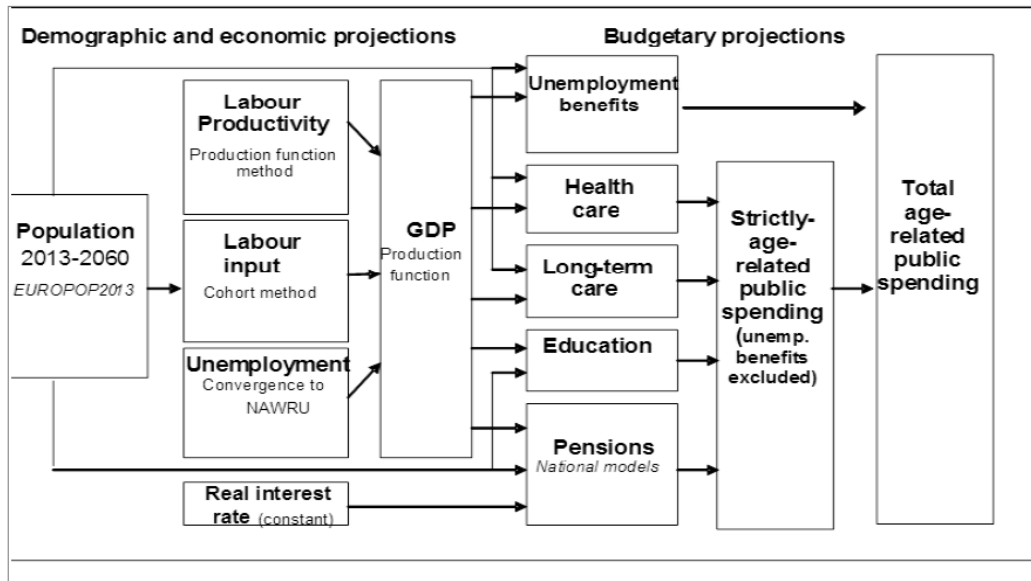
On the basis of these assumptions, separate budgetary projections were carried out for five government expenditure items. The projections for pensions were run by the Member States using their own national

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<sup>(1)</sup> Ireland has reservations around the population projections driving these figures. Whilst an exception for the basis of population projections was endorsed by EPC on April 1<sup>st</sup> for future t+10 projection exercises, the impact of this agreement is not reflected in AR15 spending projections.

<sup>(2)</sup> See European Commission and Economic Policy Committee (2014) "2015 Ageing Report: Underlying assumptions and projection methodologies", European Commission, European Economy, No 8.

model(s), reflecting current pension legislation. <sup>(3)</sup> In this way, the projections benefit from capturing the country-specific circumstances prevailing in the different Member States as a result of different pension legislation, while at the same time consistency is ensured by basing the projections on commonly agreed underlying assumptions. The projections for health care, long-term care, education and unemployment were run by the European Commission (DG ECFIN), on the basis of a common projection model for each expenditure item, taking into account country-specific settings, where appropriate. The results of this set of projections are aggregated to provide an overall projection of age-related public expenditures.



<sup>(3)</sup> In order to ensure high quality and comparability of the pension projection results, an in-depth peer review was carried out by the AWG and the Commission at four meetings during September-December 2014. The projections incorporate pension legislation in place at that time. No further reform measures has been legislated in EU Member States by 1 April 2015 (except Portugal, see the Note to Table II.1.4).

## EXECUTIVE SUMMARY

### **Demographic projections: Dramatic changes in the age structure in the EU projected**

The demographic trends projected over the long term reveal that Europe is 'turning increasingly grey' in the coming decades. The Commission, as well as the European Council, have already recognised the need to tackle resolutely the impact of ageing populations on the European Social Models.

Having reliable and comparable information on the challenges of the future demographic changes in Europe entails considering the age-structure of the population today, and how it could look like in coming decades. This sheds light on the economic, budgetary and societal challenges that policy makers will have to face in the future. The long-term projections provide an indication of the timing and scale of challenges that would result from an ageing population. They show where, when, and to what extent, ageing pressures will accelerate as the baby-boom generation retires and the average life-span continues to increase. Hence, the projections are helpful in highlighting the immediate and future policy challenges posed for EU countries by demographic trends.

Due to the dynamics in fertility, life expectancy and migration, the age structure of the EU population will change strongly in the coming decades. The overall size of the population is projected to be slightly larger by 2060 but much older than it is now. <sup>(4)</sup> The EU population is projected to increase (from 507 million in 2013) up to 2050 by almost 5%, when it will peak (at 526 million) and will thereafter decline slowly (to 523 million in 2060). This increase would however not be the case without the projected inward migration flows to the EU. There are wide differences in population trends until 2060 across Member States. While the EU population as a whole would be larger in 2060 compared to 2013, decreases of the total population are projected for about half of the EU Member States (BG, DE, EE, EL, ES, HR, LV, LT, HU, PL, PT, RO, SI and SK). For the other Member States (BE, CZ, DK, IE, FR, IT, CY, LU, MT, NL, AT, FI, SE and UK) an increase is projected.

In terms of drivers of the population changes, total fertility rates are projected to rise for the EU as a whole, though remaining below the natural replacement rate. At the same time, the projections show large and sustained increases in life expectancy at birth. In the EU, life expectancy at birth for males is expected to increase by 7.1 years over the projection period, reaching 84.8 in 2060. For females, it is projected to increase by 6.0 years, reaching 89.1 in 2060. Net migration inflows to the EU are projected to continue; first increasing to 1,364,000 by 2040, and thereafter declining to 1,037,000 people by 2060.

### **The demographic old-age dependency ratio set to nearly double over the long-term**

As a result of these different trends among age-groups, the demographic old-age dependency ratio (people aged 65 or above relative to those aged 15-64) is projected to increase from 27.8% to 50.1% in the EU as a whole over the projection period. This implies that the EU would move from having four working-age people for every person aged over 65 years to about two working-age persons.

### **Labour force projections: Projected increases in overall participation rates, and in particular for older workers on account of implemented pension reforms...**

Based on a cohort simulation model, labour force projections show a rise in overall participation rates, particularly visible for ages 50+, reflecting the combined effect of the rising attachment of younger generations of women to the labour market, together with the expected impact of pension reforms. By large, the biggest increases in participation rates are projected for older workers (around 21 pp. for women and 10 pp. for men) in the EU for the age group 55-64, influenced by enacted pension reforms. <sup>(5)</sup> Consequently, the gender gap is projected to narrow substantially in the period up to 2060. The total

<sup>(4)</sup> Eurostat's population projection (EUROPOP2013) was published on 28 March 2014.

<sup>(5)</sup> See footnote 3.

participation rate (for the age group 20-64) in the EU is projected to increase by 3.5 pp. (from 76.5% in 2013 to 80.1% in 2060). In the same period, women's participation rate is projected to increase by about 6 pp. compared with 1 pp. for men.

**... but labour supply will decline because of the projected population trends**

Total labour supply in the EU (and in the euro area) is projected to nearly stabilise between 2013 and 2023 (age group 20-64), while it is projected to decline by 8.2% between 2023 and 2060, representing roughly minus 19 million people. In the euro area, the projected fall in labour supply between 2023 and 2060 is 9.2%, equivalent to about 14 million people.

**Further rises in employment rates projected...**

Given the population projection, the labour force projection and the unemployment rate assumptions, <sup>(6)</sup> the total employment rate (for persons aged 20 to 64) in the EU is projected to increase from 68.4% in 2013 to 72.2% in 2023 and 75% in 2060. In the euro area, a similar development is expected, with the employment rate attaining 74.7% in 2060.

**... but the number of employed would diminish**

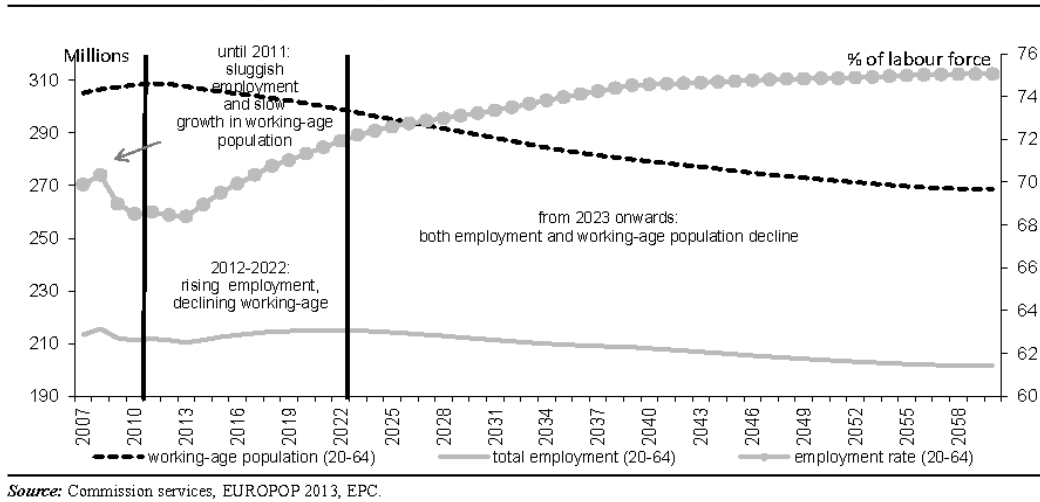
The projections show that employment (aged 20-64) will peak at 215 million in 2022, and after that fall to 202 million in 2060. This implies a decline of about 9 million workers over the period 2013 to 2060. The negative prospects stemming from the rapid ageing of the population, will only be partly offset by the increase in (female and older workers) participation rates migration inflows and the assumed decline in structural unemployment, leading to a reduction in the number of people employed during the period 2023 to 2060 (13 million).

Demographic developments have a major impact on labour market developments. Three distinct periods can be observed for the EU as a whole (see Graph 1):

- *2007-2011 – demographic developments still supportive of growth:* the working-age population is growing, but employment is sluggish as the financial and economic crisis weighs on labour prospects during this period.
- *2012-2022– rising employment rates offset the decline in the working-age population:* the working-age population starts to decline as the baby-boom generation enters retirement. However, the assumed reduction in unemployment rates, the projected increase in the employment rates of women and older workers cushion the impact of demographic change, and the overall number of persons employed would start to increase during this period.
- *From 2023 – the population ageing effect dominates:* the projected increase in employment rates is slower, as trend increases in female employment and the impact of pension reforms will be less pronounced. Hence, both the working-age population and the number of persons employed start falling over the remainder of the period.

<sup>(6)</sup> Starting from current historically high levels, a reduction in the EU unemployment rate of around 4 ¼ percentage points is projected over the long-term (to 6 ½% in 2060). A slightly larger fall of 5 ¼ pp. is projected for the euro area of (to 6 ¾% in 2060).

Graph 1: Population and employment developments, EU (million)



### Macro-economic assumptions: Potential GDP growth projected to remain quite stable over the long-term

In the EU as a whole, the annual average potential GDP growth rate in the baseline scenario is projected to remain quite stable over the long-term, albeit much lower than in previous decades. The assumption of convergence to a TFP growth rate of 1% entails for most countries that it would rise over the coming decades from the current historically low levels, and this will more than compensate for the declining labour growth from 2023 onwards. As a result, after an average potential growth of 1.1% up to 2020, a slight increase to 1.4-1.5% is projected for the remainder of the projection horizon. Over the whole period 2013-2060, average potential GDP growth rates in the EU is projected to be 1.4%. Developments in the euro area are very close to that of the EU as a whole and the potential growth rate in the euro area (averaging 1.3%) is projected to be slightly lower than for the EU throughout the projection period.

The sources of GDP growth will alter dramatically over the projection horizon. Labour will make a positive contribution to growth in both the EU and the euro area up to the 2020s, but turn negative thereafter. For the EU and for the euro area, a slight increase in the size of the total population over the entire projection period and an assumed increase of employment rates make a positive contribution to average potential GDP growth. However, this is more than offset by a decline in the share of the working-age population, which is a negative influence on growth (by an annual average of -0.2 percentage points). As a result, labour input contributes negatively to output growth on average over the projection period (by 0.1 pp. in the EU and in the euro area). Hence, labour productivity growth, driven by TFP growth, is projected to be the sole source of potential output growth in both the EU and the euro area over the entire projection period.

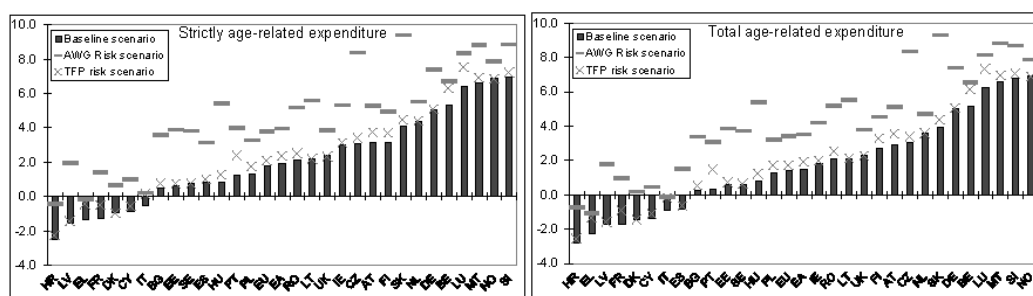
### Budgetary projections: population ageing put upward pressure on public spending

The long-term budgetary projections show that population ageing poses a challenge for the public finances in the EU. The fiscal impact of ageing is projected to be high in most Member States, with effects becoming apparent already during the next decade.

The projected change in strictly public age-related expenditure (pensions,<sup>(7)</sup> health care, long-term care and education) is almost 2 pp. of GDP in the period to 2060 (EU: +1.8 pp., EA: +1.9 pp.) between 2013 and 2060 in the baseline scenario (see Graph 2 and Table 1).<sup>(8)</sup> Looking at the components of strictly age-related expenditure, the increase between 2013 and 2060 is mostly driven by health care and long-term care spending, which combined is projected to rise by about 2 pp. of GDP (Health care: +0.9 pp., Long-term care: +1.1 pp.). After a projected increase up to 2040 (EU: +0.4 pp., EA: +0.8 pp.), public pension expenditure is projected to return close to its 2013 level (EU: -0.2 pp., EA 0 pp. over the period 2013-2060). However, the projected decline in pension spending is mostly visible in the latter part of the projection horizon. Education expenditure is projected to remain unchanged up to 2060.

The projected change in total age-related expenditure is lower, since unemployment benefit expenditure is projected to fall in the period to 2060 (by 0.4 pp. of GDP in the EU). For the EU as a whole, the projected increase in total age-related expenditure is 1.4 pp. of GDP in the baseline scenario (EA: +1.5 pp. of GDP) (see Graph 3 and Table 1).

Graph 2: Strictly and total age-related expenditure in the EU Member States, 2013-60, pp. of GDP



Source: Commission services, EPC.

There is however considerable variety across EU Member States and also in the profile over time in the long-term spending trends (see Graph 3 and Table 1). According to the projections:

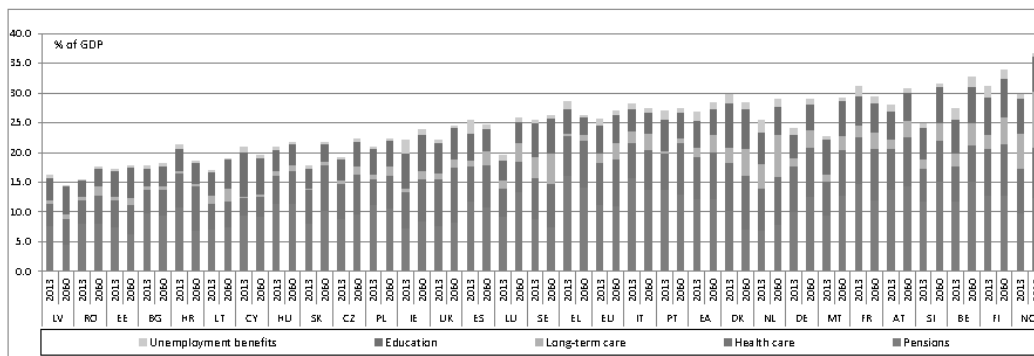
- A fall in total age-related expenditure relative to GDP is projected in eight Member States (HR, EL, LV, FR, DK, CY, IT and ES). In all of these countries, a decline in the pension-to-GDP ratio is projected in the long-term (exceeding 3 pp. of GDP in HR, DK and LV).
- For another set of countries (BG, PT, EE, SE, HU, PL, IE, RO, LT and UK), age-related expenditure ratio is expected to rise moderately (by up to 2.5 pp. of GDP).
- The age-related expenditure ratio increase is projected to be the largest in the remaining ten Member States (FI, AT, CZ, NL, SK, DE, BE, LU, MT and SI), rising by between 2.5 pp. and 6.8 pp. of GDP

(7) Public pension expenditure include all public expenditure on pension and equivalent cash benefits granted for a long period, including disability benefits and social assistance benefits for older people, see Annex 2 for details on the coverage of the projections of public pension expenditure.

(8) As in previous long-term projection exercises, the baseline scenario focuses on the budgetary impact mostly due to demographic developments.

and with pension expenditure increasing in all of these countries (exceeding 3 pp. of GDP in BE, LU, MT and SI).

Graph 3: Components of total age-related expenditure, 2013 and 2060, % of GDP



Source: Commission services, EPC.

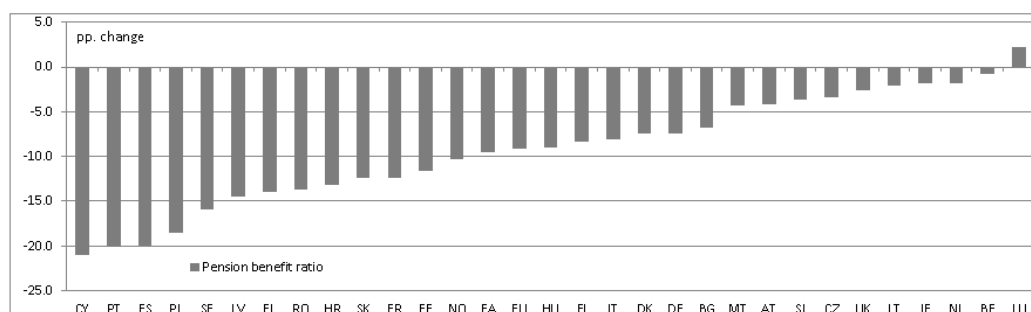
The large differences between Member States reflect primarily the diversity in public pension arrangements, their degree of maturity and the effects of pension reforms enacted so far.<sup>(8)</sup> In fact, a reduction of public pension spending as a share of GDP over the long-term is projected in the majority (15) of Member States (HR, DK, LV, FR, IT, EL, SE, EE, ES, PT, PL, BG, RO, CY and HU), mostly as a result of implemented pension reforms. These reform measures, including changes to the retirement age and the pension benefit, have primarily been adopted to address fiscal sustainability concerns of pension systems.

The pension projections rely on unchanged pension legislation, and risks exist. If pensions are being perceived as being 'too low' or the retirement age 'too high', this could eventually result in changes in pension policies, leading to upward pressure on pension spending, and the projections could thus underestimate future government expenditure. For example, the public pension benefit ratio (i.e. average pensions in relation to average wages) is projected to fall in all Member States (except Luxembourg) in the period to 2060, on average by 9 pp. in the EU and in some countries (CY, PT and ES) by up to 20 pp. (see Graph 4). Consequently, the benefit ratio at the end of the forecasting period is generally low. Even including private pensions, the benefit ratio in 2060 settle above 50 percent in only few countries (DK, EL, IT, LU, NL) while it falls below 30 percent in some other cases (BG, EE, HR, LV, PL, RO). Another upward risk is related to the projected decrease of the coverage ratio (i.e. the number of pensioners as percent of population aged 65 or more) in some countries, where a large increase of the legal retirement age is legislated. On the other hand, if countries enact additional expenditure-reducing pension reforms (currently being discussed in some countries), the projected expenditures could be overestimated.

<sup>(8)</sup> See footnote 3.



Graph 4: Public pension benefit ratio, change 2013-2060, pp. change



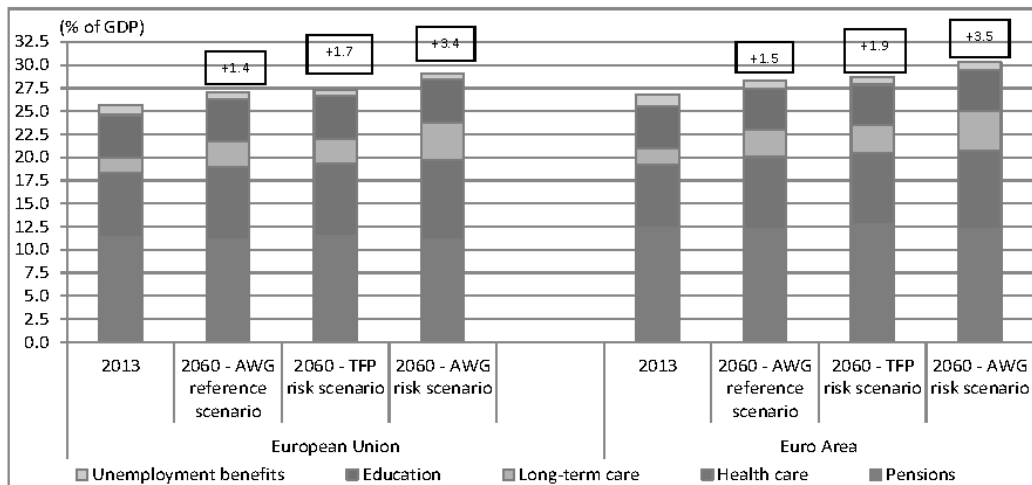
Source: Commission services, EPC.

### Risk scenarios

As noted above, there is considerable uncertainty as to future developments of age-related public expenditure. In order to provide a comprehensive assessment of the impact on government expenditure of changing the assumptions, the budgetary projections were also run with alternative scenarios, e.g. the risk scenarios. Two risk scenarios were therefore carried out, defined as follows:

- TFP risk scenario:** In light of the trend decline in TFP growth performance over the last decades in the EU, due visibility and prominence should also be given to the risk of lower TFP growth in the future. Thus, a TFP risk scenario is included, with a lower TFP growth rate (0.8%). The TFP risk scenario essentially shows that GDP growth could be much lower in the event that future TFP growth rates developed less dynamically than in the baseline scenario, i.e. more in line with the growth rate (0.8%) observed over the last 20 years. In overall potential GDP terms, it would grow by 1.2% on average up to 2060, as opposed to 1.4% in the baseline scenario. In the euro area, it would be even lower, growing by 1.1% on average. In terms of GDP per capita levels, it would be 10% lower in the TFP risk scenario compared with the baseline by 2060 in the EU.
- AWG risk scenario:** Non-demographic driver may exercise an upward push on costs in the health care and long-term care areas. In order to gain further insights into the possible importance of such developments, another set of projections were run which assumes the partial continuation of recently observed trends in health care expenditure due to, e.g. technological progress. Moreover, an upward convergence of coverage and costs to the EU average is assumed to take place in long-term care.

Graph 5: Total age-related expenditure under different scenarios, 2013-2060, pp. of GDP



Source: Commission services, EPC.

The TFP risk scenario primarily affects pension expenditure, projected to rise by  $\frac{1}{2}$  pp. of GDP more on average (EU and EA) up to 2060 compared with the baseline scenario. This is because pensions in payments are on average projected to rise in line with inflation, i.e. slower than wages (which evolve in line with labour productivity growth, which in turn depends on TFP growth). By contrast, it only has a small impact on health care and long-term care, as unit costs in these areas are closely linked to labour productivity growth and hence with wage growth. The projected increase in total age-related expenditure would be about  $\frac{1}{3}$  pp. of GDP higher than the baseline scenario up to 2060 in the EU and EA (see Graph 5 and Table 2).

The AWG risk scenario has strong impact on health care and long-term care expenditure. The projected increase in total age-related expenditure would be 2.1 pp. of GDP higher than the baseline scenario up to 2060 for both the EU as a whole and the EA. It would entail an increase over the entire projection horizon of 3.4 pp. in the EU and of 3.5 pp. in the EA. However, in both risk scenarios, the EU aggregates mask considerable variety and the expenditure projections are very different across Member States (see Graph 5 and Table 3).

#### A lower projected increase in age-related spending in the current projections than in the 2012 Ageing Report

Compared with the projections in the 2012 Ageing Report, <sup>(10)</sup> total age-related public expenditure according to the baseline scenario is now projected to rise less in all countries except Spain, Latvia and Portugal over the entire projection horizon. This is mostly due to less pronounced increases in pension expenditure over the long-term (see Graph 6). This reflects not only the impact of pension reforms, but also a less pronounced population ageing effect in the EU, according to the EUROPOP2013 demographic projection. <sup>(11)</sup>

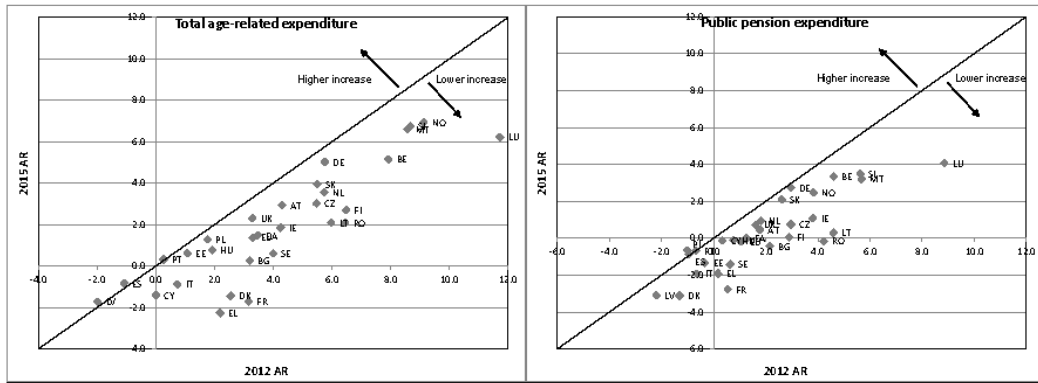
Over the period 2013-2060, the increase in the EU is  $1\frac{1}{2}$  pp. of GDP and in the EU and EA, compared with a projected increase of  $3\frac{1}{2}$  pp. of GDP in the 2012 Ageing Report (see Graph 6). The largest

<sup>(10)</sup> Pension reforms implemented and having been subject to a peer review by the EPC since the 2012 Ageing Report was published are included in the 2012 AR projections in Graph 6.

<sup>(11)</sup> A lower increase in the old age dependency ratio (aged 65 or more/aged 20-64) over the period 2013-2060 in the EU as a whole and in all countries except EL, PT, SK, UK projected in EUROPOP2013 compared with EUROPOP2010.

downward revisions have occurred in Luxembourg, France, Greece, Romania, Denmark, Lithuania and Finland (more than 3 ½ pp. of GDP).

Graph 6: Projected change in total age-related and pension expenditure (baseline) compared, 2012 and 2015 AR, 2013-60, pp. of GDP



Source: Commission services, EPC.

Table 1: Overview of the 2015 long-term budgetary projections – Baseline scenario

Age-related spending, percentage points of GDP, 2013-2060

	Pensions		Healthcare		Long-term care		Education		Strictly age-related items		Unemployment benefits		Total age-related items		
	2013 level	CH 2013-40	CH 2013-40	CH 2013-60	2013 level	CH 2013-40	CH 2013-40	CH 2013-60	2013 level	CH 2013-40	CH 2013-40	CH 2013-60	2013 level	CH 2013-40	
	2013 level	CH 2013-40	CH 2013-40	CH 2013-60	2013 level	CH 2013-40	CH 2013-40	CH 2013-60	2013 level	CH 2013-40	CH 2013-40	CH 2013-60	2013 level	CH 2013-40	
BE	11.8	3.4	6.0	0.1	0.1	2.1	0.9	1.6	5.8	0.2	0.3	5.3	27.5	4.4	5.2
BG	9.9	-1.5	-0.4	4.0	0.4	0.4	0.1	0.2	3.0	-0.1	0.4	17.3	0.5	-0.2	0.3
CZ	9.0	0.0	0.7	5.7	1.0	0.7	0.4	0.7	3.4	0.3	0.7	18.9	1.4	3.1	3.0
DK	10.3	-2.3	-3.1	8.1	0.8	0.9	2.4	1.4	2.0	7.6	-0.4	-0.7	28.4	-0.5	-0.5
DE	10.0	2.2	2.7	7.8	0.7	0.6	1.4	0.9	1.5	4.1	0.1	0.3	23.1	0.8	0.0
EE	7.6	-0.7	-1.3	4.4	0.6	0.6	0.4	0.7	4.4	0.1	0.8	17.0	0.3	0.6	0.6
IE	7.4	2.7	1.1	6.0	1.3	1.2	0.7	0.4	6.0	-0.7	0.0	20.0	3.6	3.0	1.9
EL	16.2	-2.1	-1.9	6.6	0.9	1.3	0.6	0.2	4.1	-1.4	-1.1	27.4	-2.4	-1.4	-2.3
ES	11.8	0.1	-0.8	5.9	1.1	1.1	1.0	0.6	1.4	4.0	-1.4	23.2	0.4	0.8	-0.8
FR	14.9	-1.1	-2.8	7.7	0.9	0.9	2.0	0.6	0.8	5.0	-0.1	-0.2	29.6	0.3	-1.3
HR	10.8	-3.0	-3.9	5.7	1.6	1.7	0.4	0.0	3.7	-0.5	-0.4	20.7	-1.9	-2.5	-1.7
IT	15.7	0.1	-1.9	6.1	0.6	0.7	1.8	0.4	0.9	3.7	-0.3	-0.2	27.3	0.8	-0.5
CY	9.5	-0.1	-0.1	3.0	0.3	0.3	0.3	0.2	7.3	-1.9	-1.2	20.0	-1.5	-0.8	-1.4
LV	7.7	-2.3	-3.1	3.8	0.6	0.6	0.1	0.1	3.8	0.0	0.8	16.9	-1.5	-1.6	-1.7
LT	7.2	2.2	0.3	4.2	0.5	0.1	1.4	0.8	0.9	3.8	0.3	0.9	16.7	3.8	2.2
LU	9.4	3.3	4.1	4.6	0.2	0.5	1.9	0.7	3.9	0.1	0.2	18.8	4.3	6.4	6.2
HU	11.5	-1.9	-0.1	4.7	0.6	0.8	0.8	0.2	4.4	3.6	-0.5	-0.2	20.6	-1.6	0.9
MT	9.6	0.2	3.2	5.7	1.8	2.1	1.1	0.9	1.2	5.9	0.2	0.1	22.2	2.5	6.6
NL	6.9	1.5	0.9	7.2	1.0	1.0	4.1	1.7	3.0	5.2	-0.4	-0.5	23.4	3.8	4.4
AT	13.9	0.8	0.5	6.9	1.0	1.3	1.4	0.6	1.3	4.9	-0.1	0.0	27.1	2.4	3.1
PT	11.3	-1.4	-0.7	4.2	0.8	1.2	0.8	0.5	0.9	4.4	-0.6	-0.1	20.7	-0.6	1.3
PL	13.8	1.0	-0.7	6.0	1.7	2.5	0.6	0.2	0.4	5.2	-1.2	-1.0	26.5	1.8	1.3
RO	8.2	0.2	-0.1	3.8	0.8	1.0	0.7	0.5	0.9	2.6	0.2	0.4	16.3	1.7	2.1
SI	11.8	2.6	3.9	5.7	1.1	1.2	1.4	1.0	1.5	5.3	0.1	0.8	24.2	4.7	7.0
SK	8.1	0.0	2.1	5.7	1.4	2.0	0.2	0.2	0.4	3.4	-0.6	-0.4	17.4	4.1	4.1
FI	12.9	0.7	0.1	7.8	0.7	0.7	2.4	1.8	2.1	6.1	0.2	0.3	29.2	3.4	3.2
SE	8.9	-1.4	-1.4	6.9	0.4	0.4	3.6	1.0	1.5	5.7	0.2	0.2	25.1	0.2	0.7
UK	7.7	0.8	0.7	7.8	1.0	1.3	1.2	0.3	0.4	5.1	0.0	0.0	21.8	2.0	2.4
NO	9.9	1.5	2.5	7.5	0.6	0.9	4.8	2.0	3.6	6.0	0.0	-0.1	29.2	4.1	6.9
EU	11.3	0.4	-0.2	6.9	0.8	0.9	1.6	0.7	1.1	4.7	-0.2	0.0	24.6	1.6	1.8
EA	12.3	0.8	0.0	7.0	0.8	0.8	1.7	0.7	1.3	4.5	-0.3	-0.1	25.5	2.0	1.9

(1) SK: the figures 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 until 2060.  
 (2) The health care and long-term care EU averages are weighted according to GDP. The level of health care and long-term care expenditures in 2013 is the first year of projected expenditures based on the latest available data. Health care expenditure excludes long-term nursing care.  
 (3) An in-depth peer review was carried out by the AWC and the Commission at four meetings during September-December 2014. The projections in corporate pension legislation in place at that time. No further reform measures has been legislated in EU Member States by 1 April 2015 (except Portugal, see the Note to Table II.1.4).

Source: Commission services, EPC.

Table 2: Overview of the 2015 long-term budgetary projections – TFP risk scenario

Age-related spending, percentage points of GDP, 2013-2060

	Pensions		Healthcare		Long-term care		Education		Strictly age-related items		Unemployment benefits		Total age-related items								
	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40							
	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40	2013 level	CH 2013-40							
BE	11.8	3.9	4.3	0.1	0.1	2.1	0.9	1.6	5.8	0.2	0.3	0.3	25.7	5.1	6.3	27.5	4.9	6.1			
BG	9.9	-1.3	-0.1	4.0	0.4	0.3	0.4	0.1	3.0	-0.1	0.4	0.7	17.3	-0.9	0.8	0.5	-0.2	-1.1	0.5		
CZ	9.0	0.2	1.1	5.7	0.7	0.9	0.7	0.4	3.4	0.3	0.7	18.9	1.6	3.4	0.2	0.0	0.0	19.1	1.6	3.4	
DK	10.3	-2.3	-3.1	8.1	0.8	0.8	2.4	1.4	2.0	7.6	-0.4	-0.7	28.4	-0.5	-1.0	1.4	-0.5	-0.5	-1.5	DK	
DE	10.0	2.3	2.8	7.6	0.7	0.5	1.4	0.9	1.5	4.1	0.1	0.3	23.1	4.0	5.1	0.8	0.0	0.0	23.9	3.9	5.0
EE	7.6	-0.7	-1.2	4.4	0.6	0.6	0.6	0.4	0.7	4.4	0.1	0.8	17.0	0.4	0.7	0.2	0.0	0.0	17.1	0.3	0.7
IE	7.4	2.8	1.2	6.0	1.3	1.2	0.7	0.4	6.0	-0.7	0.0	3.7	3.1	2.1	3.1	2.1	-1.1	-1.1	22.1	2.6	2.0
EL	16.2	-1.8	-1.0	6.6	0.9	1.2	0.6	0.2	4.1	-1.4	-1.1	27.4	-1.9	-0.4	1.2	-0.9	-0.9	-0.9	28.5	-2.8	-1.4
ES	11.8	0.4	0.4	5.9	1.1	1.0	1.0	0.6	1.4	4.0	-1.4	-0.8	23.2	0.7	1.0	2.2	-1.7	-1.7	25.4	-1.0	-0.7
FR	14.9	-0.6	-1.9	7.7	0.9	0.8	2.0	0.6	0.8	5.0	-0.1	-0.2	29.6	0.7	1.0	1.5	-0.4	-0.4	31.1	0.3	-0.9
HR	10.8	-2.9	-3.7	5.7	1.6	1.7	0.4	0.0	3.7	-0.5	-0.4	27.3	-1.8	-2.3	0.5	-0.3	-0.3	21.2	-2.1	-2.6	
IT	15.7	0.7	-1.2	6.1	0.6	0.6	1.8	0.4	0.9	7.3	-0.3	-0.2	27.3	1.3	0.1	0.9	-0.3	-0.3	28.2	1.0	-0.2
CY	9.5	0.1	0.2	3.0	0.2	0.3	0.3	0.2	0.2	7.3	-1.9	-1.2	20.0	-1.4	-0.6	0.8	-0.6	-0.6	20.9	-1.9	-1.1
LV	7.7	-2.2	-2.9	3.8	0.6	0.6	0.6	0.1	0.1	3.8	0.0	0.8	16.9	-1.5	-1.4	0.3	-0.2	-0.2	16.2	-1.6	-1.6
LT	7.2	2.2	0.3	4.2	0.5	0.1	1.4	0.8	0.9	3.8	0.3	0.9	16.7	3.8	2.2	0.2	0.1	0.1	16.9	3.7	2.1
LU	9.4	3.6	5.2	4.6	0.2	0.5	1.9	0.7	1.7	3.3	0.1	0.2	18.8	4.7	7.5	0.7	-0.2	-0.2	19.5	4.4	7.3
HU	11.5	-1.7	0.3	4.7	0.6	0.8	0.8	0.2	0.4	3.6	-0.5	-0.2	20.6	-1.4	1.3	0.3	0.1	0.1	20.8	-1.5	1.2
MT	9.6	0.4	3.6	5.7	1.8	2.1	1.1	0.9	1.2	5.9	-0.4	0.1	22.2	2.7	6.9	0.3	0.0	0.0	22.6	2.7	6.9
NL	6.9	1.4	1.0	7.2	1.0	0.9	4.1	1.7	3.0	5.2	-0.4	-0.5	23.4	3.7	4.4	2.0	-0.8	-0.8	25.4	2.9	3.6
AT	13.9	1.0	1.1	6.9	1.0	1.3	1.4	0.6	1.3	4.9	-0.1	0.0	27.1	2.6	3.7	0.8	-0.2	-0.2	27.9	2.4	3.6
PL	11.3	-1.2	-0.2	4.2	0.8	1.2	0.8	0.5	0.9	4.4	-0.6	-0.1	20.7	-0.5	1.8	0.2	-0.1	-0.1	20.9	-0.5	1.7
PT	13.8	1.5	0.5	6.0	1.7	2.5	0.6	0.2	0.4	5.2	-1.2	-1.0	26.5	2.2	2.4	1.5	-0.9	-0.9	27.0	1.3	1.5
RO	8.2	0.5	0.3	3.8	0.8	0.9	0.7	0.5	0.9	2.6	0.2	0.4	16.3	1.9	2.5	0.1	0.0	0.0	16.5	1.9	2.5
SI	11.8	2.7	3.8	5.7	1.1	1.2	1.4	1.0	1.5	5.3	0.1	0.8	24.2	4.9	7.2	0.6	-0.2	-0.2	24.7	4.7	7.0
SK	8.1	0.1	2.5	5.7	1.4	2.0	0.2	0.2	0.4	3.4	-0.6	-0.4	17.4	1.1	4.5	0.2	-0.1	-0.1	17.7	1.0	4.3
FI	12.8	1.1	0.6	7.8	0.7	0.7	2.4	1.8	2.1	6.1	0.2	0.3	29.2	3.8	3.7	1.9	-0.4	-0.4	31.1	3.3	3.3
SE	8.9	-1.3	-1.4	6.9	0.3	0.4	3.6	1.0	1.5	5.7	0.2	0.2	25.1	0.2	0.8	0.4	-0.1	-0.1	25.5	0.1	0.6
UK	7.7	0.8	0.7	7.8	1.0	1.2	1.2	0.3	0.4	5.1	0.0	0.0	21.8	1.9	2.3	0.3	0.3	0.3	22.1	1.9	2.3
NO	9.9	1.5	2.5	7.5	0.6	0.9	4.8	2.0	3.6	6.0	0.0	0.0	29.2	4.0	6.9	0.4	0.0	0.0	29.6	4.1	6.9
EU	11.3	0.6	0.2	6.9	0.8	0.8	1.6	0.7	1.1	4.7	-0.2	0.0	24.6	1.8	2.1	1.1	-0.4	-0.4	26.6	1.4	1.7
EA	12.3	1.1	0.5	7.0	0.8	0.7	1.7	0.7	1.3	4.5	-0.3	-0.1	25.5	2.3	2.4	1.3	-0.5	-0.4	28.8	1.8	1.9

(1) SK: the figures 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 until 2060.  
(2) The health care and long-term care EU averages are weighted according to GDP. The level of health care and long-term care expenditures in 2013 is the first year of projected expenditures based on the latest available data. Health care expenditure excludes long-term nursing care.

Source: Commission services, EPC.

Table 3: Overview of the 2015 long-term budgetary projections – A WG risk scenario

		Age-related spending, percentage points of GDP, 2013-2060																			
		Pensions				Healthcare				Long-term care				Education							
		2013 level	CH 2013-40	CH 2013-60	CH 2013-60	2013 level	CH 2013-40	CH 2013-60	CH 2013-60	2013 level	CH 2013-40	CH 2013-60	CH 2013-60	2013 level	CH 2013-40	CH 2013-60					
BE	118	34	33	6.0	0.4	0.5	2.1	1.4	2.6	5.8	0.2	0.3	25.7	6.3	6.7	1.8	-0.2	-0.2	27.5	5.2	6.5
BG	99	-1.5	-0.4	4.0	1.1	0.4	0.4	0.6	2.5	3.0	-0.1	0.4	17.3	0.2	3.6	0.5	-0.2	-0.2	17.8	0.0	3.4
CZ	90	0.0	0.7	5.7	1.3	1.7	0.7	1.7	5.2	3.4	0.3	0.7	18.9	3.3	8.4	0.2	0.0	0.0	19.1	3.3	8.3
DK	103	-2.3	-3.1	8.1	1.6	1.9	2.4	1.6	2.6	7.6	-0.4	-0.7	28.4	0.6	0.7	1.4	-0.5	-0.5	29.8	0.1	0.2
DE	100	2.2	2.7	7.6	1.3	1.3	1.4	1.6	3.1	4.1	0.1	0.3	23.1	5.2	7.4	0.8	0.0	0.0	23.9	5.1	7.4
EE	76	-0.7	-1.3	4.4	1.2	1.3	0.6	1.1	3.2	4.4	0.1	0.8	17.0	1.7	3.9	0.2	0.0	0.0	17.1	1.6	3.9
IE	74	2.7	1.1	6.0	2.0	1.9	0.7	1.0	2.3	6.0	-0.7	0.0	20.0	4.9	5.3	2.1	-1.1	-1.1	22.1	3.8	4.2
EL	162	-2.1	-1.9	6.6	1.6	2.1	0.6	0.3	0.8	4.1	-1.4	-1.1	27.4	-1.6	-0.1	1.2	-0.9	-0.9	28.5	-2.9	-1.1
ES	118	0.1	-0.8	5.9	1.9	1.9	1.0	1.1	2.9	4.0	-1.4	-0.8	23.2	1.7	3.2	2.2	-1.7	-1.7	25.4	0.1	1.5
FR	149	-1.1	-2.8	7.7	1.5	1.6	2.0	1.5	2.7	5.0	-0.1	-0.2	29.6	1.7	1.4	1.5	-0.4	-0.4	31.1	1.3	1.0
HR	108	-3.0	-3.9	5.7	2.4	2.7	0.4	0.4	1.1	3.7	-0.5	-0.4	27.3	-0.8	-0.4	0.5	-0.3	-0.3	21.2	-1.1	-0.7
IT	157	0.1	-1.9	6.1	0.9	1.2	1.8	0.5	1.1	3.7	-0.3	-0.2	27.3	1.3	0.2	0.9	-0.3	-0.3	28.2	0.9	-0.1
CY	95	-0.1	-0.1	3.0	0.5	0.6	0.3	0.4	1.8	7.3	-1.9	-1.2	20.0	-1.0	1.0	0.8	-0.6	-0.6	20.9	-1.6	0.4
LV	77	-2.3	-3.1	3.8	1.4	1.5	0.6	0.9	2.7	3.8	0.0	0.8	16.9	0.1	2.0	0.3	-0.2	-0.2	16.2	-0.1	1.8
LT	72	2.2	0.3	4.2	1.3	0.9	1.4	2.0	3.5	3.9	0.3	0.9	16.7	6.7	5.6	0.2	-0.1	-0.1	16.9	5.6	5.5
LU	94	3.3	4.1	4.6	0.4	0.8	1.6	1.2	3.3	3.9	0.1	0.2	18.8	6.1	8.4	0.7	-0.2	-0.2	19.5	4.9	8.1
HU	115	-1.9	-0.1	4.7	1.2	1.5	0.8	1.3	4.2	3.6	-0.5	-0.2	20.6	0.2	5.4	0.3	-0.1	-0.1	20.8	0.1	5.4
MT	96	0.2	3.2	5.7	2.5	3.0	1.1	1.5	2.6	5.9	-0.4	0.1	22.2	3.7	8.8	0.3	0.0	0.0	22.6	3.8	8.8
NL	69	1.5	0.9	7.2	1.4	1.6	4.1	2.0	3.5	5.2	-0.4	-0.5	23.4	4.5	5.5	2.0	-0.8	-0.8	25.4	3.7	4.7
AT	139	0.8	0.5	6.9	1.6	2.0	1.4	1.2	2.8	4.9	-0.1	0.0	27.1	3.5	5.3	0.8	-0.2	-0.2	27.9	3.4	5.1
PT	113	-1.4	-0.7	4.2	1.6	2.2	0.8	0.9	1.9	4.4	-0.6	-0.1	20.7	0.5	3.3	0.2	-0.1	-0.1	20.9	0.5	3.2
PL	138	1.0	-0.7	6.0	2.5	3.5	0.6	0.5	2.1	5.2	-1.2	-1.0	26.5	2.9	4.0	1.5	-0.9	-0.9	27.0	2.0	3.1
RO	82	0.2	-0.1	3.8	1.4	1.7	0.7	1.0	3.2	2.6	0.2	0.4	16.3	2.7	5.2	0.1	0.0	0.0	16.5	2.7	5.2
SI	118	2.6	3.6	5.7	1.7	1.9	1.4	1.4	2.7	5.3	0.1	0.8	24.2	5.6	8.9	0.6	-0.2	-0.2	24.7	5.6	8.7
SK	81	0.0	2.1	5.7	2.5	3.3	0.2	1.2	4.4	3.4	-0.6	-0.4	17.4	3.1	9.4	0.2	-0.1	-0.1	17.7	3.0	9.3
FI	129	0.7	0.1	7.8	1.1	1.3	2.4	2.3	3.3	6.1	0.2	0.3	29.2	4.4	5.0	1.9	-0.4	-0.4	31.2	3.9	4.5
SE	89	-1.4	-1.4	6.9	1.0	1.2	3.6	2.1	3.8	5.7	0.2	0.2	25.1	1.8	3.8	0.4	-0.4	-0.4	25.5	1.7	3.7
UK	77	0.8	0.7	7.8	1.5	2.0	1.2	0.5	1.1	5.1	0.0	0.0	21.8	2.8	3.9	0.3	-0.1	-0.1	22.1	2.7	3.8
NO	99	1.5	2.5	7.5	1.2	1.7	5.8	2.0	3.8	6.0	0.0	-0.1	29.2	4.7	7.9	0.4	0.0	0.0	29.6	4.7	7.9
EU	113	0.4	-0.2	6.9	1.4	1.6	1.6	1.2	2.4	4.7	-0.2	0.0	24.6	2.7	3.8	1.1	-0.4	-0.4	25.6	2.3	3.4
EA	123	0.8	0.0	7.0	1.3	1.5	1.7	1.3	2.6	4.5	-0.3	-0.1	25.5	3.1	4.0	1.3	-0.5	-0.4	26.8	2.6	3.5

(1) SK: the figures 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 until 2060.  
 (2) The health care and long-term care EU averages are weighted according to GDP. The level of health care and long-term care expenditures in 2013 is the first year of projected expenditures based on the latest available data. Health care expenditure excludes long-term nursing care.

Source: Commission services, EPC.



# Part I

Underlying demographic and macroeconomic assumptions



# 1. DEMOGRAPHIC ASSUMPTIONS

## 1.1. POPULATION PROJECTION

The 2015 long term budgetary projections are based on EUROSTAT's population projections (EUROPOP2013).<sup>(12)</sup>

However, projecting demographic and economic developments over the long run is surrounded by a high degree of uncertainty.<sup>(13)</sup>

As was the case with the previous EUROPOP2010 and EUROPOP2008 demographic projections, the EUROPOP2013 was made using a 'convergence' approach.<sup>(14)</sup> This means that the key demographic determinants are assumed to converge over the very long-term. Setting the year of convergence very far into the future has the advantage of taking due account of recent trends and developments in the beginning of the period, while at the same time assuming a degree of convergence over the very long-term in terms of demographic drivers.<sup>(15)</sup>

These demographic determinants are: (i) the fertility rate; (ii) the mortality rate and (iii) the level of net migration. As far as fertility and mortality are concerned, it is assumed that they converge to that of the 'forerunners'.<sup>(16)</sup>

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<sup>(12)</sup> Eurostat's population projection (EUROPOP2013) was published on 28 March 2014.

<sup>(13)</sup> Ireland has reservations around the population projections used in this exercise, where a net negative outward migration out to 2037 is estimated by the Eurostat model for migration flows. Based on assumptions about future cyclicity of net migration, Ireland expects that net migration will close (and change sign) significantly more rapidly than is envisaged under the EUROPOP2013 projections. Eurostat has adopted for Ireland the same methodology used for other countries. Whilst an exception for the basis of population projections for Ireland was endorsed by the EPC on April 1st 2015 for future t+10 projection exercises (up to 2025), the impact of this agreement is not reflected in AR15 projections.

<sup>(14)</sup> A description of the EUROPOP2013 projections is forthcoming in 2015. The dataset can be found on <http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/database>.

<sup>(15)</sup> The assumptions do not necessarily fully reflect the views of the AWG neither as a group nor of individual Member States or national statistical offices. The underlying data are official data produced by national statistical institutions.

<sup>(16)</sup> For further detail on demographic assumptions, see the Economic Policy Committee and the European Commission (2005): "The 2005 projections of age-related

### 1.1.1. Fertility rates

#### Past trends

In the preceding decades fertility rates declined sharply in the EU Member States after the post-war "baby boom" peak above 2.5 in the second half of the 1960s, to below the natural replacement level of 2.1 (see Graph I.1.2).

Total fertility rates (TFR<sup>(17)</sup>) have increased since 2000 on average in the EU as a whole, although this trend increase has reversed into a decline since 2010. Fertility rates have nevertheless increased between 2000 and 2012 in almost all Member States, with total fertility rates reaching above 1.8 in Ireland, France, Finland, Sweden and the UK. By contrast, fertility rates have decreased in Cyprus, Luxembourg, Malta Poland and Portugal.

#### The EUROPOP2013 projection

The EUROPOP2013 projection assumes a process of convergence in the fertility rates across Member States to that of the forerunners over the very long-term. The total fertility rate (TFR) is projected to rise from 1.59 in 2013 to 1.68 by 2030 and further to 1.76 by 2060 for the EU as a whole. In the euro area, a similar increase is projected, from 1.56 in 2013 to 1.72 in 2060.

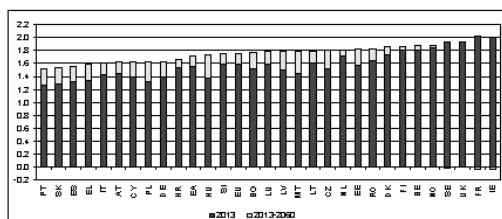
The fertility rate is projected to increase over the projection period in nearly all Member States, with the exception of Ireland, France and Sweden (the forerunners, with values above 1.9) where it is expected to decrease, whereas in the UK it is projected to remain stable. Consequently, fertility rates in all countries are expected to remain below the natural replacement rate of 2.1 in the period to 2060 (see Graph I.1.1).

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expenditure (2004–50) for the EU-25 Member States: underlying assumptions and projection methodologies", European Economy, Special Reports 4/2005.

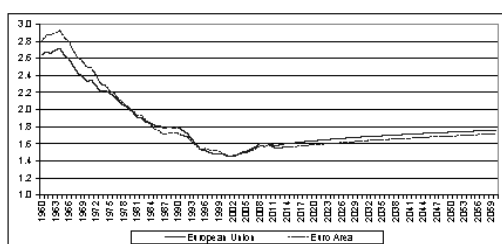
<sup>(17)</sup> Fertility rates are reflected by the average number of children a woman would have, should she at each bearing age have the fertility rates of the year under review (this number is obtained by summing the fertility rates by age and is called the Total Fertility Rate, or TFR).

Graph I.1.1: Projection of total fertility rates in EUROPOP2013 (number of births per woman)



Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.2: Total fertility rates



Source: Commission services, Eurostat, EUROPOP2013.

### 1.1.2. Life expectancy

#### Past trends

Life expectancy has been increasing in most developed countries worldwide over very long time periods. Since 1960, there have been significant increases in life expectancy at birth in all Member States, (see Graph I.1.3 and Graph I.1.4), especially for women. In euro-area Member States, the increase is even more pronounced where the life expectancy at birth increased with up to three months each year.

The difference between female and male life expectancies has diminished since 1990 in the EU due to faster improvements in life expectancy for males relative to females.

Official projections generally assume that gains in life expectancy at birth will slow down compared with historical trends. This is because mortality rates at younger ages are already very low and future gains in life expectancy would require improvements in mortality rates at older ages (which statistically have a smaller impact on life expectancy at birth). On the other hand, the wide range of life expectancies across EU Member

States, and also compared with other countries, points to considerable scope for future gains. In 2012, life expectancy at birth for females ranged from 77.9 in Bulgaria to 85.5 years in Spain, and for males ranging from 68.4 in Lithuania to 79.9 in Sweden.

However, regarding trends over the very long term, there is no consensus among demographers, e.g. whether there is a natural biological limit to longevity, the impact of future medical breakthroughs, long-term impact of public health programmes and societal behaviour such as reduction of smoking rates or increased prevalence of obesity. Past population projections from official sources have, however, generally underestimated the gains in life expectancy at birth as it was difficult to imagine that the reduction of mortality would continue at the same pace in the long run. Some commentators have argued that as a consequence, governments may have underestimated the potential budgetary impact of ageing populations.

#### The EUROPOP2013 projection

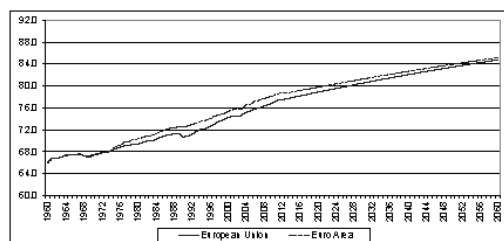
The EUROPOP2013 projection shows large increases in life expectancy at birth being sustained during the projection period, albeit with a considerable degree of diversity across Member States reflecting the convergence assumption.

In the EU, life expectancy at birth for males is expected to increase by 7.1 years over the projection period, from 77.6 in 2013 to 84.7 in 2060. For females, life expectancy at birth is projected to increase by 6.0 years for females, from 83.1 in 2013 to 89.1 in 2060, implying a convergence of life expectancy between males and females. The largest increases in life expectancies at birth, for both males and females, are projected to take place in the Member States with the lowest life expectancies in 2013. Life expectancies for males in 2013 are the lowest in Bulgaria, Estonia, Latvia, Lithuania, Hungary and Romania, ranging between 69 and 72 years. Life expectancies increase more than 10 years up to 2060 for these countries, indicating that some catching-up takes place over the projection period. For females, the largest gains in life expectancies at birth of 8 years or more are projected in Bulgaria, Latvia, Lithuania, Hungary, Romania and Slovakia. In all of these countries, female life expectancies in 2013

are below 80 years (see Graph I.1.5 and Graph I.1.6).

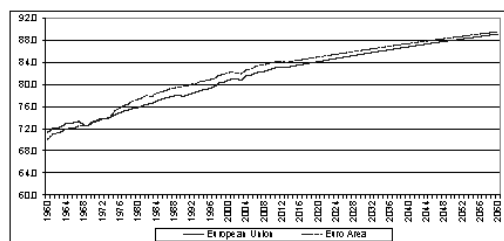
In the EU as a whole, life expectancy at age 65 is projected to increase by 4.8 years for males and by 4.6 years for females over the projection period 2013-2060. In 2060, life expectancy at age 65 will reach 22.4 years for males and 25.6 for females and the projected difference (3.2 years) is smaller than the 4.3 year difference in life expectancy at birth. In 2060, the highest life expectancy at age 65 is expected in France for both males (23 years) and females (26.6 years), while the lowest is expected in Bulgaria for both males (20.3 years) and females (23.4 years) (see Graph I.1.7 and Graph I.1.8).

Graph I.1.3: Life expectancy at birth, men (in years)



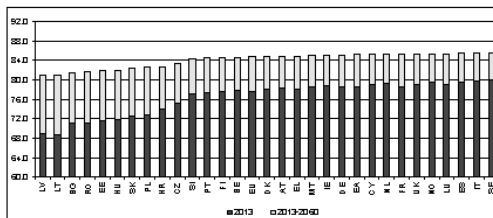
Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.4: Life expectancy at birth, women (in years)



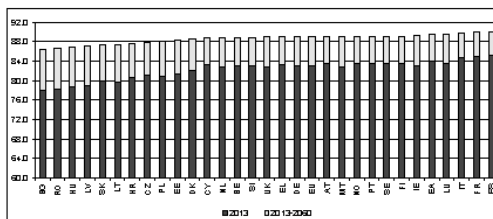
Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.5: Projection of life expectancy at birth in EUROPOP2013, men (in years)



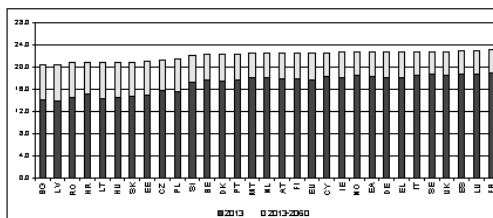
Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.6: Projection of life expectancy at birth in EUROPOP2013, women (in years)



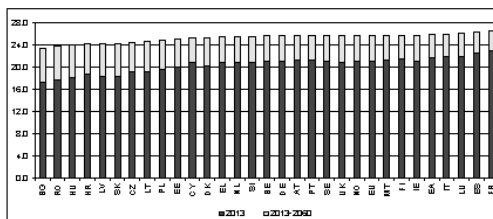
Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.7: Projection of life expectancy at 65 in EUROPOP2013, men (in years)



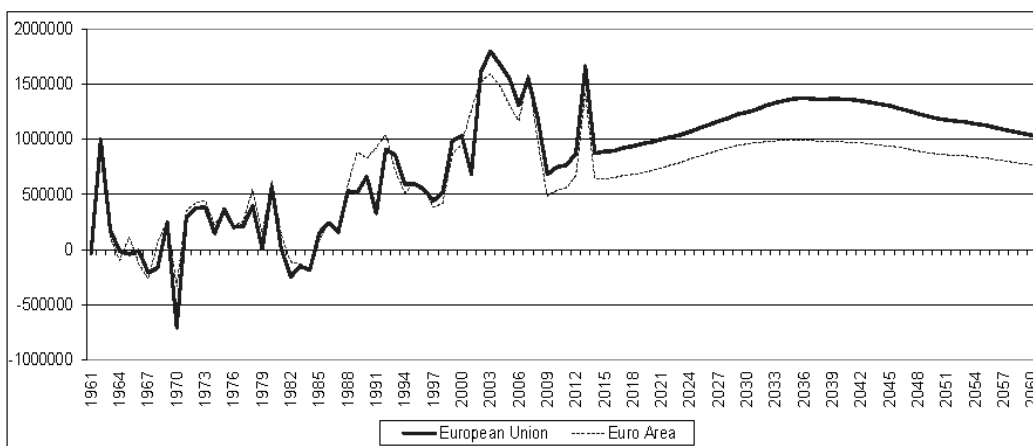
Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.8: Projection of life expectancy at 65 in EUROPOP2013, women (in years)



Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.9: Net migration flows 1961-2060



Source: Commission services, Eurostat, EUROPOP2013.

### 1.1.3. Net migration flows

#### Past trends and driving forces

European countries have gradually become a destination for migrants, starting in the 1950s in countries with post-war labour recruitment needs and with colonial past (see Graph I.1.9). Overall, the average annual net entries for the EU more than tripled from around 198,000 people per year during the 1980s to around 750,000 people per year during the 1990s. High clandestine migration also marks the decade of the 1990s.

In the beginning of the 2000's the net migration flows to the EU countries increased markedly reaching 1.8 million in 2003 and staying at levels above or close to 1.5 million until the onset of the financial and economic crisis, when net migration in the EU dropped sharply to around 700,000 in the years 2009-2011. In the last two years net migration flows have again increased, reaching pre-crisis levels (1.7 million) in 2013.

Net migration flows <sup>(18)</sup> per country are characterised by high variability. Traditionally,

<sup>(18)</sup> Due to difficulties in having for each Member State good statistics of the migration flows, net migration is measured as the difference between the total population on 31 December and 1 January for a given calendar year, minus the difference between births and deaths (or natural increase). The approach is different from that of subtracting recorded emigration flows from immigration flows. Notably, when operating like that, the "net migration" not

Germany, France and the UK record the largest number of arrivals in the EU, but in the last decade there was first a rise of migration flows to Italy, Spain and Ireland that switched from countries of origin to destination countries. Since 2009 the situation has changed again, with significant outflows from Spain and Ireland.

#### The EUROPOP 2013 projection

Net inflows for the EU as a whole are projected to increase from about 874,000 people in 2014 to 1,364,000 by 2040 and thereafter declining to 1,037,000 people by 2060 (an annual inflow of 0.2% of the EU population).

only records errors due to the difficulty of registering the migration moves, it also includes all possible errors and adjustments in other demographic variables.

**Box 1.1.1: Net migration assumptions in the EUROPOP2013 projections**

Like the assumptions on fertility and mortality, the (net) migration assumptions are the combination of three components: short-term (nowcasting), medium-term (trends) and long-term assumptions (convergence hypothesis).

The nowcasting method has been applied to produce estimates for the year 2013 only and – whenever possible – it has made direct use of inputs from the Member States. It has also been used to introduce ad-hoc corrections for countries where the impact of the latest population census had not yet been fully incorporated in the demographic figures. Twelve countries (Belgium, the Czech Republic, Denmark, Germany, Spain, Italy, Lithuania, Malta, Portugal, Finland, Sweden and the United Kingdom) have provided Eurostat with migration estimates for the entire year 2013: these values have been directly included in the projections. Some of those countries (namely Denmark, Spain, Finland and Sweden) had provided also the population broken down by single age and sex on 1 January 2014. In these countries the net migration figure for 2013 was used only for the sake of demographic balance in 2013.

For other five countries (France, Hungary, the Netherlands, Austria and Norway), the total net migration was derivable indirectly, as a residual from the difference between the base population in 2014 and the (nowcasted) natural change in 2013. Therefore, data on total net migration for 2013 were available - directly or indirectly - for 17 countries.

Of the remaining 12 countries, only Slovenia and Slovakia had provided some migration data referring to 2013. For these two countries, the total immigration and total emigration for 2013 have been estimated with a proportional rule. For the remaining 10 countries for which no information on migration was available for 2013 (Bulgaria, Estonia, Ireland, Greece, Croatia, Cyprus, Latvia, Luxembourg, Poland and Romania), migration assumptions for 2013 have been taken from the trend component.

The trend component has been derived from statistical modelling, with demanding data

requirements<sup>(1)</sup>. Migration flows were measured in terms of *net migration*<sup>(2)</sup>, computed as a residual from the annual demographic balance; by doing so, time series were usually available starting from the year 1960.

Due to the high variability over time of net migration and its dependency from national economic and political circumstances, there has been no attempt to identify a common data generator process for migration. By using an optimal automatic selection method, an ARIMA model has been specified for each country and used for the extrapolation.

The total net migration flows based on the convergence assumption are computed following the same logic applied in the previous EUROPOP2010 exercise. The convergence model assumes net migration to converge to zero in the very far future (the convergence year)<sup>(3)</sup>. Intermediate values for total net migration are obtained by means of a double linear interpolation between net migration levels in the last observed year and zero in the convergence year, the intermediate point being obtained as an average of the last 10 years. In case a country has a negative intermediate point, the convergence is brought forward to 2035, in order to avoid negative net migration for a very long period. Such double linear interpolation, firstly between the last observed year and the intermediate point and then between that same intermediate point and the convergence year, is implemented to reduce the impact of the high variability of recent migration levels on the projected values.

The preliminary time series of projected total net migration is then computed by a weighted average

- (1) Unfortunately, migration is well known to be the demographic component which is most affected by lacks in data availability and quality.
- (2) Although Eurostat is regularly collecting immigration and emigration data from the EU Member States, such a dataset is still at an early stage and it does not allow an analysis of long-term trends.
- (3) It should be noted that zero net migration does not imply zero migration but only equality of total immigration and emigration levels, and differences in the age and sex patterns of immigrants and emigrants may still affect the population structure.

*(Continued on the next page)*

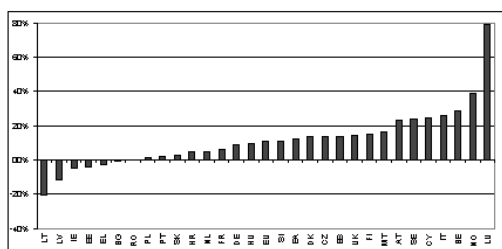
Box (continued)

of the three components: nowcasting, trends and convergence. In summary, the total net migration is taken from nowcasting for the very first year of projections, from the trend component for the following five years, and from the convergence for the long term. For the medium term, the assumptions are a mix of trend and convergence components.

This set of assumptions is further modified to take into account the demographic changes going on in the countries. It is assumed that part of the decline in the (natural) working-age population size will be offset by immigration. An (additional) immigration flow is then computed in a proportional fashion to the shrinkage of the population in working ages. By doing so, immigration assumptions are – to some extent – explicitly driven by a demographic factor. This additional quantity of immigration is finally added to the net migration previously obtained to complete the migration assumptions.

The cumulated net migration to the EU over the entire projection period is 55 million (about 11% of the EU population in 2013, see Graph I.1.10), of which the bulk is concentrated in the euro area (40 million). Net migration flows are projected to be concentrated to a few destination countries: Italy (15.5 million cumulated up to 2060), the UK (9.2 million), Germany (7.0 million) and Spain (6.5 million). According to the assumptions, the change of Spain and Italy from origin in the past to destination countries would be confirmed in the coming decades. For countries that currently experience a net outflow (BG, CZ, EE, IE, EL, ES, HR, CY, LV, LT, PL, PT and RO), this is projected to taper off or reverse in the coming decades.

Graph I.1.10: Projection of net migration flows in EUROPOP2013 over the period 2013-2060 cumulated as a percentage of the population in 2013



Source: Commission services, Eurostat, EUROPOP2013

#### 1.1.4. Overall results of the EUROPOP2013 population projection

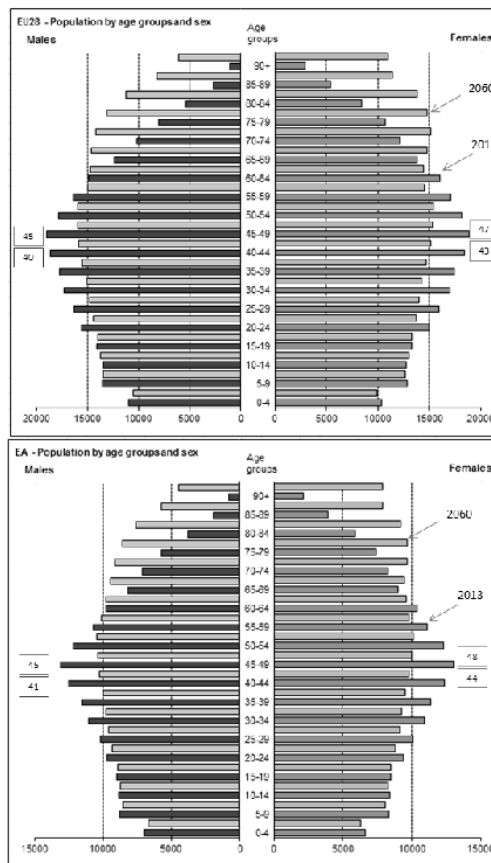
Due to the dynamics in fertility, life expectancy and migration the age structure of the EU population will change strongly in the coming decades. The overall size of the population is projected to be slightly larger by 2060 but much older than it is now. The EU population is projected to increase (from 507 million in 2013) up to 2050 by almost 5%, when it will peak (at 526 million) and will thereafter decline slowly (to 523 million in 2060).

There are wide differences in population trends until 2060 across Member States. While the EU population as a whole would be larger in 2060 compared to 2013, decreases of the total population are projected for about half of the EU Member States (BG, DE, EE, EL, ES, HR, LV, LT, HU, PL, PT, RO, SI and SK). For the other Member States (BE, CZ, DK, IE, FR, IT, CY, LU, MT, NL, AT, FI, SE and UK) an increase is projected. The strongest population growth is expected by EUROSTAT to be in Luxembourg (+111%) due to the projected very high net-migration, Belgium (+38%), Sweden (+36%), Cyprus (30%) the United Kingdom (+25%). The sharpest decline is expected in Lithuania (-38%), Latvia (-31%), Bulgaria (-25%), Greece (-23%) and Portugal (-22%) (see Graph I.1.12).

In 2013, the Member States with the largest population were: Germany (81 million), France (66 million), the United Kingdom (64 million), Italy (60 million) and Spain (47 million). According to Eurostat, in 2060, the UK would become the most populous EU country (80 million), followed by France (76 million), Germany (71 million), Italy (66 million) and Spain (46 million).

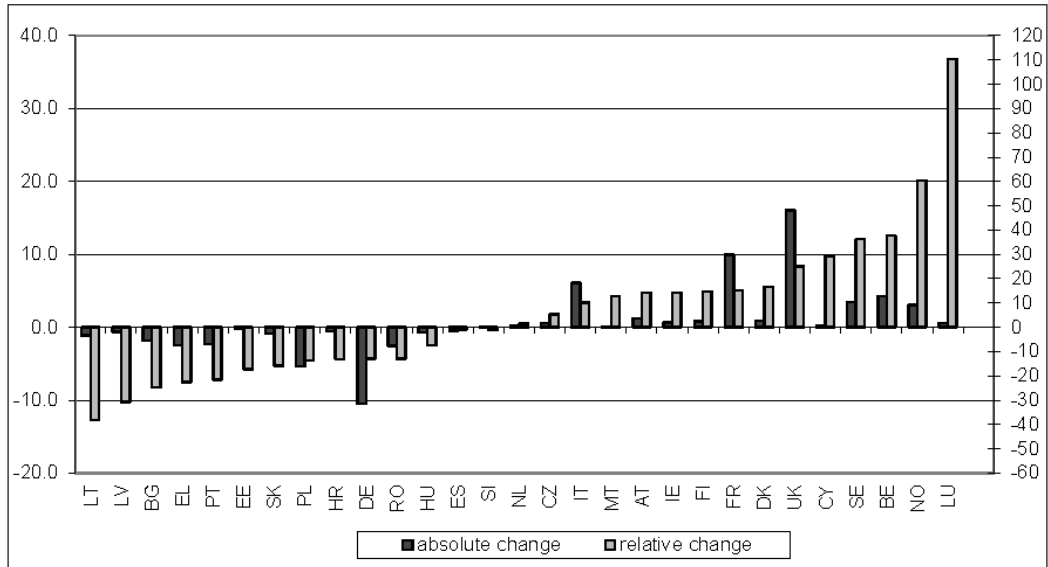
The population pyramids presented in Graph I.1.11 show that the age structure of the EU population is projected to change dramatically. In 2013 the median age for males and females is 40 and 43 years old respectively. In 2060, it is projected to rise to 45 and 47, respectively, as the number of elderly people is projected to account for an increasing share of the population, due to the combination of the numerous cohorts born in the 1950's and 1960's and the continuing projected gains in life expectancy. At the same time, the base of the age pyramid becomes smaller due to below replacement fertility rates in the last decades. As a consequence, the shape of the age-pyramids gradually changes towards more evenly sized pillars. A similar development is projected for the euro area.

Graph I.1.11: Population pyramids (in thousands), EU and EA, in 2013 and 2060



Source: Commission services, Eurostat, EUPOP2013.

Graph I.1.12: Projection of the total population (percentage and absolute change for the period 2013-2060)



Source: Commission services, Eurostat, EUROPOP2013.



Table I.1.1: Peaks and troughs for the size of the total population and the working-age population

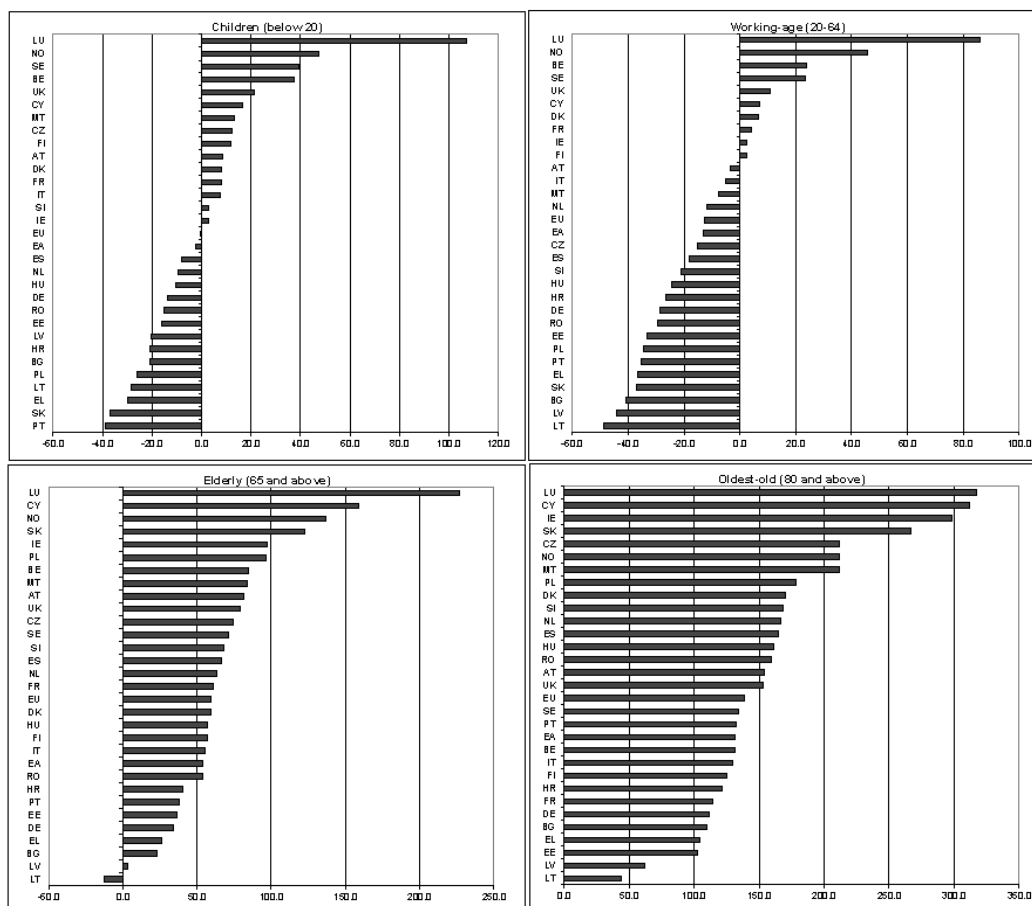
	Total population (in millions)						Working-age population 20-64 (in millions)							
	2013 - value	Peak value	year	% change 2013 - peak	Trough value	year	% change peak - trough	2013 - value	Peak value	year	% change 2013 - peak	Trough value	year	% change peak - trough
BE	11.2	15.4	2060	37.7%	11.2	2013	-27.4%	6.7	8.3	2060	23.9%	6.7	2013	-19.3%
BG	7.3	7.3	2013	0.0%	5.5	2060	-24.8%	4.5	4.5	2013	0.0%	2.7	2060	-40.8%
CZ	10.5	11.1	2055	5.5%	10.5	2013	-5.2%	6.7	6.7	2013	0.0%	5.6	2058	-15.6%
DK	5.6	6.5	2060	16.5%	5.6	2013	-14.2%	3.3	3.5	2055	7.3%	3.3	2013	-6.8%
DE	81.3	81.3	2013	0.0%	70.8	2060	-12.9%	49.7	49.7	2013	0.0%	35.4	2060	-28.8%
EE	1.3	1.3	2013	0.0%	1.1	2060	-17.2%	0.8	0.8	2013	0.0%	0.5	2058	-33.8%
IE	4.6	5.3	2060	14.3%	4.6	2029	-13.2%	2.7	2.8	2060	2.8%	2.5	2047	-12.1%
EL	11.0	11.0	2013	0.0%	8.6	2060	-22.5%	6.6	6.6	2013	0.0%	4.2	2060	-36.4%
ES	46.6	46.6	2013	0.0%	44.4	2034	-4.7%	29.0	29.0	2013	0.0%	22.4	2049	-22.9%
FR	66.7	75.7	2060	15.1%	66.7	2013	-13.1%	37.9	39.4	2060	4.2%	37.4	2038	-6.2%
HR	4.3	4.3	2013	0.0%	3.7	2060	-13.1%	2.6	2.6	2013	0.0%	1.9	2060	-26.6%
IT	60.2	67.1	2049	11.4%	60.2	2013	-10.2%	36.1	36.7	2024	1.5%	34.3	2060	-6.6%
CY	0.9	1.1	2060	29.5%	0.9	2013	-22.8%	0.6	0.6	2060	6.9%	0.5	2029	-8.7%
LV	2.0	2.0	2013	0.0%	1.4	2060	-30.7%	1.2	1.2	2013	0.0%	0.7	2058	-44.5%
LT	3.0	3.0	2013	0.0%	1.8	2060	-38.1%	1.8	1.8	2013	0.0%	0.9	2058	-49.0%
LU	0.5	1.1	2060	110.5%	0.5	2013	-62.5%	0.3	0.6	2060	85.8%	0.3	2013	-46.2%
HU	9.9	9.9	2013	0.0%	9.2	2060	-7.5%	6.2	6.2	2013	0.0%	4.7	2060	-24.5%
MT	0.4	0.5	2060	12.7%	0.4	2013	-11.3%	0.3	0.3	2013	0.0%	0.2	2060	-7.5%
NL	16.8	17.7	2037	5.2%	16.8	2013	-4.9%	10.1	10.1	2013	0.0%	8.9	2060	-11.7%
AT	8.5	9.7	2050	16.0%	8.5	2013	-13.0%	5.2	5.4	2021	2.9%	5.1	2060	-6.2%
PL	38.5	38.5	2013	0.0%	33.2	2060	-13.8%	25.0	25.0	2013	0.0%	16.4	2060	-34.5%
PT	10.5	10.5	2013	0.0%	8.2	2060	-21.6%	6.3	6.3	2013	0.0%	4.1	2060	-35.4%
RO	20.0	20.0	2013	0.0%	17.4	2060	-12.9%	12.5	12.5	2013	0.0%	8.8	2060	-29.6%
SI	2.1	2.1	2024	1.6%	2.0	2060	-2.5%	1.3	1.3	2013	0.0%	1.0	2056	-21.4%
SK	5.4	5.4	2017	0.1%	4.6	2060	-15.9%	3.6	3.6	2013	0.0%	2.2	2060	-37.2%
FI	5.4	6.2	2060	14.8%	5.4	2013	-12.9%	3.2	3.3	2047	3.3%	3.1	2023	-4.8%
SE	9.6	13.1	2060	36.3%	9.6	2013	-26.6%	5.6	6.9	2060	23.5%	5.6	2013	-19.0%
UK	64.1	80.1	2060	25.0%	64.1	2013	-20.0%	37.8	41.8	2060	10.7%	37.8	2013	-9.8%
NO	5.1	8.2	2060	60.5%	5.1	2013	-37.7%	3.0	4.4	2060	46.6%	3.0	2013	-31.3%
EU	507.2	525.6	2048	3.6%	507.2	2013	-3.5%	307.6	307.6	2013	0.0%	268.7	2060	-12.6%
EA	334.5	346.2	2045	3.2%	334.5	2013	-3.1%	201.7	201.7	2013	0.0%	175.5	2058	-13.0%

Source: Commission services, Eurostat, EUROPOP2013.

The proportion of young people (aged 0-19) is projected to remain fairly constant by 2060 in the EU28 and the euro area (around 20%), while those aged 20-64 will become a substantially smaller share, declining from 61% to 51%. Those aged 65 and over will become a much larger share (rising from 18% to 28% of the population), and those aged 80 and over (rising from 5% to 12%) will almost become as numerous as the young population in 2060 (see Graph I.1.13 and Graph I.1.15).

As a result of these different trends among age-groups, the demographic old-age dependency ratio (people aged 65 or above relative to those aged 15-64) is projected to increase from 27.8% to 50.1% in the EU as a whole over the projection period. This implies that the EU would move from having four working-age people for every person aged over 65 years to only two working-age persons. For the EU and the EA the working-age population is projected to shrink starting from the beginning of the projection period (2013) by around 13% during the projection period (see Table I.1.1).

Graph I.1.13: Projected change of main population groups (in % change over the period 2013-2060)

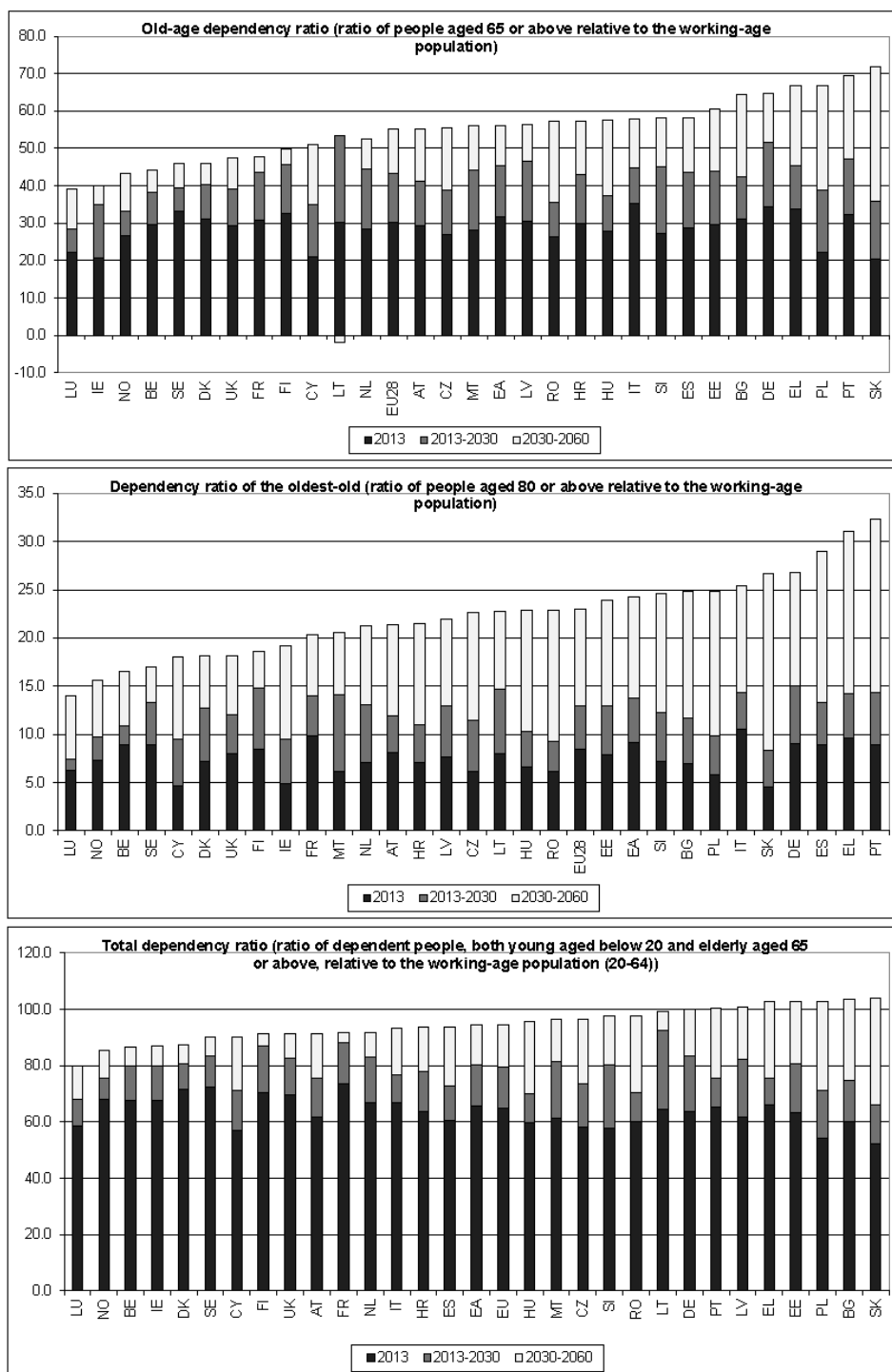


Source: Commission services, Eurostat, EUROPOP2013.

The increase in the total age-dependency ratio (people aged below 20 and aged 65 and above over the population aged 20-64) is projected to be even larger, rising from 64.9% to 94.5%.<sup>(19)</sup> The difference is noticeable among individual EU Member States. A relatively small increase in the total age-dependency ratio (less than 20 p.p.) is projected in Belgium, Denmark, Ireland, France, and Sweden, while in Bulgaria, Poland, Slovenia and Slovakia an increase of 40 percentage points or more is expected by 2060 (see Graph I.1.14).

<sup>(19)</sup> The increase in the total age-dependency ratio defined as people aged 14 and below and people aged 65 and above over the population aged 15-64 is projected to rise from 51.4% to 76.6%.

Graph I.1.14: Dependency ratios (in percentage)



Source: Commission services, Eurostat, EUROPOP2013.

### 1.1.5. Comparison with the 2012 Ageing Report

Total fertility rates in the EU are marginally higher in the EUROPOP2013 projection compared with the EUROPOP2010 projection, particularly at the end of the projection period (up by 0.06 in 2060). This pattern is especially the case in CZ, DE, EE, LV, LT, LU, HU, MT, RO and SI (higher by about 0.1 or more in 2060). Conversely, the total fertility rate is projected to decline by 2060 compared with EUROPOP2010 in IE, EL, ES, NL and SK (Table I.1.2).

In the EU, life expectancy at birth is expected to be higher in EUROPOP2013 than in the previous projection, particularly for men and at the beginning of the projection period (2013). The largest increases in 2013 (of 0.5 years or more) for males occurred in DK, EE, IE, IT, LU, HU, MT, SI and FI. The increase in life expectancy at birth for men is expected to wind down at the end of the projection period, with rises of only 0.1 for men (and unchanged for women).

With the notable exception of Italy, net migration inflows into the EU as a whole, particularly in some MSs (DE and ES), are lower in the EUROPOP2013 projection compared with EUROPOP2010 in 2013 by about 1.1 million people. <sup>(20)</sup>

Based on the set of all demographic assumptions, in the EU the population in 2013 is estimated to be 3.2 million people smaller compared with the EUROPOP2010 projection. By 2030, the population is projected to be about 7.9 million people smaller and by 2060 about 2.6 million people larger (+0.5%). The higher population in 2060 mostly reflects positive developments in the working-age population.

The increase in the old-age dependency ratio (persons aged over 64 in relation to persons aged 15-64) is lower in the EUROPOP2013 projection compared with EUROPOP2010 (Table I.1.3). <sup>(21)</sup>

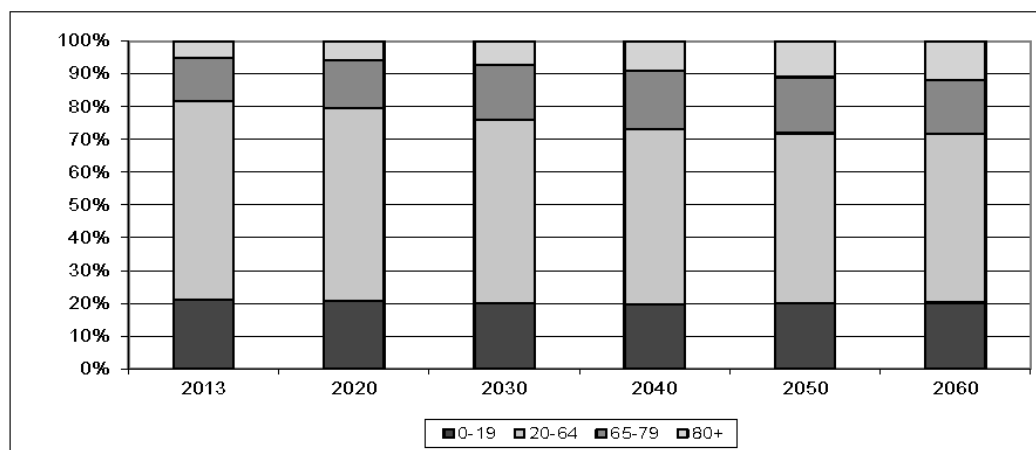
<sup>(20)</sup> For DE the reduction in net migration in 2013 is of technical nature. It is caused by the negative impact of the most recent census on the 2013 population. This impact is attributed to net migration according to the Eurostat methodology (see Box I.1.1 above).

<sup>(21)</sup> The increase in the old age dependency ratio is projected to be higher in 4 countries (EL, PT, SK and UK). However, due to changes in the projected population structure over

The increase in the total dependency ratio (population under 15 and over 64 in relation to the population aged 15-64) is also lower in the current projection exercise compared with the previous one.

time, the average old age dependency ratio in 2013-2060 is projected to be higher in 12 countries (EE, IE, EL, ES, CY, LV, LT, NL, PT, SI, SK and UK).

Graph I.1.15: Projection of changes in the structure of the EU population by main age groups (in %)



Source: Commission services, Eurostat, EUROPOP2013.

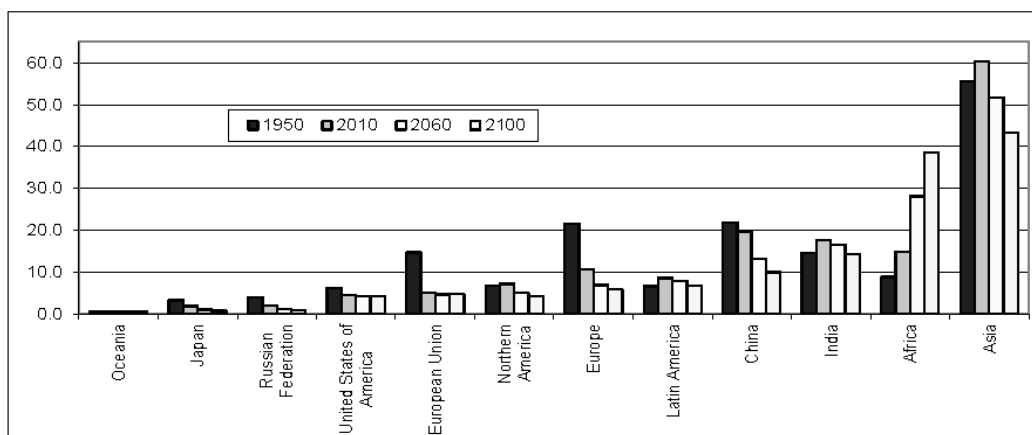


Table I.1.3: Comparison of EUROPOP2013 and EUROPOP2010 projections (total population, demographic dependency ratio and total dependency ratio)

	Total population (millions)			Demographic dependency ratio (65+/(15-64))			Total dependency ratio			Projection exercise 2015 (EUROPOP2013)			Projection exercise 2015 - Projection exercise 2012 (65+/(15-64))			Total dependency ratio			
	2013	2060	% change	2013	2060	p.p change	2013	2060	p.p change	2013	2060	p.p change	2013	2060	p.p change	2013	2060	p.p change	
BE	11.2	15.4	37.7	27.1	39.9	12.9	53.1	68.4	15.2	0.1	2.0	17.0	-0.3	-3.9	-3.6	-0.3	-3.5	-3.2	BE
BG	7.3	5.5	-24.8	28.9	58.4	29.6	49.3	84.4	35.1	-0.2	-0.1	1.5	1.2	-1.5	-2.8	0.3	0.3	0.0	BG
CZ	10.5	11.1	5.4	25.1	50.1	24.9	47.1	77.3	30.3	-0.1	0.6	7.1	0.5	-4.8	-5.3	0.5	-1.8	-2.4	CZ
DK	5.6	6.5	16.5	27.9	41.8	13.9	54.7	69.8	15.0	0.0	0.5	8.0	0.0	-1.9	-2.0	0.0	-0.4	-1.1	DK
DE	81.3	70.8	-12.9	31.8	59.2	27.4	51.4	83.2	31.8	0.2	4.7	5.6	0.0	-0.7	-0.7	0.0	0.6	0.7	DE
EE	1.3	1.1	-17.2	27.5	54.5	26.9	51.4	82.2	30.8	0.0	-0.1	4.5	1.3	-0.8	-2.1	1.1	0.7	-0.5	EE
IE	4.6	5.3	14.3	18.9	35.6	16.7	52.2	66.4	14.2	0.0	-1.3	-29.5	-0.2	-0.9	-0.8	-1.1	-0.1	1.0	IE
EL	11.0	8.6	-22.5	31.2	60.8	29.7	53.6	84.5	30.9	-0.4	-2.7	-20.6	0.9	4.3	3.4	1.1	3.5	2.5	EL
ES	46.6	46.1	-1.0	26.8	53.2	26.4	49.5	77.0	27.4	0.0	-6.1	-13.0	0.4	-3.1	-3.5	0.2	-2.1	-2.3	ES
FR	65.7	75.7	15.1	27.9	42.9	14.9	57.1	72.6	15.6	-0.2	1.9	3.2	0.0	-3.7	-3.7	0.2	-2.7	-2.8	FR
HR	4.3	3.7	-13.1	27.3	52.3	25.0	49.5	77.0	27.4	..	..	..	..	..	..	..	..	..	HR
IT	60.2	66.3	10.1	32.8	53.0	20.3	54.4	76.9	22.5	-1.2	1.4	4.2	0.4	-3.6	-4.0	0.5	-2.1	-2.5	IT
CY	0.8	1.1	29.5	19.1	46.5	27.4	42.4	73.3	30.9	0.0	0.0	-6.4	-1.4	-1.3	0.1	-2.2	-0.3	1.9	CY
LV	2.0	1.4	-30.7	28.3	50.3	22.0	50.2	78.5	29.3	-0.2	-0.3	-3.3	2.5	-17.6	-20.0	3.4	-11.0	-14.3	LV
LT	3.0	1.8	-38.1	27.4	45.7	18.3	48.3	77.1	27.8	-0.3	-0.8	-16.1	3.5	-11.0	-14.5	3.4	-4.6	-8.0	LT
LU	0.5	1.1	110.5	20.3	35.6	15.2	44.9	63.1	18.1	0.0	0.4	75.7	-0.6	-9.6	-9.0	-1.1	-8.0	-6.9	LU
HU	9.9	9.2	-7.5	25.4	52.6	27.1	46.6	76.3	31.7	-0.1	0.3	3.9	0.1	-5.5	-5.6	-0.1	-2.1	-1.9	HU
MT	0.4	0.5	12.7	25.8	50.9	25.1	47.1	76.4	31.3	0.0	0.1	19.3	0.5	-5.0	-5.5	-0.4	-0.9	-0.5	MT
NL	16.8	17.1	1.6	25.9	47.8	21.9	51.8	74.4	22.6	0.0	0.0	0.4	0.1	0.3	0.2	-0.1	-0.2	-0.1	NL
AT	8.5	9.7	14.3	27.0	50.5	23.5	48.3	75.1	26.8	0.0	0.8	9.4	-0.1	-0.3	-0.2	0.0	0.7	0.7	AT
PL	36.5	33.2	-9.0	20.5	61.0	40.5	41.9	85.0	43.1	0.2	0.6	1.0	0.0	-3.8	-3.8	0.0	-2.3	-2.3	PL
PT	10.5	8.2	-21.6	29.8	63.9	34.0	52.1	84.8	32.7	-0.2	-2.1	-17.1	0.0	6.6	5.0	1.6	6.1	4.5	PT
RO	20.0	17.4	-12.9	24.1	51.8	27.7	47.1	79.1	32.0	-1.3	0.2	7.0	2.3	-13.0	-15.3	3.6	-7.2	-10.9	RO
SI	2.1	2.0	-1.0	25.4	52.5	27.2	48.7	78.8	32.1	0.0	0.0	0.8	0.5	-4.9	-5.5	0.7	-3.6	-4.3	SI
SK	5.4	4.6	-15.8	18.7	66.1	47.4	40.1	87.6	47.5	-0.1	-0.5	-8.6	0.4	4.1	3.7	0.6	2.9	2.3	SK
FI	5.4	6.2	14.8	29.6	45.1	15.5	55.0	73.1	18.0	0.0	0.5	9.2	0.0	-2.5	-2.4	-0.2	-2.6	-2.4	FI
SE	9.6	13.1	36.3	30.2	41.5	11.2	56.8	71.3	14.5	0.0	1.5	16.3	-0.1	-4.8	-4.7	-0.1	-4.4	-4.3	SE
UK	64.1	60.1	-25.0	26.6	42.8	16.1	53.7	72.4	18.6	0.6	1.0	0.7	-0.3	0.6	0.9	-0.2	0.9	1.0	UK
NO	5.1	8.2	60.5	23.9	39.0	15.1	51.7	67.6	15.9	0.0	1.6	30.3	-0.3	-4.1	-3.7	-0.9	-5.0	-4.1	NO
EU	507.2	522.8	3.1	27.8	50.1	22.3	51.4	76.6	25.2	-3.2	2.6	1.1	0.3	-2.4	-2.7	0.3	-1.3	-1.6	EU
EA	337.5	345.0	1.6	29.3	51.1	21.8	52.6	78.9	24.2	-2.3	-2.1	0.0	0.2	-2.2	-2.4	0.2	-1.2	-1.4	EA

Source: Commission services, Eurostat, EUROPOP2013.

Graph I.1.16: Population of main geographic areas and selected countries as percentage of the world population, 1950, 2010, 2060, 2100



Source: UN World Population Prospects: The 2012 Revision.

#### 1.1.1. Population ageing is a global phenomenon

Population ageing is a well-known phenomenon and challenge not only in the EU. Similar trends are present also in other parts of the world, but to varying degrees (see Graph I.1.16). The UN population statistics and projections provide a source for demographic trends in a global perspective. <sup>(22)</sup> The world population share of the current EU Member States declined from 14.7% in 1950 to 5.1% in 2010, and it is expected to drop to 4.7% in 2060, despite the projected net migration flows. The world population shares of Japan, China and the US were also declining over the last six decades. These declining trends over the period 1950 to 2000 are in contrast with increasing world population shares in Africa, Asia and Latin America. Going to 2100, continuous declines are projected for the EU, Japan and China, while the US population share is expected to stabilise.

Africa's world population share is projected to increase at the fastest rate of all continents to over 28% in 2060. In Asia, a slight decline is expected though it is projected to still account to well over 50% of the world population in 2050. The decline is particularly evident for China, where the world population share is projected to fall from 19.6% to 13.2% between 2010 and 2060. The population of

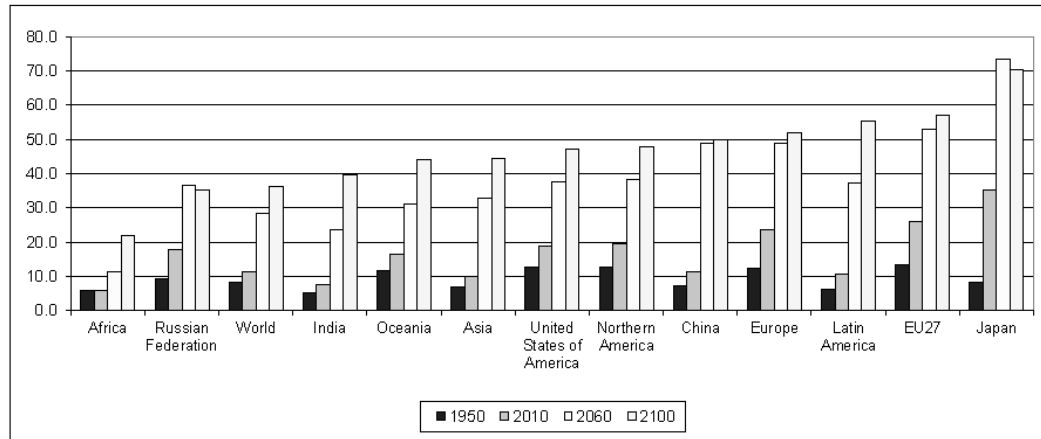
the European continent will become relatively smaller by 2060 with its share shrinking by 3.7 p.p. (from 10.6% to 6.9%). The world population shares of Northern America and the US (5.1% and 4.6%, respectively in 2010) will decline only marginally. The other regions of the world will roughly keep their share in the sharply growing world population (an increase of over 3 billion persons or 44%, from 6.9 billion in 2010 to 10.0 billion in 2060). Going to 2100, another 0.9 billion persons would be added to the world population.

Looking at the age structure in the UN projections, it can be seen that Europe is currently the oldest continent with the highest old age dependency ratio, and will remain so until 2060 (see Graph I.1.17). By 2100, Latin America is projected to overtake Europe. Other parts of the world are however also experiencing a dramatic ageing of their populations, with old-age dependency ratios climbing to levels clearly above the ones now in Europe on all continents except Africa. The demographic change is pronounced in particular in China, where the old age dependency ratio is projected to be at similar levels to the European one at around 50% in 2100. While the old-age dependency ratios are projected to reach 35% to 50% for Asia as a whole as well as Oceania, Northern America and Latin America, Africa remains the only continent with a relatively low old-age dependency ratio at the end of the projection period (at 11% in 2060 and 22% in 2100).

<sup>(22)</sup> The United Nations Population Division produces global population projections revised every two years. The latest projections are the 2012 Revision.



Graph I.1.17: Old age dependency ratio (people aged 65 or above relative to the working-age population) by main geographic areas and selected countries (in percentage), 1950, 2010, 2060, 2100



Source: UN World Population Prospects: The 2012 Revision.

## 2. MACROECONOMIC ASSUMPTIONS

### 2.1. LABOUR FORCE PROJECTIONS

#### 2.1.1. Introduction

Despite large cross-country labour force variability in the EU, some stylised facts need to be taken into account in any projection exercise. They can be summarised as follows:

- participation rates of prime-age male workers (aged 25 to 54), at around 90%, remain the highest of all groups, although showing signs of marginal decline. The participation rates of men aged 55 to 64 years, which had recorded a steady decline in the past twenty five years, are showing clear signs of a reversal in most countries since the turn of the century, mostly due to pension reforms, raising the statutory retirement age or the state pension age;
- women participation rates have steadily increased over the past twenty five years, largely reflecting societal trends and pension reforms;
- participation rates of young people (aged 15 to 24 years) have declined, mostly due to a longer stay in education, but also to unfavourable cyclical developments.

Given these trends, the main drivers of the projected change in the total participation rate will be changes in the labour force attachment of prime age women, older workers (especially women) and, to a lesser extent, young people.

#### 2.1.2. The impact of legislated pension reforms

The cohort simulation model (CSM) is used to project participation rates. A strong point of the CSM is its ability to take into account the expected effects on the participation rate of older workers of legislated pension reforms, <sup>(23)</sup> including measures to be phased in gradually. A description of past legislated pension reforms that have an impact on future participation rates, covering a total of 27 EU Member States, is provided in Box I.2.1 of "The 2015 Ageing Report, Underlying Assumptions and

<sup>(23)</sup> Enacted until 1 April 2015 (see footnote 3).

Projection Methodologies", European Economy No 8/2014.

Estimation of the effects of pension reforms highlights the following stylised fact. Although the age profiles of the probability of retirement vary across countries, reflecting the heterogeneity of pension systems, a common feature is that the distribution of retirement decisions is markedly skewed towards the earliest possible retirement age. In fact, a typical distribution of the retirement age tends to have spikes/modes at both the minimum age for early retirement and the normal (statutory) retirement ages (or the state pension age). <sup>(24)</sup>

A comprehensive assessment of how to shift the distribution of retirement ages ultimately depends on the considered judgement of all the relevant factors underlying retirement decisions. This assessment is carried out by Commission Services (DG ECFIN) in close cooperation with EPC-AWG delegates.

The average exit ages for 2060 presented in Graph I.2.1 are calculations based on participation rates before and after the impact of pension reforms. It gives us a summary measure of the long term impact of enacted pension reforms in 27 Member States. <sup>(25)</sup>

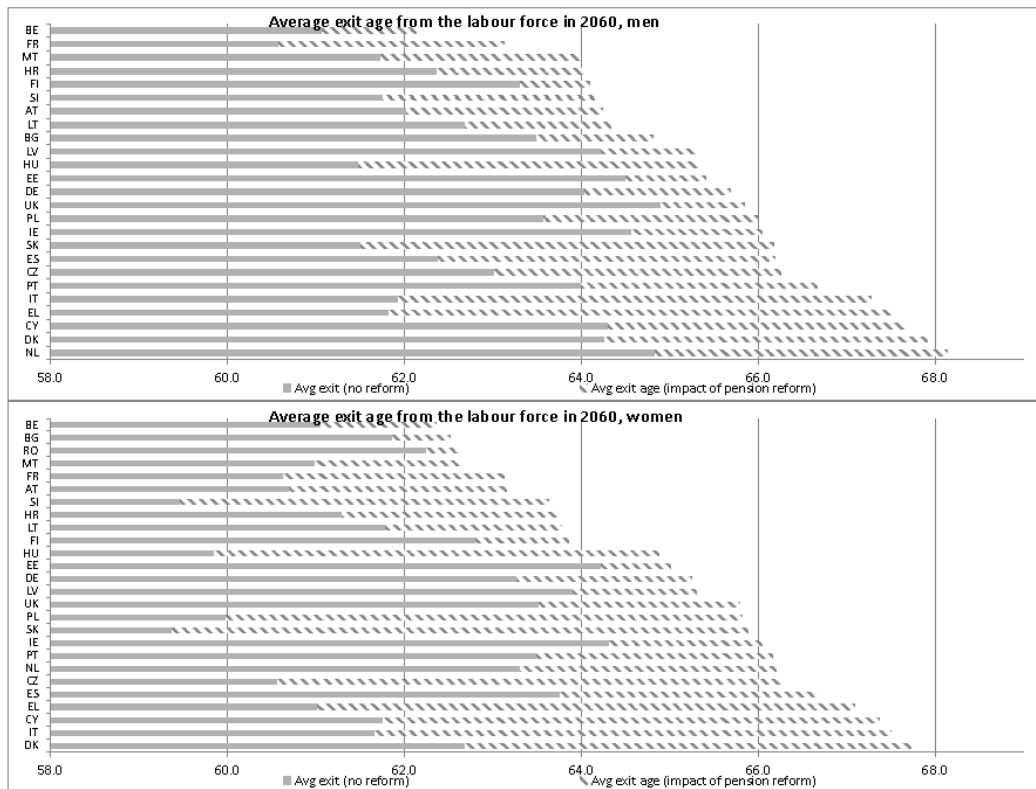
Projections show an average increase of approximately 2½ years in the effective retirement age for men. <sup>(26)</sup> In Greece, Italy, Slovakia, Hungary, Spain, Denmark, Cyprus, the Netherlands, and the Czech Republic the expected increase exceeds 3 years. The expected increase in the retirement age of women is slightly higher (about 3 years on average), reflecting in a number of countries the progressive convergence of retirement ages across genders.

<sup>(24)</sup> For example, let us assume that in a given country the (historical) retirement probability is concentrated at age 58, while a reform ends with early retirement schemes or increases the minimum years of contribution. In order to calculate the impact of this reform, the peak of the retirement probability distribution is shifted away from the historical peak of 58 years and moved closer to the statutory retirement age.

<sup>(25)</sup> All EU Member States except Luxembourg and Sweden, and Norway.

<sup>(26)</sup> Non-weighted average of the 26 Member States considered.

Graph I.2.1: Impact of pension reforms (1) on the average effective retirement age from the labour force (2)



(1) Enacted until January 2015 at the latest (see footnote 1 page 1)

(2) Based on the age group 50-70

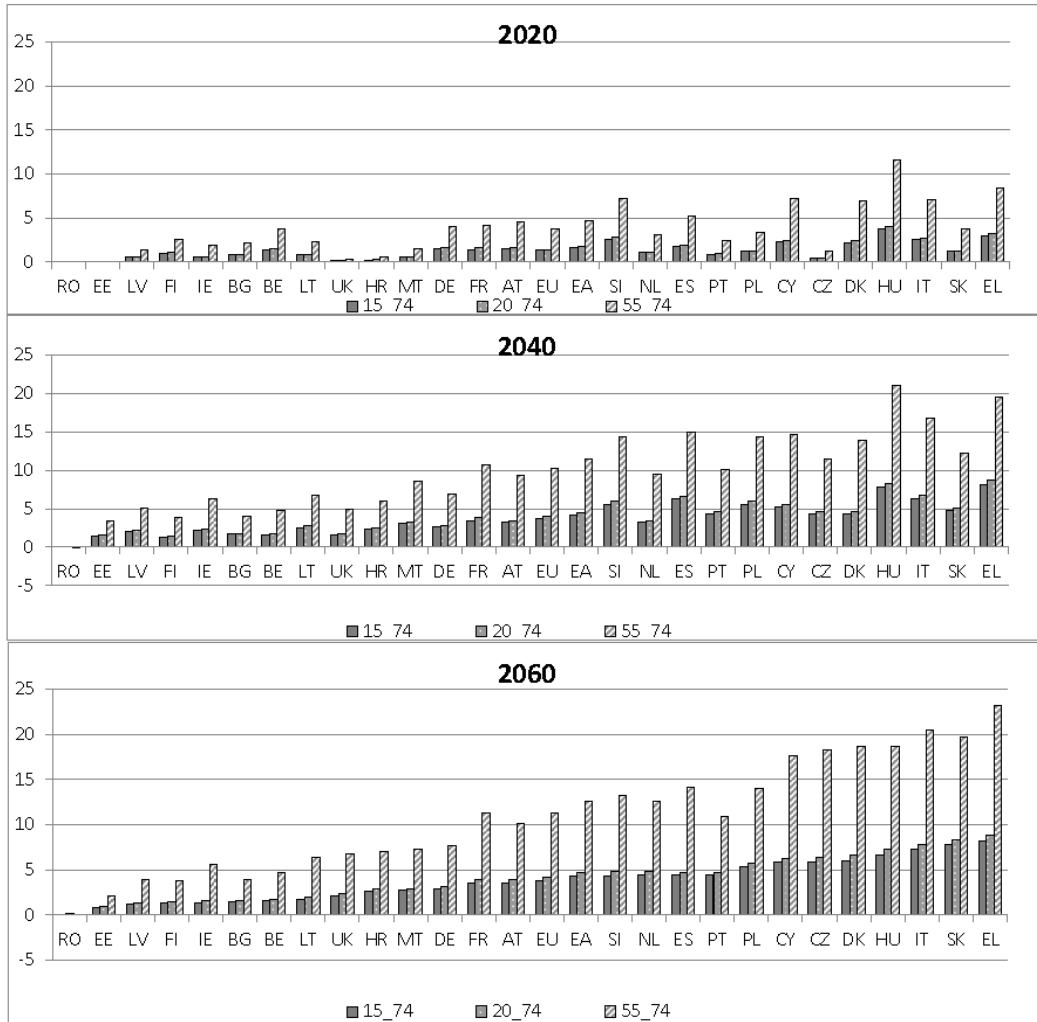
Source: Commission services, EPC

Graph I.2.2 shows the estimated impact of pension reforms on participation rates. In most of the 26 EU Member States that have recently legislated pension reforms, they are projected to have a sizeable impact on the labour market participation of older workers (aged 55 to 74), which depends on their magnitude and phasing in.

Overall in the EU, the participation rate of older people (55-74) is estimated to increase by about 4 pp in 2020, 10 pp in 2040, and 11 pp in 2060 due to the projected impact of pension reforms. In the euro area, the impact is estimated to be even larger about: 5 pp, 11½ pp, and 12½ pp, respectively, in 2020, 2040, and 2060. In Denmark, Greece, Italy, Cyprus, Hungary, and Slovenia the impact is estimated to be close or above 7 pp already by 2020, but in a large number of countries it is projected to be more than about 9 pp by 2040.

It should be recalled that total participation rates are mainly driven by changes in the participation rate of prime-age workers (25-54), as this group accounts for about 60% (50%) of the total population, for the age groups 15-64 and 15-74, respectively. Therefore, even these significant projected rises in participation rates for older workers will only have a rather limited impact on the total participation rate. For example, the 11 pp increase in the participation rate of workers aged 55 to 74 years in the EU will lead to an increase in the total participation rate (15-74) of only about 3½ pp by 2060.

Graph I.2.2: Projected impact of pension reforms on participation rates (2020, 2040, 2060) in percentage points - comparison of projections with and without pension reforms



Note: Ranked by increasing order of differences in 2060 for the age group 15 to 74.  
 Source: Commission services, EPC

1.1.2. Projection of participation rates

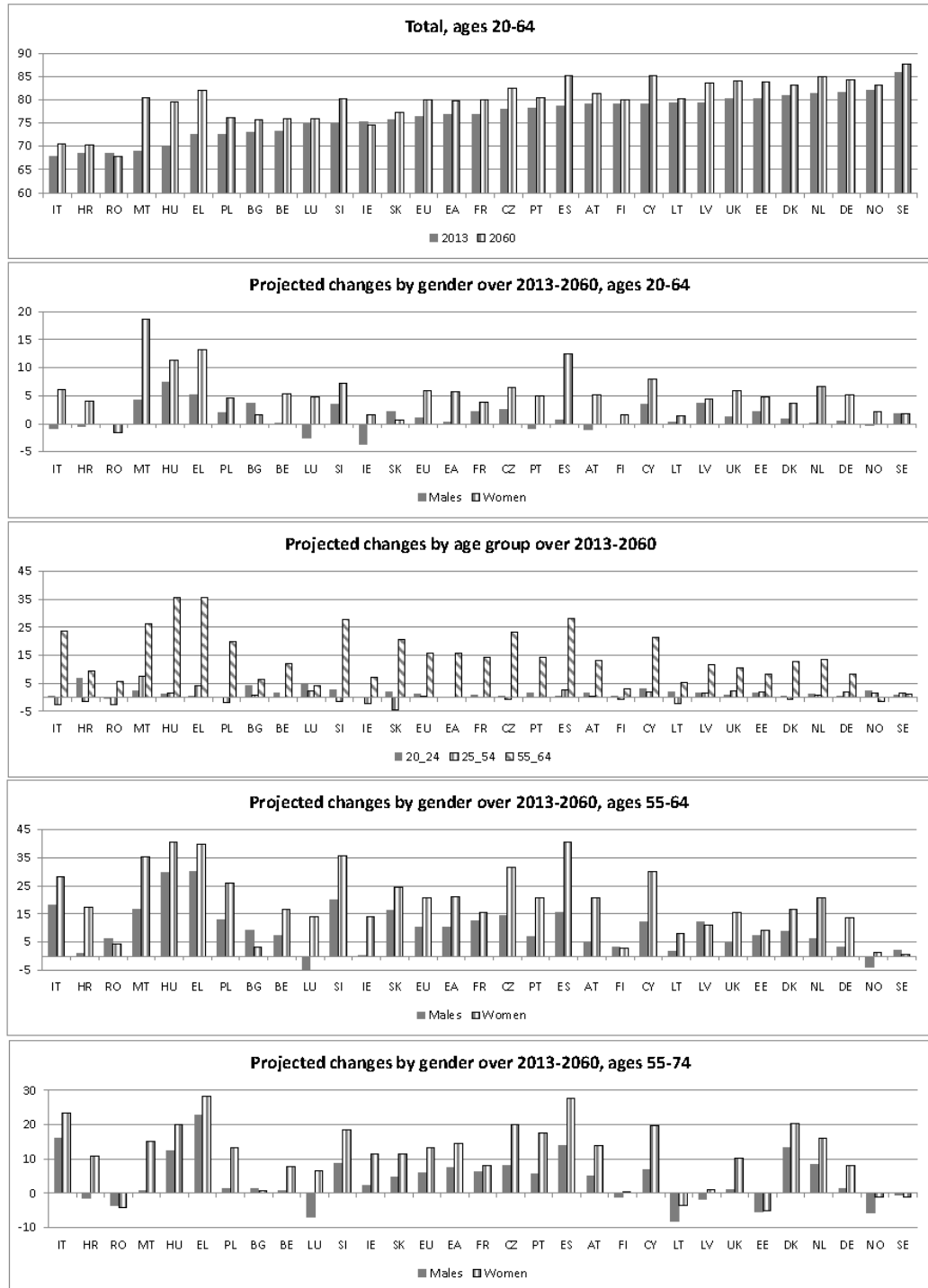
The outcome of the CSM yields a rightward shift in the age profiles of participation rates, particularly visible for ages 50+, reflecting the combined effect of the rising attachment of younger generations of women to the labour market, together with the expected impact of pension reforms.

Graph I.2.3 presents an overview of participation rate projections between 2013 and 2060 broken

down by age groups and gender. By large, the biggest increases in participation rates are projected for older workers (around 21 pp for women and 10 pp for men) in the EU for the age group 55-64, <sup>(27)</sup> influenced by pension reforms and societal trends affecting women participation rates. Consequently, the gender gap is projected to narrow substantially in the period up to 2060.

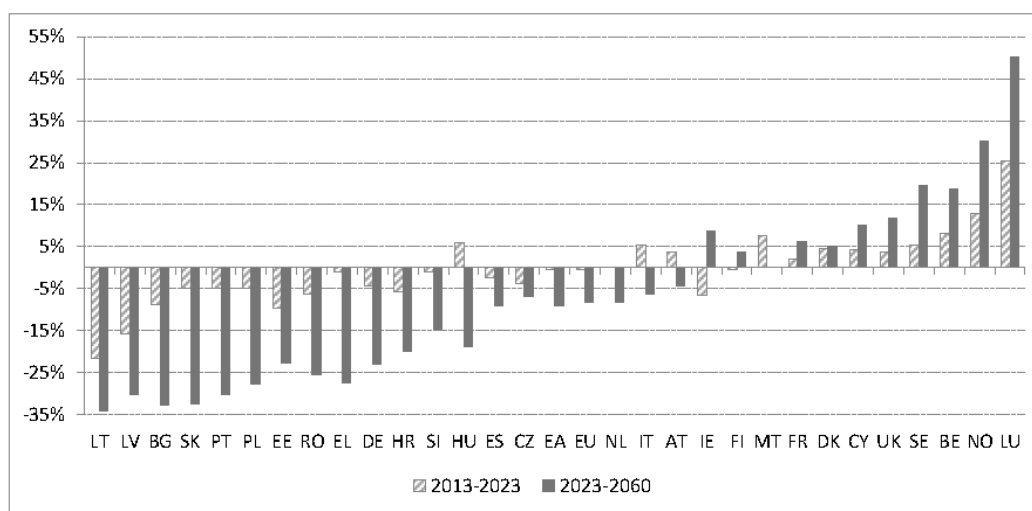
<sup>(27)</sup> Comparing with more 13 pp and 6 pp, respectively, for the age group 55-74.

Graph I.2.3: Participation rates



Source: Commission services, EPC.

Graph I.2.4: Percentage changes in total labour supply of the population aged 20 to 64 (2013-2023, 2023-2060) (1)



(1) Countries ranked in ascending order of total changes over the period 2013-2060.

Source: Commission services

The total participation rate (for the age group 20-64) in the EU is projected to increase by 3.5 pp (from 76.5% in 2013 to 80.1% in 2060). In the same period, women's participation rate is projected to increase by about 6 pp compared with 1 pp for men.

Although the participation rate of total prime age workers (25-54) in the EU is projected to remain almost unchanged between 2013 and 2060, at about 85½%, this is the outcome of opposite trends by gender. In fact, women's participation rate is projected to rise by about 2 pp, reaching 81.3% in 2060, while men's participation rate is projected to decline by about 1 pp, attaining 90.3% in 2060.

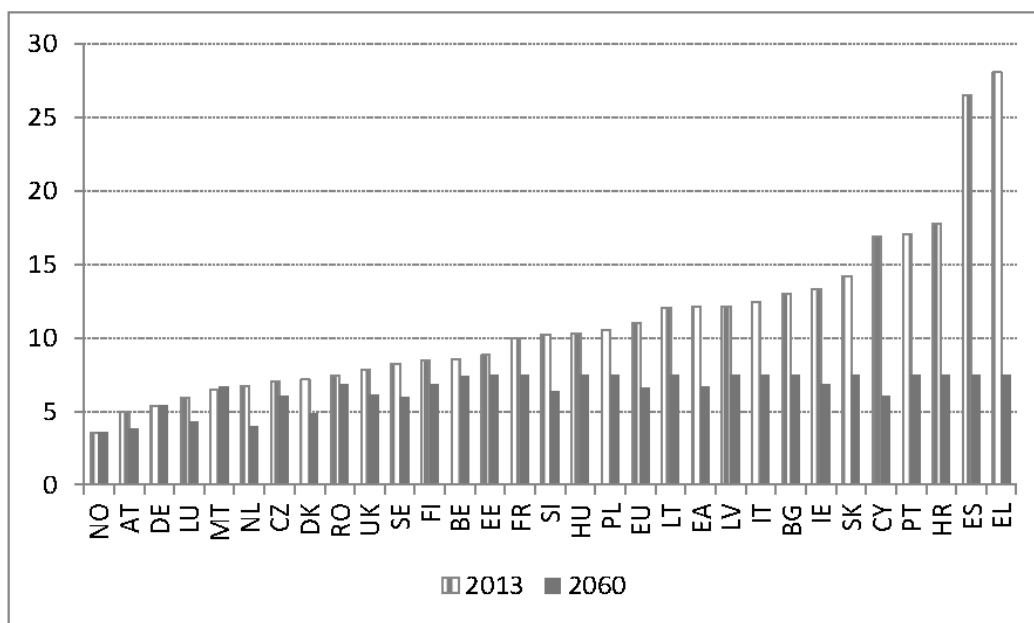
### 1.1.3. Projection of labour supply

Labour supply projections are calculated by single age and gender (by multiplying participation rates by population values). Total labour supply in the EU (and in the euro area) is projected to nearly stabilise between 2013 and 2023 (age group 20-64), while it is projected to decline by 8.2% between 2023 and 2060, representing roughly minus 19 million people. In the euro area, the projected fall in labour supply between 2023 and 2060 is 9.2%, equivalent to about 14 million people.

Graph I.2.4 highlights the wide diversity across Member States of labour supply projections, ranging from an increase of 50.3% in Luxembourg to a decrease of 34.0% in Lithuania (2023-2060). The initial largely neutral trend across most countries in the first ten years of the projections (2013-2023) is projected to deteriorate after 2023, when a large majority of countries are expected to record a decline (20 EU Member States in total).

In the eight largest (in terms of labour force) EU Member States, representing about ¾ of the total EU labour force in 2013, their prospective evolution in the period 2013-2060 is strikingly dissimilar (see Table I.2.1), reflecting differences in demographic prospects. Expected differences in the annual growth rate of total labour force are very significant, because they are "compounded" over a long period. DE, PL and RO are projected to register average annual declines of between ½ and ¾ of a pp, ES and NL are expected to register a decline of about ¼ pp, which are equivalent to the EU average. Conversely, the UK, FR (and IT) are expected to register expansions (stabilisation) in the total labour force.

Graph I.2.5: Unemployment rate assumptions (age 15-64, in percentage) (1)



(1) Countries ranked in ascending order of the unemployment rate in 2013  
Source: Commission services, EPC

Table I.2.1: Labour supply projections in the "largest" eight EU Member States (1)

	Total LF (20-64) (thousands persons)		Avg. annual growth rate of the LF 2060-2013	Impact on potential output growth (1)
	2013	2060		
DE	40594	29910	-0.6%	-0.3%
ES	22825	20261	-0.3%	0.0%
FR	29137	31592	0.2%	0.2%
IT	24493	24189	0.0%	0.1%
NL	8210	7559	-0.2%	0.0%
PL	18149	12456	-0.8%	-0.4%
RO	8560	5970	-0.8%	-0.4%
UK	30317	35132	0.3%	0.3%
EA	154853	140147	-0.2%	0.0%
EU	235358	215135	-0.2%	0.0%

(1) Impact of LF growth differentials relative to the EU average  
Source: Commission services, EPC

Overall, the projected negative labour force growth in the EU is mainly due to negative demographic developments, given that participation rates over the period – especially for older workers and women – are projected to continue to increase.

### 2.1.5. Assumptions on structural unemployment

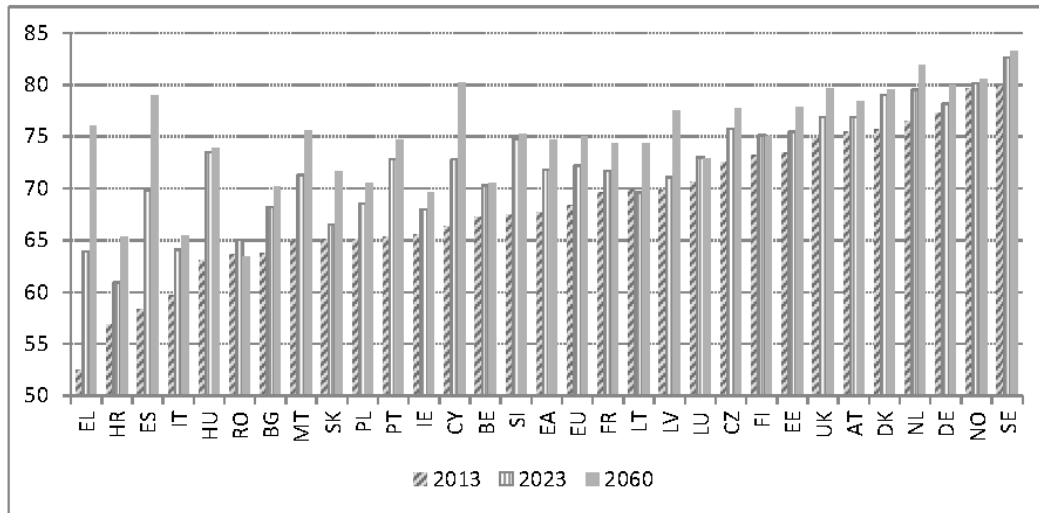
As a general rule, actual unemployment rates are assumed to converge to NAWRU rates by 2018, corresponding to the closure of the output gap. On their turn, NAWRU rates are assumed to gradually<sup>(28)</sup> converge to the minimum of country specific *Anchors*<sup>(29)</sup> or the weighted median of national *Anchors*, whichever is the lowest. Furthermore, for those countries where current NAWRU anchors exceed unemployment rates for 2060, as projected in the 2012 Ageing Report, only half of that increase is retained.<sup>(30)</sup>

<sup>(28)</sup> The gradual convergence is assumed to be completed by 2040.

<sup>(29)</sup> Under the guidance of the EPC-OGWG and with the twin objectives of improving the medium term framework for fiscal surveillance up to T+10 (currently 2023), and correcting for the counter cyclicity of the NAWRU, DG ECFIN carried out some econometric work leading to the estimation of *Anchor* values for the NAWRU.

<sup>(30)</sup> For the methodology see: "The 2015 Ageing Report: Underlying Assumptions and Projection Methodologies", European Economy, No. 8/2014, European Commission.

Graph I.2.6: Employment rates for the age group 20 to 64 (in percentage) (1)



(1) Countries ranked in ascending order of the employment rate in 2013  
Source: Commission services, EPC

Graph I.2.5 presents the unemployment rate assumptions. In the EU, the unemployment rate is assumed to decline from 11.0% in 2013 to 6.6% in 2060. In the euro area, the unemployment rate is expected to fall from 12.1% in 2013 to 6.7% in 2060.

employment levels after the middle of the next decade.

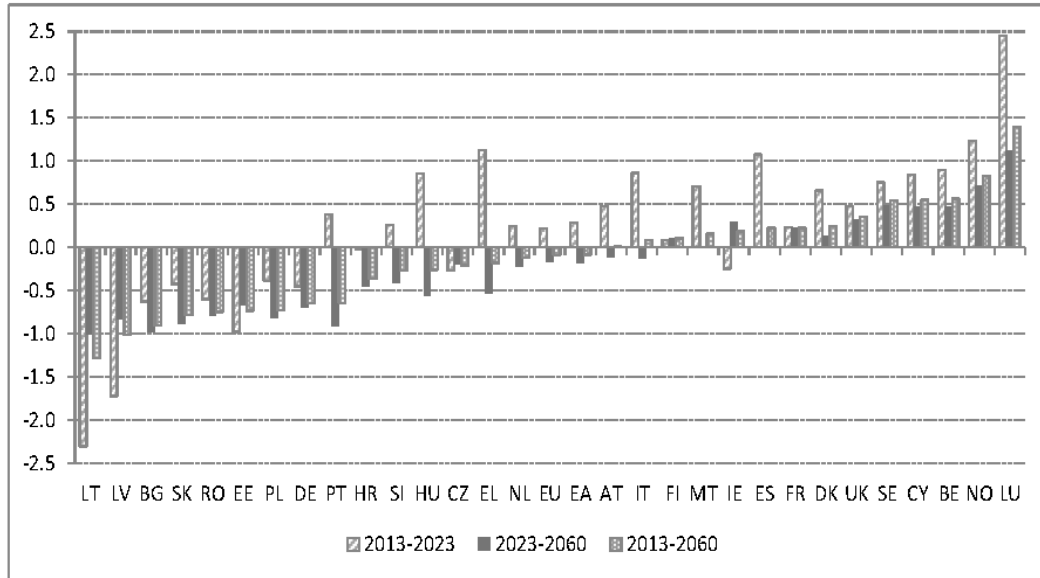
#### 2.1.6. Employment projections

The total employment rate (for persons aged 20 to 64) in the EU is projected to increase from 68.4% in 2013 to 72.2% in 2023 and 75.1% in 2060. In the euro area, a similar development is expected, with the employment rate attaining 74.7% in 2060 (Graph I.2.6).

The number of persons employed (using the LFS definition) is projected to record an annual growth rate of only 0.2% over the period 2013 to 2023 (a deceleration from 0.4% over the period 2003-2013), which is expected to revert to -0.2% over the period 2023 to 2060 (Graph I.2.7). The outcome of these opposite trends is a cumulated overall decline of about 8.7 million workers over the entire 2013-2060 period in the EU. The negative prospects for population developments, including the rapid ageing of the population, will only be partly offset by the increase in (female and older workers) participation rates and migration inflows, leading to an overall reduction in

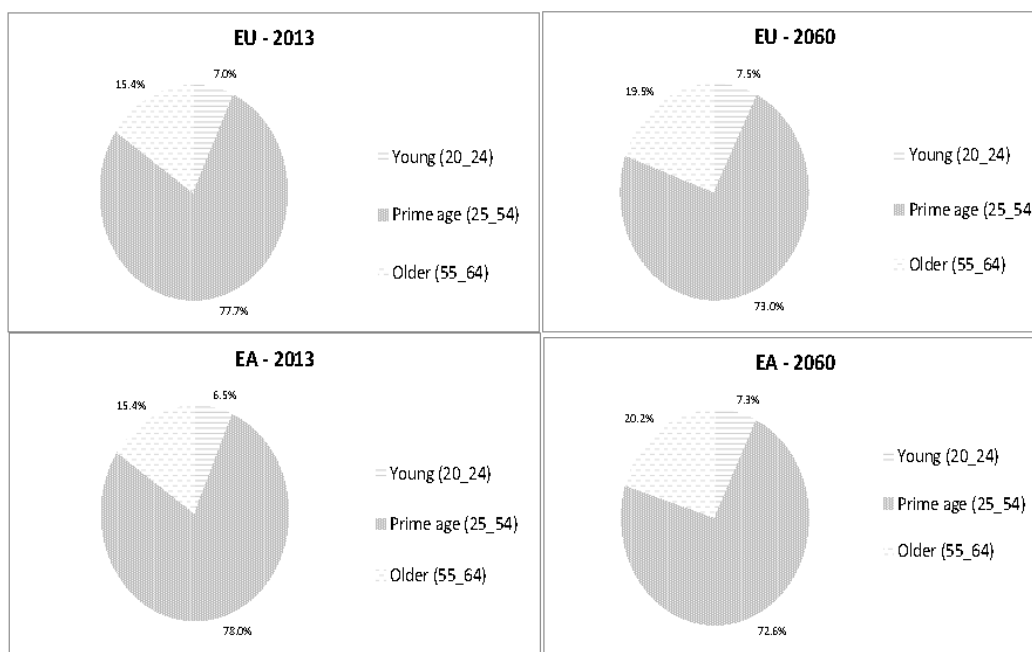


Graph I.2.7: Employment growth rates for the age group 20 to 64 (average annual values) (1)



(1) Countries ranked in ascending order of average employment growth rates in the 2013-2060 period  
 Source: Commission services, EPC

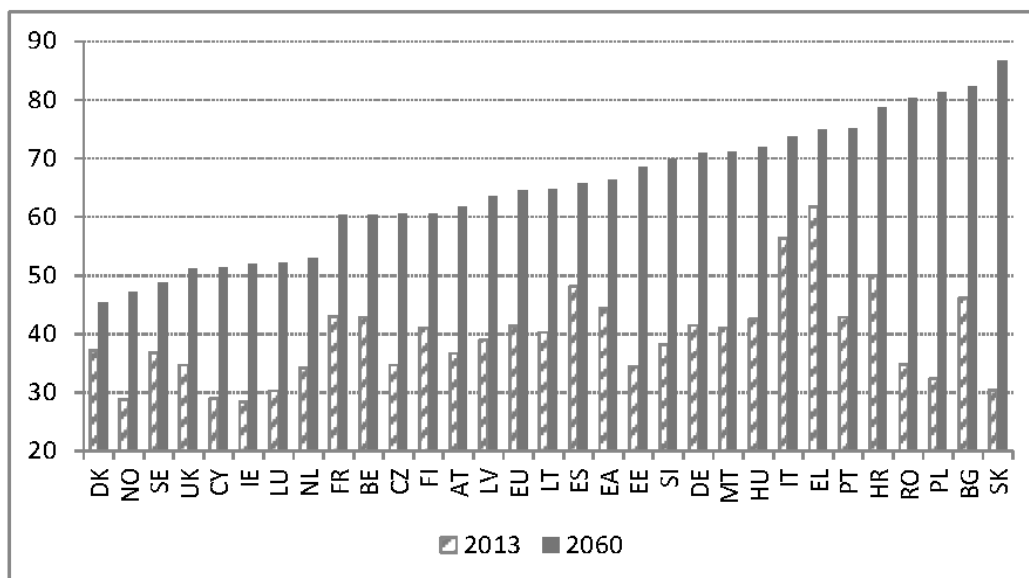
Graph I.2.8: Employment projections, breakdown by age groups



Source: Commission services, EPC

Mainly as a result of the ageing process, the age structure of employment is projected to undergo a number of significant changes. The share of older workers (aged 55 to 64) in total employment (aged 20 to 64) is projected to rise by around one third, rising from 15.4% in 2013 to 19.5% in 2060 in the EU (Graph I.2.8). In the euro area, it is projected to rise by slightly more, reaching about 20% in 2060. The projected increase is about 50% or more in Greece, Spain, Slovakia, Italy, Portugal, Hungary and Slovenia.

Graph I.2.9: Effective economic old age dependency ratio - inactive population aged 65 and more over employment (20-74) – (1)



(1) Countries ranked in ascending order of the old age dependency ratio in 2060

Source: Commission services, EPC

#### 2.1.7. The balance of non-workers to workers: economic dependency ratios

The effective economic old age dependency ratio is an important indicator to assess the potential impact of ageing on social expenditure, particularly relevant for pay-as-you-go pension systems. This indicator is calculated as the ratio between the inactive elderly (65+) and total employment (either 20-64 or 20-74). The effective economic old age dependency ratio is projected to rise significantly from 41.5% in 2013 to 64.5% in 2060 in the EU (employed aged 20-74). In the euro area, a similar deterioration is projected from 44.6% in 2013 to 66.4% in 2060 (Graph I.2.9).

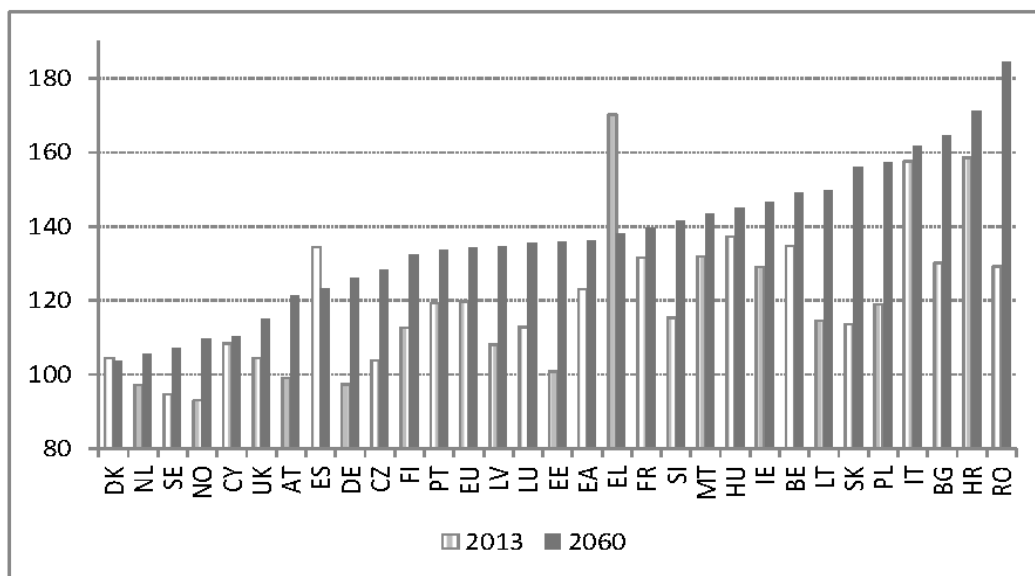
In 2060 across EU Member States, the effective economic old-age dependency ratio is projected to range from less than 55% in Denmark, Sweden, the United Kingdom, Cyprus, Ireland, Luxembourg and the Netherlands, to more than 75% in Portugal, Croatia, Romania, Poland, Bulgaria and Slovakia (employed 20-74).

The total economic dependency ratio is a more comprehensive indicator, which is calculated as the ratio between the total inactive population and employment (either 20-64 or 20-74). It gives a

measure of the average number of individuals that each employed "supports". It is expected to stabilise in the period up to the middle of the next decade around 120% in the EU, and then to rise to close to 135% by 2060 (employed 20-74). A similar evolution is projected in the euro area. The projected development of this indicator reflects the strong impact of the ageing process, after the middle of the next decade, in most EU Member States (Graph I.2.10).

However, there are large cross-country differences. In Romania, Slovakia, Poland, Bulgaria, Estonia and Lithuania it is projected to increase by 30 pp or more between 2013 and 2060, while in others (France, Cyprus, Denmark, Spain, Greece, the Netherlands, Hungary and Italy) it is projected to rise by 10 pp or less.

Graph I.2.10: Total economic dependency ratio - total inactive population over employment (20-74) – (1)

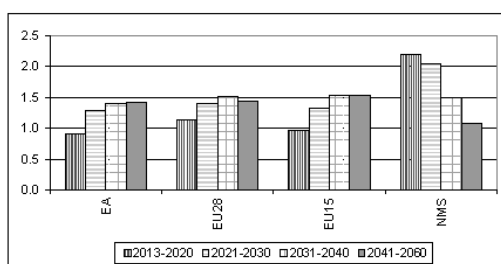


(1) Countries ranked in ascending order of the total economic dependency ratio in 2060  
 Source: Commission services, EPC

## 2.2. LABOUR PRODUCTIVITY AND GDP

### 2.2.1. Main results of the projections – baseline scenario

Graph I.2.11: Potential growth rates (annual average growth rates), EU aggregates



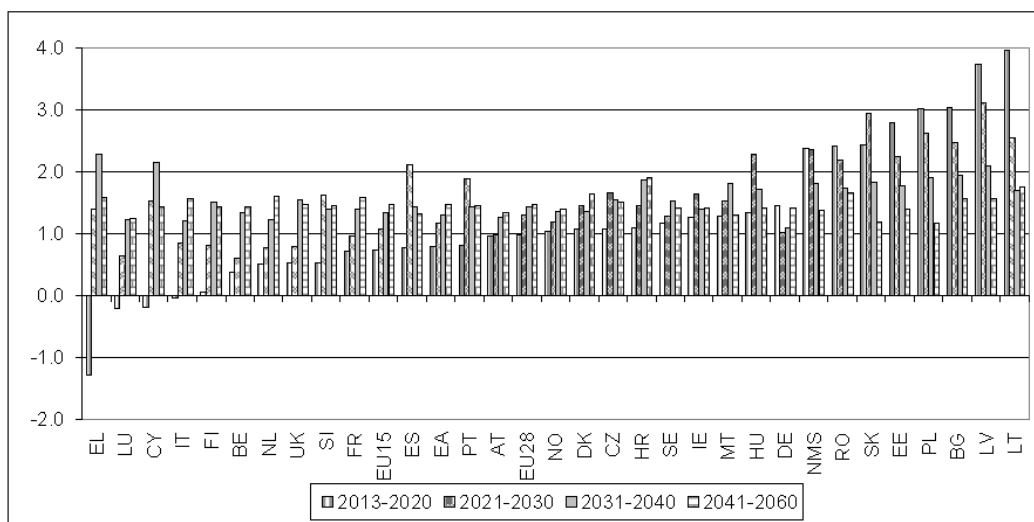
Source: Commission services, EPC

In the EU as a whole, the annual average potential GDP growth rate is projected to remain quite stable over the long-term (Graph I.2.11). After an average potential growth of 1.1% up to 2020, an increase to 1.4-1.5% is projected over the remainder of the projection horizon. Over the whole period 2013-2060, the average annual output growth rate in the EU is projected to be

1.4%. Developments in the euro area are very close to those in the EU as a whole, about 0.1 pp lower.

For four periods, Graph I.2.12 plots average per capita potential GDP growth rates. Eventually, (potential) growth rates stabilise at around 1½%, although in the short- to medium-term they can be affected by country specificities, such as cyclical developments, periods of (protracted) economic adjustment, and catching-up effects.

Graph I.2.12: Potential GDP per capita growth rates (period averages) (1)

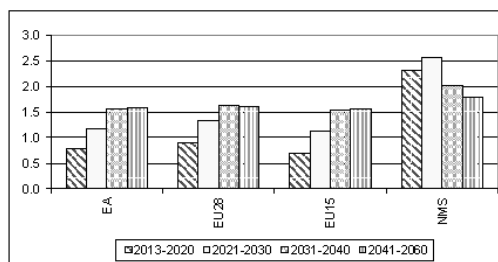


(1) Countries ranked in ascending order of the 2013-2020 period average  
 Source: Commission services, EPC

In the period 2013-2023, GDP growth is assumed to be higher than potential growth rates, reflecting the gradual closure of negative output gaps.<sup>(31)</sup> For the EU as a whole, GDP growth is assumed to be 0.2 pp higher than potential growth rates. However, there are significant differences across Member States (Graph I.2.14).

Potential growth is explained by labour productivity and labour input, whereas the former turns out to be the key driving factor. In the EU, labour productivity is projected to grow slightly below 1% between 2013 and 2020, and then marginally increases and remain fairly stable thereafter at around 1½% until 2060 (Graph I.2.13). The projected increase in the period up to 2030 is due to the assumption of higher productivity growth (through TFP) in the MSs assumed to have a catching-up potential. Eventually, in 2060 all MSs are assumed to reach the same productivity growth of 1.5%.

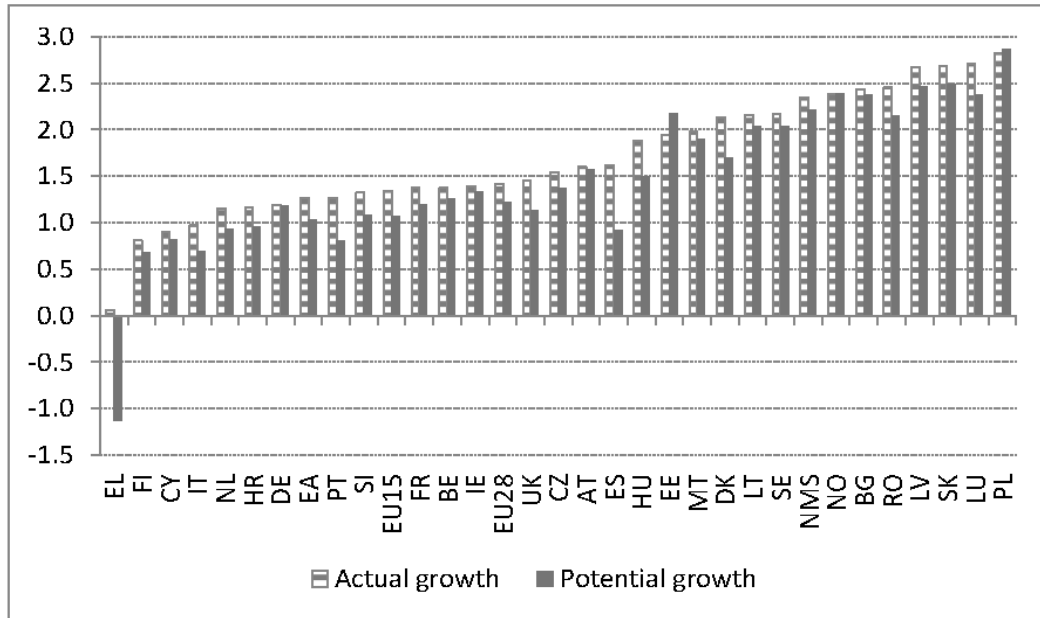
Graph I.2.13: Labour productivity per hour, annual average growth rates



Source: Commission services, EPC

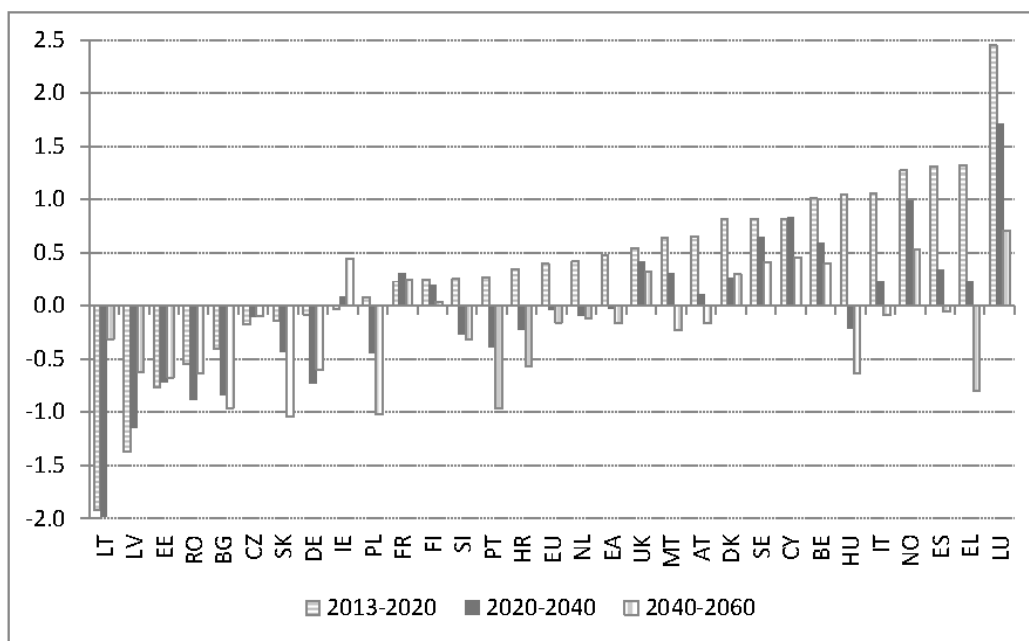
<sup>(31)</sup> For the medium-term (until 2018), GDP estimates are based on the Commission services economic forecast of spring 2014 and subsequent data revisions are not included in the projections (for more details see "The 2015 Ageing Report, Underlying Assumptions and Projection Methodologies", European Economy No. 3/2014).

Graph I.2.14: Actual and potential GDP growth, annual average growth rates 2013-2023 (1)



(1) Countries ranked in ascending order of actual growth  
Source: Commission services, EPC

Graph I.2.15: Hours worked (average annual growth rate) 15-74 (1)



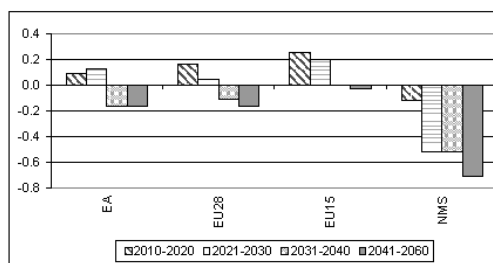
(1) Countries ranked in ascending order of the 2013-2020 average  
 Source: Commission services, EPC

Total hours worked are projected to rise by 0.4% (annual average growth rate) in the period 2013 to 2020.<sup>(32)</sup> However, from 2020 onwards, this upward trend is expected to be reversed and total hours worked are expected to nearly stabilise between 2020 and 2040 and then to decline by 0.2% between 2040 and 2060 (Graph I.2.15).

There are major differences across Member States, reflecting different demographic outlooks. In terms of the annual average growth rate, a fall of 0.8% or more is projected for Bulgaria, Latvia and Lithuania. By contrast, an increase of 0.7% or more on average is expected in Cyprus, Luxembourg and Norway.

<sup>(32)</sup> The total number of hours worked is the product between employment and hours worked per person. Regarding hours worked, the following assumptions are made: i) total amount of hours worked per person (in 2013) are kept constant by gender and type of work (part-time versus full time); and ii) the part-time share of total work by gender and age groups (15-24, 25-54 and 55-74) are kept constant over the entire projection period.

Graph I.2.16: Labour input (total hours worked), annual average growth rates

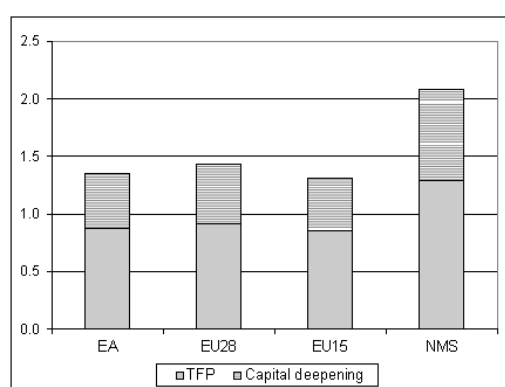


Source: Commission services, EPC

The projected demographic changes after 2020, with a reduction in the size of the labour force due to a decline in the working-age population, are projected to yield negative labour input growth for the remainder of the period up to 2060 (Graph I.2.16). Therefore, labour dynamics will drag down GDP growth in the EU, the euro area, and in most MSs, especially in the NMS from 2030 onwards. The only significant exceptions (to a decline in labour input) are Belgium, Denmark, Ireland, France, Cyprus, Luxembourg, Malta, Sweden, the United Kingdom, and Norway.

Graph I.2.17 breaks down labour productivity growth between TFP growth and capital deepening. Trends in TFP growth explain most of productivity per hour growth. By assumption, TFP growth converges to 1% by 2060 in all Member States, which given a labour income share of 0.65 implies a labour productivity growth of 1½% for all MSs in 2060.

Graph I.2.17: Determinants of labour productivity: total factor productivity and capital deepening (pp contributions for the annual growth rate in the period 2013-2060)



Source: Commission services, EPC

For countries with a relatively low per capita GDP, the capital deepening contribution is very high in the first part of the projection period, reflecting the assumed catching-up process of converging economies. Then, the contribution gradually declines to the steady state value of 0.5%.

Table I.2.2 presents the usual growth accounting breakdown. For the EU and the euro area, the contribution of total population to the average growth of potential GDP is only marginally positive. However, this is more than offset by a decline in the share of the working-age population, pulling down growth by an annual average of -0.2 pp. As a result, labour input contributes negatively to output growth by about an annual average of -0.1. Therefore, labour productivity growth is the only source for potential output growth in the EU and the euro area.

Sources of growth will change during the projection period. The positive contribution of labour input during the period 2013-2020 will turn negative afterwards, although being more than

offset by the rise in the contribution of labour productivity.

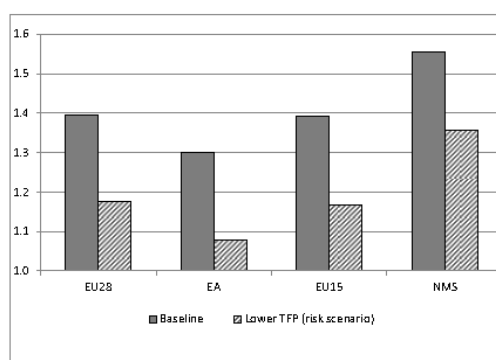
Table I.2.2: Breakdown of potential GDP growth in percentage (average annual values, 2013-2060)

	EU28	EA
1 GDP growth in 2013-2060	1.4	1.3
Due to % change in:		
2=3+4 Productivity (GDP per hour worked)	1.4	1.4
of which:		
3 TFP	0.9	0.9
4 Capital deepening	0.5	0.5
5=6+7+8+9 Labour input	-0.1	-0.1
of which:		
6 Total population	0.1	0.0
7 Employment rate	0.1	0.1
8 Share of working age population	-0.2	-0.2
9 change in average hours worked	0.0	0.0
10=1-6 GDP per capita growth in 2013-2060	1.3	1.3

Source: Commission services, EPC

## 2.2.2. Main results of the projections – risk scenario

Graph I.2.18: Potential growth rates in the European Union (average annual values, 2013-2060)



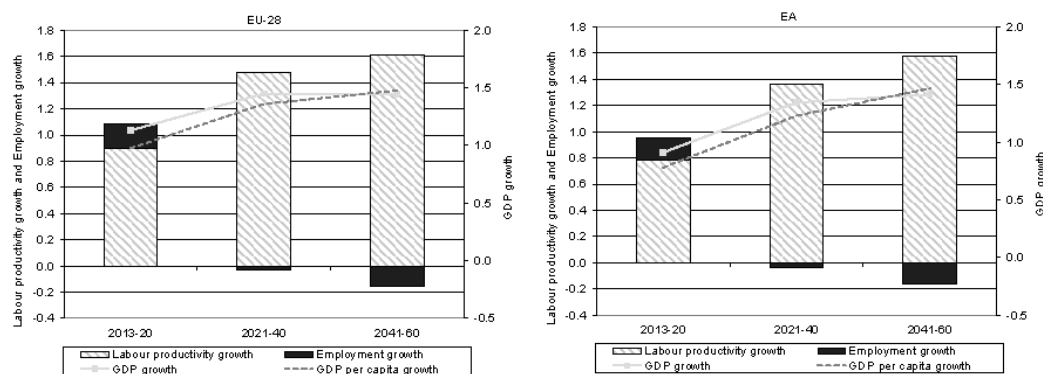
Source: Commission services, EPC

In the risk scenario, TFP is assumed to converge to 0.8%, instead of 1.0% in the baseline. The risk scenario provides a measure of the potential effects on potential GDP growth of a less dynamic rise in TFP as assumed in the baseline scenario. Potential GDP would grow by 1.2% on average up to 2060, compared to 1.4% in the baseline scenario (Graph I.2.18).<sup>(33)</sup>

<sup>(33)</sup> For a detailed presentation of all sensitivity tests and policy scenarios see Part I, Chapter 3, of this report.



Graph I.2.19: Breakdown of Potential GDP growth (average annual growth rate)



Source: Commission services, EPC

### 2.3. COMPARISON WITH THE 2012 AGEING REPORT

#### 2.3.1. Labour force developments

For the EU as a whole, the impact of the great recession on employment rates in 2013 is still visible in the downward revision (-1.3 pp, Table I.2.3) from the 2012 to the 2015 Ageing Reports. By contrast, the employment rate is revised upwards by 0.2 pp for the EU in 2060, reflecting the closure of the output gap and the impact of planned pension reforms, which together with cohort effects, are expected to raise the employment rate of older workers by 1.2 pp in 2060.

Unemployment rates in 2013 have been revised upwards by 1.9 pp in the EU as a whole, reflecting worsening labour markets in a number of MSs, such as BG, EL, ES, IT, CY and PT. Given the use of a similar unemployment rate threshold of around 7½% in both the 2012 and 2015 ARs, capping unemployment rates in underperforming labour markets, results in a relatively unchanged unemployment rate for the EU as a whole in 2060.

#### 2.3.2. Productivity and GDP developments

Overall, the 2015 AR brings about marginal changes regarding the potential GDP growth and its drivers in the EU as a whole (Table I.2.4 and Graph I.2.19). In the 2015 AR, potential GDP is projected to rise on an annual average growth rate of 1.4% in the EU in the period 2013-2060,

unchanged from the 2012 AR. The potential GDP growth rate in the euro area is expected to be 1.3% (-0.1 pp compared with the 2012 AR). In the EU, this stabilisation results from an increase of labour input (+0.1 pp) which is exactly offset by a decline in productivity per hour worked (-0.1 pp). Across the EU, the following MSs registered a decline in potential GDP growth rate of 0.2 pp or more on an annual average in the period 2013-2060: IE, EL, ES, NL, PT, SK and the UK. Conversely, the following countries registered an improvement in potential GDP growth rate of 0.2 pp or more on an annual average in the period 2013-2060: DK, LV, LU, HU, MT, RO, SE and NO.

Table I.2.3. Long-term projections compared (2015 and 2012 projections): labour force developments

	Projection exercise 2015						Projection exercise 2012																								
	Employment rate (65-64)			Unemployment rate (15-64)			Employment rate (65-64)			Unemployment rate (15-64)																					
	2013	2060	p.p. change	2013	2060	p.p. change	2013	2060	p.p. change	2013	2060	p.p. change																			
BE	61.8	64.2	2.4	41.6	53.5	11.9	67.6	69.3	1.8	44.0	56.0	12.0	8.5	7.4	-1.1	-1.7	-0.2	1.5	-1.3	1.4	2.7	-1.4	-0.2	1.2	-1.0	1.8	2.7	0.7	0.1	-0.6	BE
BG	59.6	64.1	4.4	47.6	56.7	9.1	68.6	69.2	0.7	54.4	61.0	6.6	13.0	7.5	-5.6	-3.1	-0.3	2.6	0.1	0.8	0.7	-0.2	-0.2	-0.1	2.9	1.2	-1.6	4.3	0.2	-4.1	BG
CZ	67.8	70.4	2.6	51.9	74.8	22.9	72.9	74.9	2.0	65.3	78.0	12.7	7.0	6.0	-1.0	1.0	1.8	0.8	3.4	5.7	2.3	1.4	1.8	0.4	3.7	5.7	2.0	0.5	-0.1	-0.6	CZ
DK	72.6	78.5	3.9	62.0	75.4	13.4	78.2	80.4	2.2	65.3	78.0	12.7	7.2	4.9	-2.3	-2.3	-0.9	1.4	1.8	1.7	-0.1	-1.5	-0.8	0.7	2.2	1.8	-0.4	1.1	-1.0	-1.0	DK
DE	73.5	75.5	2.0	63.7	71.8	8.0	77.7	79.8	2.1	67.6	76.1	8.5	5.4	0.0	-0.8	0.8	1.5	0.6	2.0	1.8	-0.2	0.4	0.9	0.6	1.6	1.3	-0.3	-0.6	-0.7	-0.1	DE
EE	68.6	70.7	2.1	62.6	71.0	8.4	75.3	76.4	1.2	66.6	74.8	8.2	8.8	7.5	-1.4	2.6	0.6	-2.0	5.8	2.3	-3.5	-0.2	0.8	1.1	2.2	1.2	-1.0	-3.7	0.2	3.9	EE
IE	60.4	63.5	3.1	51.2	61.3	10.1	69.7	68.2	-1.6	57.3	64.6	7.3	13.3	6.8	-6.5	0.6	0.3	-0.3	-2.4	-0.4	2.0	-0.1	0.9	1.0	-1.7	0.7	2.3	-0.9	0.6	1.7	IE
EL	48.7	68.8	21.1	35.5	74.6	39.1	67.7	75.4	7.7	42.4	78.0	35.5	28.0	7.5	-20.6	-10.7	2.5	13.2	-9.1	7.5	16.5	-1.9	2.9	4.8	-5.7	8.4	14.1	13.4	0.2	-13.2	EL
ES	54.5	73.0	18.5	43.4	77.9	34.5	74.2	78.9	4.7	54.2	82.5	28.2	26.5	7.5	-19.0	-5.3	0.5	5.8	-4.1	2.2	6.3	-0.6	0.7	1.4	-1.3	2.7	4.0	6.4	0.2	-6.2	ES
FR	63.9	68.1	4.1	46.8	60.2	14.4	71.0	73.6	2.5	49.2	63.4	14.2	10.0	7.5	-2.5	-0.4	-1.1	-0.7	5.5	0.1	-5.4	0.3	-1.1	-1.3	6.2	0.1	-6.1	0.9	0.2	-0.7	FR
HR	52.3	60.4	8.1	37.1	48.8	11.7	63.5	65.2	1.7	41.4	50.9	9.5	17.8	7.5	-10.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	HR
IT	55.5	60.3	4.8	42.8	66.7	23.9	63.4	65.2	1.8	45.4	69.0	23.6	12.4	7.5	-4.9	-2.6	-1.4	1.2	1.8	0.6	-1.2	0.2	-1.4	-1.7	2.9	0.7	-2.2	4.5	0.2	-4.3	IT
CY	60.6	73.8	13.2	49.8	74.8	25.0	72.9	78.6	5.7	57.0	78.4	21.4	16.9	6.1	-10.8	-10.4	-3.0	7.4	-10.3	-3.4	6.9	-2.4	-1.9	0.5	-5.8	-2.6	3.2	11.1	1.6	-9.6	CY
LV	65.3	69.9	4.7	56.0	68.5	13.5	74.3	75.6	1.3	61.5	73.1	11.6	12.1	7.5	-4.7	1.8	-3.3	-5.1	2.3	-1.5	-3.8	-2.2	-3.4	-1.2	0.2	-1.4	-1.6	-4.9	0.2	5.1	LV
LT	63.8	66.6	2.8	53.4	61.4	8.1	72.5	72.0	-0.5	60.2	65.6	5.5	12.0	7.5	-4.6	1.8	-1.1	-2.9	1.5	-4.3	-2.8	0.2	-1.0	-1.2	1.7	-0.5	-2.2	-2.3	0.2	2.5	LT
LU	65.3	67.0	1.7	40.2	44.9	4.7	69.4	70.0	0.5	42.2	46.5	4.3	5.9	4.2	-1.7	0.0	2.4	2.4	0.8	4.2	3.4	1.1	2.5	1.4	2.0	5.0	3.0	1.5	0.0	-1.5	LU
HU	55.0	67.5	9.5	38.6	73.6	35.0	64.7	73.0	8.3	41.8	77.5	35.7	10.3	7.5	-2.8	0.3	4.0	3.7	-1.7	10.5	12.1	0.5	4.4	4.0	-1.3	11.6	13.0	0.2	0.2	0.0	HU
MT	61.0	70.3	9.3	36.5	60.8	24.4	65.3	75.4	10.1	38.7	64.8	26.2	6.5	6.7	0.2	2.8	4.7	1.9	3.1	4.5	1.3	2.9	5.1	2.2	3.8	6.3	2.5	-0.3	0.0	0.3	MT
NL	74.3	79.6	5.3	60.1	74.8	14.8	79.7	82.9	3.2	64.1	77.6	13.5	6.7	3.9	-2.8	-2.0	-1.0	1.0	2.9	-2.0	4.9	0.3	-0.6	-0.9	4.9	-1.6	-6.5	2.9	0.5	-2.4	NL
AT	72.3	75.0	2.7	44.8	58.3	13.5	76.1	78.0	1.8	46.4	59.7	13.3	5.0	3.8	-1.2	-0.1	0.6	0.8	0.2	3.2	3.0	0.5	0.4	-0.1	0.9	3.6	2.8	0.8	-0.3	-1.1	AT
PL	60.3	64.7	4.4	40.8	60.9	20.1	67.4	70.0	2.6	44.2	64.3	20.1	10.5	7.5	-3.1	-0.4	-0.6	-0.2	4.3	1.3	-3.0	1.0	-0.5	-1.5	5.3	1.5	-3.8	2.0	0.2	-1.8	PL
PT	60.6	68.6	8.0	46.8	64.5	17.7	73.1	75.2	2.1	54.3	68.6	14.3	17.0	7.5	-9.6	-4.6	-1.5	3.1	-4.4	-1.0	3.4	-1.9	-1.5	0.4	-2.7	-0.8	1.8	4.1	0.2	-3.9	PT
RO	59.1	58.2	-1.0	41.4	47.2	5.8	63.9	62.5	-1.4	43.0	48.7	5.7	7.4	6.9	-0.6	-0.5	1.4	1.9	0.3	2.2	1.9	-0.2	1.6	1.8	0.7	2.5	1.8	0.6	0.2	-0.3	RO
SI	63.4	69.1	5.7	33.1	61.0	27.9	70.7	73.8	3.1	35.6	63.4	27.9	10.2	6.4	-3.9	-3.0	-1.6	1.4	-5.2	0.2	5.3	-1.7	-1.1	0.6	-4.4	0.9	5.3	2.0	0.7	-1.4	SI
SK	60.1	66.1	6.0	44.1	67.1	22.9	70.1	71.4	1.4	49.6	70.4	20.8	14.2	7.5	-6.7	0.3	-0.8	-1.1	2.6	-1.4	-4.0	0.9	-0.7	-1.5	4.1	-0.9	-4.9	0.6	0.2	-0.4	SK
FI	68.6	70.3	1.5	58.4	62.1	3.7	75.1	75.5	0.4	62.7	65.7	3.0	8.4	6.9	-1.6	-1.1	-0.9	0.2	-0.4	-0.5	-0.1	-0.1	-0.7	-0.6	0.6	-0.1	-0.7	1.3	0.3	-1.0	FI
SE	74.6	77.4	2.8	73.7	76.0	2.3	81.3	82.3	1.0	77.7	78.9	1.2	8.2	5.9	-2.3	-0.2	0.9	1.1	2.6	1.3	-1.2	0.9	0.5	-0.4	3.3	1.1	-2.2	1.2	-0.6	-1.8	SE
UK	70.4	74.6	4.2	59.9	70.6	10.7	76.3	79.4	3.1	62.9	73.3	10.4	7.8	6.1	-1.7	0.4	2.2	1.8	0.7	2.8	2.1	0.3	2.7	2.4	0.8	3.2	2.4	-0.1	0.5	0.6	UK
NO	75.5	78.3	2.8	71.2	69.9	-1.4	78.2	79.1	0.9	72.1	70.8	-1.4	3.5	3.6	0.0	-0.2	0.9	1.1	1.5	2.5	1.1	-0.1	1.2	1.3	1.5	2.6	1.1	0.1	0.3	0.1	NO
EU	64.0	68.7	4.7	50.3	67.1	16.8	72.0	74.6	2.7	54.4	70.2	15.8	11.0	6.6	-4.4	-1.3	0.2	1.5	1.2	1.2	0.1	0.1	0.3	0.2	2.0	1.4	-0.6	1.9	0.1	-1.8	EU
EA	63.5	68.4	4.9	50.1	67.3	17.2	72.2	74.3	2.1	54.8	70.7	15.9	12.1	6.7	-5.4	-1.7	-0.3	1.5	1.1	0.6	-0.5	0.0	-0.3	-0.3	2.1	0.7	-1.4	2.4	0.0	-2.4	EA

Source: Commission services, EPC

Table I.2.4.: Long-term projections compared (2015 and 2012): potential GDP growth and its determinants

	Projection exercise 2015										Projection exercise 2012									
	Due to growth in:					Due to growth in:					Due to growth in:					Due to growth in:				
	1-2+5	2-3+4	3	4	5-6+7+8+9	6	7	8	9	10-1+6	1-2+5	2-3+4	3	4	5-6+7+8+9	6	7	8	9	10-1+6
BE	1.7	1.2	0.8	0.4	0.5	0.7	0.0	-0.1	0.0	1.1	0.1	-0.2	-0.1	-0.1	0.3	0.3	0.0	0.0	0.0	-0.2
BG	1.5	2.2	1.3	0.9	-0.8	-0.6	0.1	-0.3	0.0	2.1	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.1
CZ	1.6	1.7	1.1	0.6	-0.1	0.1	0.1	-0.3	0.0	1.5	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	-0.1
DK	1.8	1.5	1.0	0.5	-0.3	0.3	0.1	-0.3	0.0	1.4	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.0	0.2
DE	1.0	1.5	1.0	0.5	-0.6	-0.3	0.1	-0.3	0.0	1.3	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
EE	1.5	2.0	1.2	0.8	-0.6	-0.4	0.1	-0.3	0.0	1.9	0.0	0.0	0.0	0.0	0.0	-0.1	0.2	0.0	0.0	0.1
IE	1.7	1.4	0.9	0.5	0.3	0.2	0.2	-0.2	0.1	1.4	0.0	0.0	0.0	0.0	-0.1	-0.5	0.3	-0.1	0.1	0.1
EL	0.7	1.0	0.7	0.3	-0.3	-0.5	0.5	-0.3	0.0	1.2	0.0	0.0	0.0	0.0	-0.2	-0.5	0.4	0.0	0.0	0.3
ES	1.4	1.4	0.9	0.5	0.0	0.0	0.3	-0.3	0.0	1.4	0.0	0.0	0.0	0.0	-0.2	-0.3	0.1	0.0	0.0	0.1
FR	1.6	1.3	0.8	0.5	0.3	0.3	0.1	-0.1	0.0	1.3	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	-0.1
HR	1.4	1.7	1.1	0.7	-0.4	-0.3	0.2	-0.2	0.0	1.7	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
IT	1.3	1.2	0.8	0.4	0.1	0.2	0.1	-0.2	0.0	1.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	-0.1
CY	1.9	1.4	0.8	0.6	0.5	0.5	0.2	-0.2	0.0	1.3	0.0	0.0	0.0	0.0	0.0	-0.1	0.3	0.0	0.0	0.2
LV	1.6	2.4	1.4	1.0	-0.9	-0.8	0.2	-0.3	0.0	2.3	0.0	0.0	0.2	0.2	-0.2	0.2	0.0	0.0	0.1	0.5
LT	1.2	2.3	1.4	1.0	-1.1	-1.0	0.2	-0.3	0.0	2.3	0.0	0.0	0.0	-0.4	-0.6	0.3	-0.1	-0.1	0.1	0.5
LU	2.5	1.2	0.7	0.4	1.4	1.6	-0.1	-0.1	-0.1	0.9	0.0	0.0	0.0	0.0	0.9	0.9	0.1	0.0	0.0	-0.3
HU	1.5	1.8	1.2	0.6	-0.3	-0.2	0.1	-0.3	0.0	1.6	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.2
MT	1.7	1.4	0.9	0.5	0.3	0.3	0.3	-0.3	0.0	1.5	0.0	0.0	0.0	0.0	0.5	0.4	0.1	0.0	0.0	-0.1
ML	1.2	1.2	0.8	0.4	0.0	0.0	0.1	-0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	-0.2
AT	1.5	1.4	0.9	0.5	0.1	0.3	0.1	-0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	-0.1
PL	1.6	2.2	1.4	0.9	-0.6	-0.3	0.0	-0.3	0.0	1.9	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0
PT	0.9	1.5	1.0	0.5	-0.6	-0.5	0.2	-0.3	0.0	1.4	0.0	0.0	0.0	0.0	-0.4	-0.4	0.1	0.0	0.0	0.1
RO	1.6	2.3	1.4	0.9	-0.7	-0.3	-0.1	-0.3	0.0	1.9	0.0	0.0	0.0	0.3	0.2	0.2	0.0	0.0	0.0	0.4
SI	1.3	1.6	1.0	0.6	0.0	0.0	0.0	-0.3	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.1	0.0
SK	1.5	2.2	1.6	0.8	-0.7	-0.4	0.0	-0.3	0.0	1.9	0.0	0.0	0.0	-0.2	-0.2	0.0	0.0	0.0	0.0	-0.1
FI	1.4	1.3	0.8	0.5	0.1	0.3	0.0	-0.2	0.0	1.1	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	-0.3
SE	2.0	1.5	1.0	0.5	0.6	0.7	0.0	-0.2	0.0	1.4	0.0	0.0	0.0	0.3	0.3	0.1	0.0	0.0	0.0	0.1
UK	1.7	1.2	0.8	0.5	0.4	0.5	0.1	-0.2	0.0	1.2	0.0	0.0	0.0	-0.3	-0.1	0.2	0.0	0.1	0.0	-0.2
NO	2.3	1.5	1.0	0.5	0.8	1.0	-0.1	-0.1	0.0	1.3	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0
EA	1.4	1.4	0.9	0.5	-0.1	0.0	0.1	-0.2	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
EU28	1.4	1.4	0.9	0.5	-0.1	0.1	-0.1	-0.2	0.0	1.3	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0

Source: Commission services, EPC

### 3. SENSITIVITY TESTS

Table I.3.1: Overview of sensitivity tests

Unchanged policy scenarios						Changed policy scenario
Population		Labour force		Productivity		Linking retirement ages with increases in life expectancy
High life expectancy	Lower migration	Higher employment rate	Higher employment rate older workers	Higher/lower labour productivity	Lower TFP (risk scenario)	
A scenario with an increase of life expectancy at birth of two years by 2060 compared with the baseline projection.	A scenario with 20% less migration compared with the baseline projection.	A scenario with the employment rate being 2 p.p. higher compared with the baseline projection for the age-group 20-64. The increase is introduced linearly over the period 2016-2025 and remains 2 p.p. higher thereafter. The higher employment rate is assumed to be achieved by lowering the rate of structural unemployment (the NAWRU).	A scenario with the employment rate of older workers (55-74) being 10 p.p. higher compared with the baseline projection. The increase is introduced linearly over the period 2016-2025 and remains 10 p.p. higher thereafter. The higher employment rate of this group of workers is assumed to be achieved through a reduction of the inactive population.	A scenario with labour productivity growth being assumed to converge to a productivity growth rate which is 0.25 percentage points higher/lower than in the baseline scenario. The increase is introduced linearly during the period 2016-2025, and remains 0.25 p.p. above/below the baseline thereafter.	TFP growth would converge to 0.8%, with convergence to the target rate in 2035 from the latest downturn year, i.e. 2013, and the period of fast convergence limited to 5 years, i.e. until 2040.	Exit probabilities from the labour market are shifted to older ages in line with gains in life expectancy and legislated pension reforms. Potential increase in labour supply due to linking is reduced by 25% to account for older workers leaving prematurely the labour market.

Source: Commission services, EPC

#### 3.1. OVERVIEW OF ALTERNATIVE SCENARIOS

Besides making projections based on the baseline scenario agreed in the AWG, an additional set of seven (unchanged policy) scenarios and one policy scenario are considered to assess the possible impact of various elements on the macroeconomic and budgetary variables.<sup>(34)</sup> Sensitivity tests are an indispensable element of (long-term) budgetary projections, in order to quantify the responsiveness of results to changes in key drivers, such as macroeconomic and population variables, together with policy assumptions, thereby providing "confidence intervals" in order to gauge uncertainty.

In addition to seven sensitivity scenarios a policy change scenario has also been considered, namely linking retirement ages with increases in life expectancy (Table I.3.1).<sup>(35)</sup>

#### 3.2. PROJECTION RESULTS

Developments in GDP growth can be broken down into labour productivity per hour worked and labour input (Table I.3.2). The former turns out to be the key determining factor of (potential) long-term growth (Graph I.3.1 and Table I.3.2). In the

EU as a whole, average per capita GDP growth is projected to fall from 1.3% in the baseline scenario to 1.1% in the risk scenario, while being expected to rise to 1.4% in the policy scenario, and to 1.5% in the high labour productivity scenario.

In the EU, annual average potential GDP growth rates over the period 2013-2060 range from 1.16% in the lower TFP scenario (risk scenario) to 1.59% in the higher labour productivity one, i.e. a 43 basis points difference. This basically reflects changes in labour productivity per hour worked, as changes in labour input growth are smaller, ranging from a minimum of -0.14% in the lower migration scenario to a maximum of 0.06% in the higher employment rate of older workers one, i.e. a 20 basis points difference (Table I.3.2).

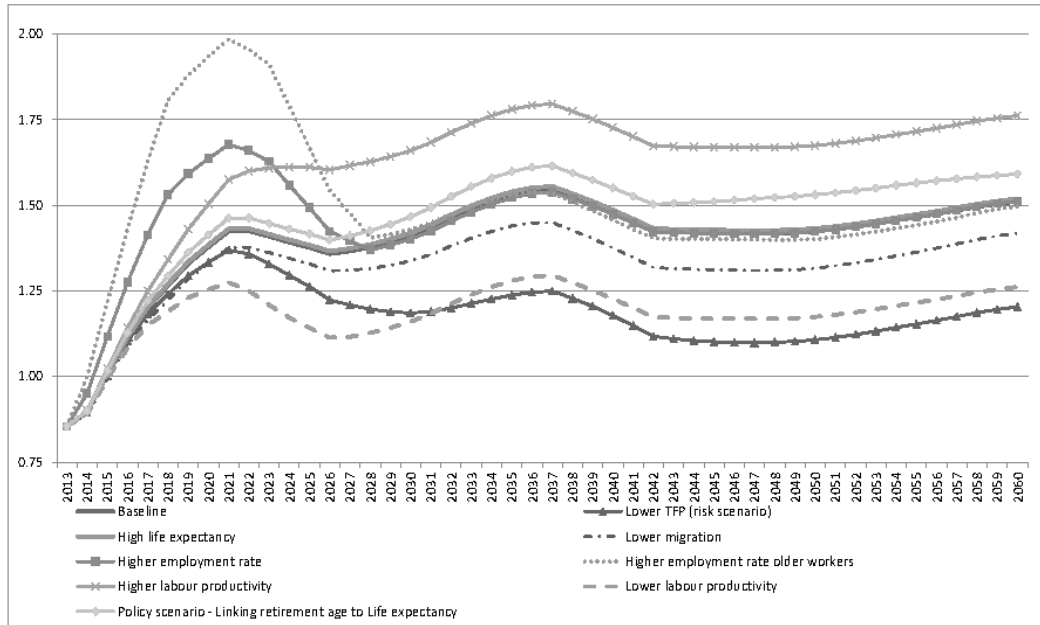
Although overall in the EU, the contribution of labour input is projected to be relatively marginal over the period 2013-2060 (-0.05% in the baseline scenario), in NMS its contribution is projected to be more negative (-0.53% in the baseline scenario), reflecting less favourable demographic developments (Graph I.3.3). However, due to expected positive catching up effects, stronger growth in labour productivity per hour is expected to more than offset labour input developments (Graph I.3.4).

As regards the policy scenario, linking retirement ages with increases in life expectancy partially insures against the risk of a negative productivity shock (i.e. the risk scenario). In fact, in the EU as a whole, in the risk scenario (lower TFP) potential GDP growth is expected to increase only by 1.16%

<sup>(34)</sup> Note the existence in Table I.3.1 of both a higher and a lower labour productivity scenarios.

<sup>(35)</sup> For more details see Part I, Chapter 5, ("Sensitivity tests") of "The 2015 Ageing Report – Underlying assumptions and projection methodologies", European Economy No. 8/2014.

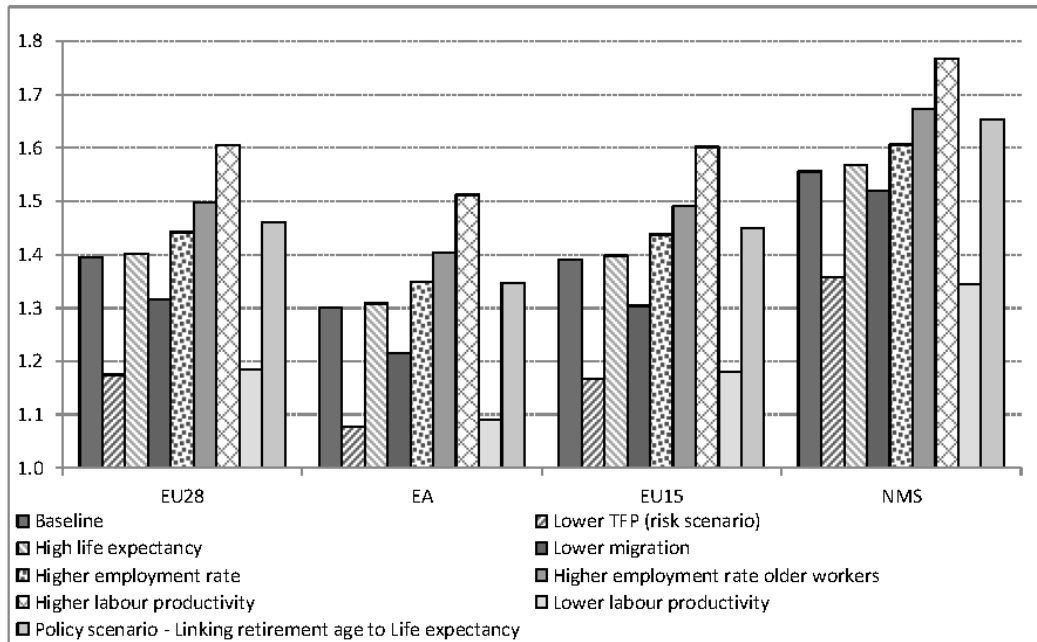
Graph I.3.1: Potential GDP growth rates (five years centred moving average) - European Union



Source: Commission services, EPC

per year (on average over the period 2013-2060) down from 1.38% in the baseline scenario, whereas in the policy scenario, GDP growth is expected to be 1.45%. Conversely, in the high labour productivity scenario, potential GDP growth is project to be at 1.59% (Graph I.3.2).

Graph I.3.2: Potential growth rates in the European Union (average annual values, 2013-2060)



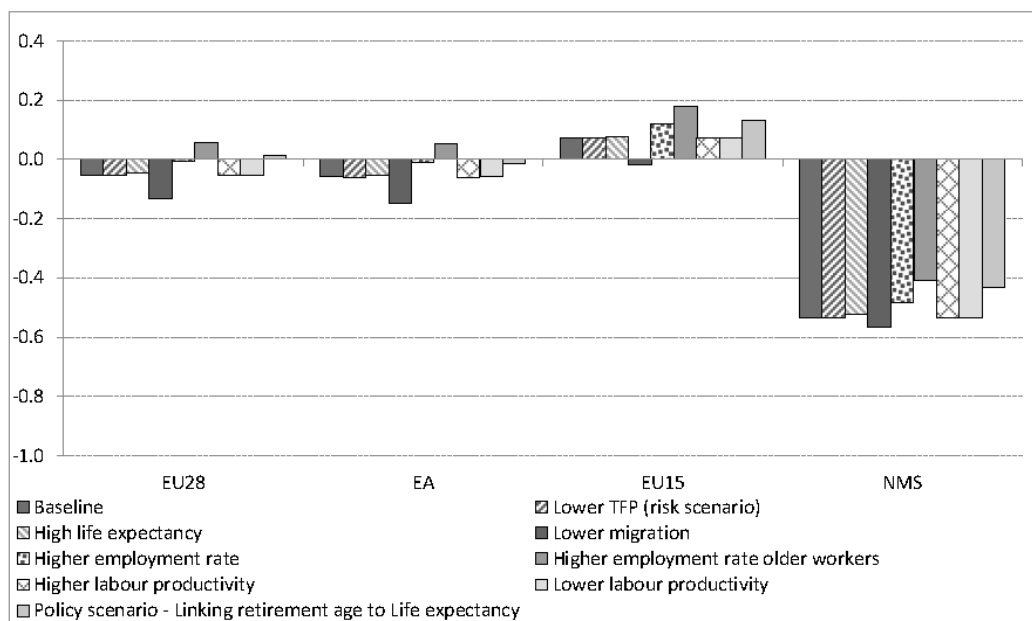
Source: Commission services, EPC

Table I.3.2: Breakdown of potential GDP growth in % by scenario (average annual values, 2013-2060)

Scenario	Labour productivity (GDP per hour worked)		TFP	Capital deepening	Labour input	Total population	Employment rate	Share of working age population	Change in average hours worked	GDP per capita growth in 2013-2060
	1=2+5	2=3+4								
Baseline	1.4	1.4	0.9	0.5	-0.1	0.1	0.1	-0.2	-0.01	1.3
Lower TFP (risk scenario)	1.2	1.2	0.8	0.4	-0.1	0.1	0.1	-0.2	-0.01	1.1
High life expectancy	1.4	1.4	0.9	0.5	0.0	0.1	0.1	-0.2	-0.01	1.3
Lower migration	1.3	1.4	0.9	0.5	-0.1	0.1	0.1	-0.3	-0.02	1.2
Higher employment rate	1.4	1.4	0.9	0.5	0.0	0.1	0.1	-0.2	0.03	1.4
Higher employment rate older workers	1.5	1.4	0.9	0.5	0.1	0.1	0.1	-0.2	0.08	1.4
Higher labour productivity	1.6	1.6	1.1	0.5	-0.1	0.1	0.1	-0.2	-0.01	1.5
Lower labour productivity	1.2	1.2	0.7	0.5	-0.1	0.1	0.1	-0.2	-0.01	1.1
Policy scenario - Linking retirement age to Life expectancy	1.4	1.4	0.9	0.5	0.0	0.1	0.2	-0.2	0.00	1.4

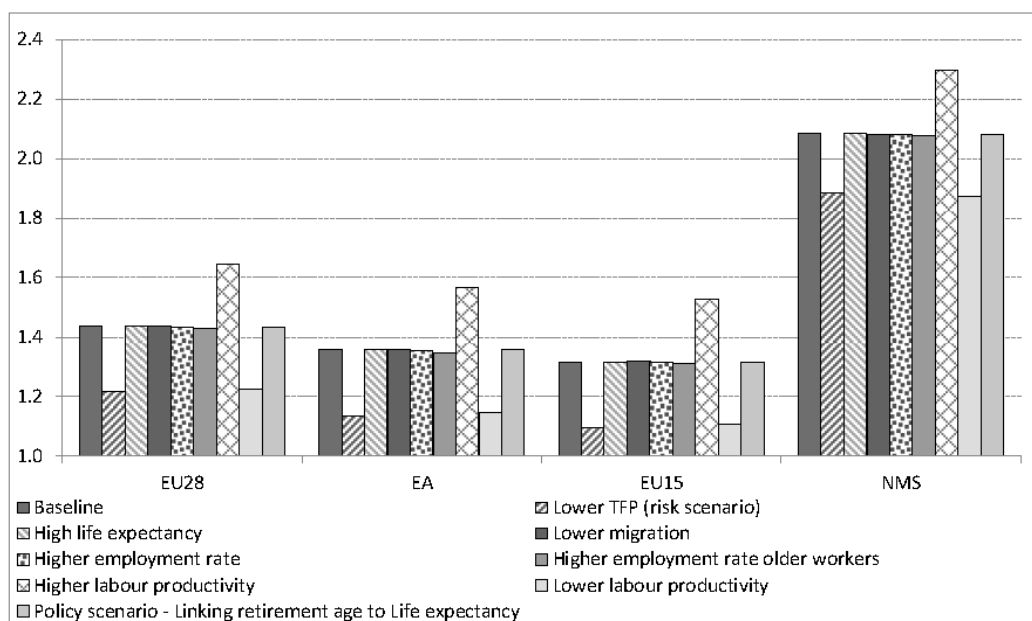
Source: Commission services, EPC

Graph I.3.3: Labour input by country grouping (average annual rates, 2013-2060)



Source: Commission services, EPC

Graph I.3.4: Labour productivity per hour (annual average growth rates, 2013-2060)



Source: Commission services, EPC

# Part II

Long-term projections of age-related  
expenditure and unemployment benefits



# 1. PENSIONS

## 1.1. INTRODUCTION

Given the prominent role of the State in pension provision in the EU countries, the main emphasis of the projections is on public pensions.<sup>(36)</sup> A broad definition of public schemes and other public pensions includes those schemes that are statutory and that the general government sector administers. Public pension schemes affect public finances as they are considered to belong to the general government sector in the national account system. Ultimately, the government bears the costs and risks attached to the scheme.

One of the most crucial parts of the EC-EPC budgetary projection exercise is the assessment of the impact of ageing populations on pension expenditure.

The way public pensions are arranged in the EU varies significantly across Member States. This is due to both different traditions on how to provide retirement income and different phases of the reform process of pension systems. However, a strong public sector involvement in the pension system is a common feature for all EU Member States.

## 1.2. TAXONOMY OF MAIN PENSION SCHEMES IN EU MEMBER STATES

Publicly provided earnings-related pension systems across Member States accumulate entitlements following three broad schemes: defined-benefit (DB), notional defined contribution (NDC) as well as point systems (PS) (see Table II.1.1). In a few Member States, notably in Denmark, the Netherlands, Ireland and the United Kingdom, the public pension system provides in the first instance a flat-rate pension, which can be supplemented by earnings-related private occupational pension schemes (in the UK, also by a public earnings-related pension scheme – State Second Pension – and in Ireland by an earnings-related pension scheme for public service employees).

<sup>(36)</sup> Public pension expenditure include all public expenditure on pension and equivalent cash benefits granted for a long period, see Annex 2 for details on the coverage of the projections of public pension expenditure.

The public pension system is based in most countries on statutory earnings-related old-age pension schemes. This can take the form of a common scheme for all employees or several parallel schemes in different sectors or occupational groups. The type of benefits provided by the public pension systems diverges across countries. Most pension schemes provide not only old-age pensions but also early retirement, disability and survivors' pensions. Some countries, however, have specific schemes for some of these benefit types; in particular, disability benefits in some countries (e.g. Ireland, United Kingdom and Hungary) are not considered as pensions (despite the fact that they are granted for long periods), and in some cases they are covered by the sickness insurance scheme.

In addition, public pension systems usually provide also a (quasi-) minimum guaranteed pension to those who do not qualify for the earnings-related scheme or have accrued only a small earnings-related pension. Minimum guaranteed pensions are either provided through earnings-related schemes or are means-tested and provided by a specific minimum pension scheme or through a general social assistance scheme.

Table II.1.1: Taxonomy of main public pension schemes across Member States

Country	Type	Country	Type
BE	DB	LU	DB
BG	DB	HU	DB
CZ	DB	MT	Flat rate + DB
DK	Flat rate + DB	NL	Flat rate + DB
DE	PS	AT	DB
EE	DB	PL	NDC
IE	Flat rate + DB	PT	DB
EL <sup>(1)</sup>	Flat rate + DB + NDC	RO	PS
ES	DB	SI	DB
FR <sup>(2)</sup>	DB + PS	SK	PS
HR	PS	FI	DB
IT	NDC	SE	NDC
CY	PS	UK	Flat rate + DB
LV	NDC	NO	NDC
LT	DB		

(1) The public supplementary pension funds are NDC since 2015.

(2) Point system refers to the ARRCO and AGIRC pension schemes

DB: Defined benefit system

NDC: Notional defined contribution scheme.

PS: Point system.

Source: Commission services, EPC.

Pensions provided by occupational schemes are those that, rather than being statutory by law, are linked to an employment relationship with the scheme provider. However, in some countries, the occupational pension provision is broadly equivalent to earnings-related public pension schemes. A number of Member States, including Sweden and some new Member States such as Bulgaria, Estonia, Croatia Latvia, Lithuania, Hungary, Poland and Slovakia, have switched part of their public pension schemes into (quasi-) mandatory private funded schemes. Typically, this provision is statutory but the insurance policy is made between the individual and the pension fund. As a consequence, the insured persons have the ownership of pension assets. This means that the owner enjoys the rewards and bears the risks regarding the value of the assets. Participation in a funded scheme is conditional on participation in the public pension scheme and is mandatory for new entrants to the labour market (in Sweden for all non-retired taxpayers), while it is voluntary for older workers (in Lithuania it is voluntary for all). However some of these countries (Hungary, Slovakia and Poland) have recently decided to shift back a part of the private schemes again to public schemes.

The financing arrangements of pension systems also differ across countries. Employment related systems are financed entirely or largely from contributions (usually a percentage of earnings) made by employers, workers or both and are in most instances compulsory for defined categories of workers and their employers. Most public pension schemes work on a pay-as-you-go (PAYG) basis, whereby current contribution revenues are used for the payments of current pensions.

The government is "pro forma" the ultimate guarantor of many benefits. There is a considerable variation between countries regarding the extent to which contribution revenues cover all pension expenditures or just a certain part of it. In many countries, the national government participates in the financing of employment-related as well as other social security programs. In most countries, guaranteed minimum pensions are covered by general taxes and earnings-related schemes are often subsidised to varying degrees from general government funds. The government may indeed contribute through an appropriation from general

revenues based on a percentage of total wages paid to insured workers, finance part or all of the cost of a program, or pay a subsidy to make up any deficit of an insurance fund. In some cases, the government pays the contributions for low-paid workers.<sup>(37)</sup> Social security contributions and other earmarked income are kept in a dedicated fund and are shown as a separate item in government accounts.

Some specific schemes, notably public sector employees' pensions sometime do not constitute a well identified pension scheme but, instead, disbursements for pensions appear directly as expenditure in the government budget. On the other hand, some predominantly PAYG pension schemes have statutory requirements for partial pre-funding and, in view of the increasing pension expenditure, many governments have started to collect reserve funds for their public pension schemes.

While occupational and private pension schemes are usually funded, the degree of their funding relative to the pension promises may differ, due to the fact that future pension benefits can be related either to the salary and career length (defined-benefit system) or to paid contributions.

### 1.3. COVERAGE OF PENSION PROJECTIONS

Pension systems and arrangements are very diverse in the EU Member States, making it difficult to reliably project pension expenditure on the basis of one common model, to be used for all the 28 EU Member States. As for the past exercises, National models were used reflecting in more detail the institutional features of the pension systems in individual countries, highlighting those that should have relevant bearing on the future budgetary outcomes.

Using different, country-specific, projection models may nevertheless introduce an element of heterogeneity of the projection results. Therefore, in order to ensure high quality and comparability of the pension projection results, an in-depth peer review has been carried out by the AWG and the

<sup>(37)</sup> These arrangements are separate from obligations the government may have as an employer under systems that cover government employees.

Commission. The projected figures have been discussed and validated with regard to adherence to the agreed methodology and macroeconomic assumptions, described in Chapter I of this report, and interpretation of the legislation in force in each Member States. <sup>(38)</sup> Annex II provides details on the coverage of the projections.

In order to ensure high quality and comparability of the pension projection results, an in-depth peer review was carried out by the AWG and the Commission at four meetings during September-December 2014. The projection results were discussed and revised where deemed necessary. The projections incorporate pension legislation in place at that time. No further reform measures had been legislated in EU Member States by 1 April 2015 (except PT, see note to the Table II.1.5).

It was found that in some cases, the huge burden of data requested and/or the common macroeconomic assumptions, poses some challenges for the Member States projection models. The table in the Section 1.10 provides an overview of those Member States with scope for improvement in view of the next projection round.

#### 1.4. CHARACTERISTICS OF PENSION SYSTEMS IN EUROPE

##### 1.4.1. Pension system expenditures

The main part of pension entitlements is accrued in the (first) public pension pillar in most Member States. Consequently, the projection exercise has a major focus on public pension expenditure in the first pillar with its main components (minimum, old-age, early retirement, disability and survivors' pensions). On top of that, several Member States have introduced occupational pension schemes and/or private mandatory and voluntary schemes in the 2<sup>nd</sup> and/or 3<sup>rd</sup> pillar of their pension systems.

An overview of the main characteristics of the existing pension schemes in Member States is given in Table II.1.2. It shows whether pensions

are provided on a flat-rate (probably means-tested) or on an earnings-related basis, whether the enrolment in the scheme is mandatory or voluntary, etc. It also informs about the coverage of Member States' current pension projections.

The coverage of public pensions is complete, with the exception of Slovenia that does not project expenditure on minimum pension and/or social allowance. In some countries (e.g. Ireland, the United Kingdom and Hungary), disability benefits are not considered as pensions.

The size and development of public pension expenditure in the future is not only driven by demographic factors, but also by the generosity of the system. Three important drivers of future spending are: i) the definition of pensionable earnings, ii) the valorisation rule as well as iii) the indexation rule (see Table II.1.3). <sup>(39)</sup>

Following reforms over the last decade, a large number of Member States applies pension benefit formulas in which full career earnings are taken as a reference to calculate pension entitlements, hence realising a close relationship between contribution career and pension benefit. In terms of financial sustainability, this leads – *ceteris paribus* – to lower pension expenditures in comparison to countries that calculate pension benefits with a pensionable earnings reference that is restricted to a specific amount of best earnings years or only years at a rather mature stage of the career. One can presume as a rule that a selection of best years or late career years leads to higher pension entitlements as wages are generally higher at the end of the career in comparison to the starting wage. In countries with flat-rate pensions, the pensionable earnings reference is irrelevant (Denmark, the Netherlands, Ireland and United Kingdom).

Valorisation rules define how pension contributions paid during the working life are indexed before retirement. Several countries valorise pension contributions in relation to wage developments (Bulgaria, the Czech Republic, Germany, Spain, Cyprus, Luxemburg, Hungary, Austria, Slovenia, Slovakia, Sweden and Norway).

<sup>(38)</sup> For further details on the legislation in place see the EC-EPC, The 2015 Ageing Report: Underlying Assumptions and Projection Methodologies, European Economy No. 8/2014, [http://ec.europa.eu/economy\\_finance/publications/european\\_economy/2014/pdf/ee8\\_en.pdf](http://ec.europa.eu/economy_finance/publications/european_economy/2014/pdf/ee8_en.pdf)

<sup>(39)</sup> Two further decisive drivers are retirement ages and accrual rates. Both aspects will be discussed separately at a later stage in this chapter.

Other countries apply a mix of wages and prices (Greece, Croatia, Romania, Finland and UK) or a mix of wages (or comparable variables) and GDP growth (Italy) or a pure price valorisation (Belgium, France and Portugal).

One additional way of looking at pensionable earnings reference and valorisation rule is from the angle of the replacement rate and the personal income distribution. Different mixes of the two will result into a higher or lower pension benefit compared to the wage received when working (replacement rate).<sup>(40)</sup> This will determine whether pensioners will be, at retirement, on a higher or lower percentile of the income distribution compared to the pre-retirement position. Under the wage evolution assumptions described above, Member States who target to preserve the average relative position of the new pensioners in the personal income distribution, tend to consider as reference for the pensionable earning a full career wage and to apply a wage valorisation rule. Using the best wages during a career or an average based on recent years as reference for the pensionable earnings tend to preserve the relative income of the pensioners compared to the distribution of wages at retirement. Valorisation rules that do not consider (or do it just partially) the increase in labour productivity, result in lower pension benefits and hence a lower position in the income distribution when retired.

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<sup>(40)</sup> The accrual rate and the contributory period are the other determinants of the pension benefit into an earnings-related system.

Table II.1.2: Pension schemes in EU Member States and projection coverage

Country	Public pensions <sup>(1)</sup>					Private pension scheme		
	Minimum Pension <sup>(2)</sup>	Old-age pensions	Early retirement pensions	Disability pensions	Survivors' pensions	Occupational pension scheme	Mandatory private individual	Voluntary private individual
BE	MT - SA	ER	ER	ER priv FR self-emp	ER	M* priv V* self-emp	X	Yes*
BG	MT - SA	ER	ER	ER	ER	V*	Yes*	Yes*
CZ	FR	ER	ER	ER	ER	X	X	Yes*
DK	FR & MT suppl.	FR & MT suppl.	V	FR	FR	Quasi M	X	Yes*
DE	MT - SA	ER	ER	ER	ER	V*	X	Yes*
EE	MT - SA	ER	ER	ER	ER	M*	Yes*	Yes*
IE	MT - FR & SA	FR - ER	FR - ER/MT	FR - ER/MT	FR - ER/MT	M pub V* priv	X	Yes*
EL	MT - FR	FR & ER	FR & ER	FR & ER	FR & ER	X	X	Yes*
ES	MT	ER	ER	ER	ER	V	X	Yes
FR	MT - SA	ER	ER	ER	ER - MT	V*	X	Yes*
HR	ER	ER	ER	ER	ER	V*	M*	Yes*
IT	MT - SA	ER	ER	ER	ER	V*	X	Yes*
CY	MT & ER	ER	ER	ER	ER	M* - pub V* - priv	X	X
LV	FR - SA	ER	ER	ER	ER	X	Yes*	Yes*
LT	SA	ER	ER	ER	ER	X	quasi M	Yes*
LU	MT - SA	ER	ER	ER	ER	V*	X	Yes*
HU	MT - SA	ER	ER	ER	ER	V*	X	Yes*
MT	MT - SA	FR & ER	X	FR & ER	FR & ER	M*	X	Yes*
NL	SA	FR	X	ER	FR	M	X	Yes*
AT	MT - SA	ER	ER	ER	ER	M*	X	Yes*
PL	ER	ER	ER	ER	ER	V*	Yes*	Yes*
PT	MT - SA	ER	ER	ER	ER	M & V	X	Yes*
RO	SA	ER	ER	ER	ER	X	Yes	Yes
SI	X	ER	ER	ER	ER	V*	X	Yes*
SK	MT - SA	ER	ER	ER	ER	X	Yes*	Yes*
FI	MT	ER	ER	ER	ER	V*	X	Yes*
SE	MT	ER	ER	ER	ER	quasi-M	Yes	Yes
UK	FR & MT - SA	FR-ER, V	X	ER	ER	V*	X	Yes*
NO	FR	ER	X	ER	ER	M*	X	Yes*

(1) Public pension expenditure include all public expenditure on pension and equivalent cash benefits granted for a long period, see Annex 2 for details on the coverage of the projections of public pension expenditure.

(2) Minimum pension corresponds to Minimum pension and other social allowances for older people not included elsewhere.

MT - Mean-tested

FR - Flat rate

ER - Earnings related

SA - Social allowance/assistance

V - Voluntary

M - Mandatory

X - Does not exist

\* Not covered in the projection

Source: Commission services

Table II.1.3: Key parameters of pension system in Europe (old-age pensions)

Country	Pensionable earnings reference	General valorisation variable(s)	General indexation variable(s)
BE	Full career	Prices	Prices and living standard
BG	Full career	Wages	Prices and wages
CZ	Full career	Wages	Prices and wages
DK	Years of residence	Not applicable	Wages
DE	Full career	Wages	Wages plus sustainability factor
EE	Full career	Social taxes	Prices and social taxes
IE	Flat rate	Not applicable	No fixed rule
EL	Full career	Price and wages	Prices and GDP (max 100% prices)
ES	Last 25 years	Wages	Index for pension revaluation
FR	25 best years (CNAVTS)	Prices	Prices
HR	Full career	Price and wages	Price and wages
IT	Full career	GDP	Prices
CY	Full career	Wages	Prices and wages
LV	Full career	Contribution wage sum index	Prices and wages
LT	25 best years	Yearly discretionary decision	Yearly discretionary decision
LU	Full career	Wages	Prices and wages
HU	Full career	Wages	Prices
MT	10 best of last 40 years	Cost of living	Prices and wages
NL	Years of residence	Not applicable	Wages
AT	40 best years	Wages	Prices
PL	Full career	NDC 1st: Wages, NDC 2nd: GDP	Prices and wages
PT	Full career up to a limit of 40 years	Prices	Prices and GDP
RO	Full career	Prices and wages until 2030	Prices and wages until 2030
SI	Best consecutive 24 years	Wages	Prices and wages
SK	Full career	Wages	Prices and wages
FI	Full career	Prices and wages	Prices and wages
SE	Full career	Wages	Wages
UK	Years of insurance contributions	Wages	Wages
NO	Full career	Wages	Wages

(1) A more detailed and comprehensive description of the EU Member States pension systems is in The 2015 Ageing Report – Underlying assumptions and projections methodologies, European Economy 8 – 2014.

BG Pensionable earnings reference is full career starting from 1997. 3 Best years before 1997

CZ Pensionable earnings reference is full career back to 1986. Currently 30 years to be considered.

IE A price and wage indexation rule has been assumed in the projections.

EL Pensionable earnings reference is full career starting from 2011. Before 2011: best 5 of last 10 years/last 5 years.

ES Pensionable earnings reference is last 25 years as of 2022. The maximum value of the valorisation rule is close to prices. The IPR is established annually at a level consistent with a balanced budget of the Social Security system over the medium run. Depending on the balance of the system the indexation will be less than price (budget deficit) or price + 0.5% (budget balance).

FR The pensionable earnings reference is full career in AGIRC and ARRCO. Valorisation rule and indexation rules are price - 1% in both AGIRC and ARRCO in 2014 and 2015. AGIRC: Association générale des institutions de retraite des cadres; ARRCO: Association pour le régime de retraite complémentaire des salariés; CNAVTS: Caisse nationale de l'assurance vieillesse des travailleurs salariés.

LT Pensionable earnings reference is 25 best years after 1994 and 5 best years for the period 1984-1993. A wage indexation rule has been assumed in the projections.

LU Indexation rule is wages if sufficient financial resources available, otherwise only cost of living indexation.

HU Pensionable earnings reference is full career back to 1988.

MT Pensionable earnings reference rule applies to people born as of 1962

AT Pensionable earnings reference is converging towards the best 40 years in 2028. Currently 25 best years

PT Pensionable earnings reference is full career as of 2002. 10 best years out of last 15 before 2002. Price and wage valorisation rule applies to earnings registered between 2002 and 2011

RO Price valorisation and indexation after 2030.

SK Pensionable earnings reference is full career back to 1984.

NO Indexation rule is wage growth minus 0.75 p.p.

UK Triple-lock indexation (highest of average earnings, CPI or 2.5%) is a commitment of the current government, but is not enshrined in law.

Source: Commission services.

Once the average replacement rate at retirement is determined, the additional issue is the indexation of pensions in payment, i.e. how the pension preserves its value over time. Hence, it will state whether the pensioner can expect to maintain its relative position over the personal income distribution over time. In the projections, wages are assumed to evolve in line with price and labour productivity. A nominal wage indexation rule will enable the pensioners to maintain their relative

position in the income distribution. On the contrary, partial nominal wage indexation or price indexation will make the pensioners slide over time towards lower percentiles of the income distribution. Hence, in the aggregate, the generosity of a pension system is affected by:

1. the average replacement rate at retirement and

2. the evolution of the benefit ratio (influenced by indexation rules).<sup>(41)</sup> the evolution of projected minimum pension is presented in section 1.7.3 of this chapter.

Indexation rules applied in the Member States are on average slightly lower than valorisation rules. A majority of countries (21) in the EU applies indexation rules for pensions in payment that do not fully reflect a 1:1 relationship with nominal wage increases: some apply a price indexation rule (France, Italy, Hungary and Austria), others an indexation mix of wages (or comparable variables) and prices (Belgium, Bulgaria, the Czech Republic, Estonia, Croatia, Cyprus, Latvia, Luxembourg, Malta, Poland, Romania,<sup>(42)</sup> Slovenia, Slovakia and Finland) or a mix of GDP growth and prices (Greece, Portugal). Since 2011, the United Kingdom had applied annually a "triple guarantee" (the so called "triple-lock" system), with pensions being increased by the highest of wage growth, inflation or 2.5%; however, indexation to wages, which is the minimum required by law, has been assumed in the projections.

In addition, some countries (Germany, Finland, Spain, Italy, Latvia, Poland, Portugal, Sweden and Norway) have introduced a "sustainability factor" and/or other "reduction coefficients" into the calculation mechanism that determines the amount of pension entitlements. These factors change the size of the pension benefit, depending on expected demographic changes such as the life expectancy at the time of retirement or the ratio between contributions and pensions (see also Box II.1.1).

Moreover, in a few countries there is no explicitly legislated rule guiding the indexation of (minimum) pension benefits (such as Germany, Ireland and Lithuania). In these cases, an approximation of the expected indexation has been made for the purpose of the long-term projection so as to reflect effective constant policy.<sup>(43)</sup>

The legislated indexation rule is of strategic relevance when dealing with the provision of minimum pensions. A more detailed analysis of

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<sup>(41)</sup> See par. 1.7.2 of this chapter for a more detailed analysis of the indicators.

<sup>(42)</sup> Till 2030, than price indexation.

<sup>(43)</sup> Annex III provides an overview of those cases where the legal indexation rule either does not exist or differs from the rules applied in the projection.

**Box II.1.1: Automatic balancing mechanisms, sustainability factors and links to life expectancy in pension systems**

A few Member States that reformed their pension systems in the recent past have formally introduced an "automatic balancing mechanism" and/or other "sustainability factor (benefit linked to life expectancy)" into the specification that determines the amount of pension benefits (Portugal and most recently Spain). The first one copes with the fact that the pension liability, as a main rule, is not indexed with the internal rate of return of the pension system and thus potentially financially unstable. The mechanism ensures that the system will be able to finance its obligations by reducing the indexation or by increasing the contribution until the financial stability is restored. The second instrument consists of introducing a component that changes the size of the pension benefit depending on expected demographic changes such as the life expectancy at the time of retirement. In most of the cases, this leads to a reduction in pension entitlements, having a positive impact on the sustainability of the public pension system as well as on public finances.

In addition, several countries have introduced a link between retirement ages and life expectancy (or age) in their pension system legislation (most recently the Slovak Republic). This approach presents an effective tool for increasing sustainability in public pension systems. Moreover, by increasing retirement ages, people are assumed to accrue more pension rights and thus a higher pension provided that the labour market allows for working longer. Thus, there is also a positive effect on pension adequacy.

Country	Automatic balancing mechanism	Sustainability factor (benefit link to life expectancy)	Retirement age linked to life expectancy
Germany	X		
Finland		X	
Spain	X	X	
Italy		X	X
France*		X	
Latvia		X	
Poland		X	
Portugal		X	X
Sweden	X	X	
Norway		X	
Cyprus			X
Denmark**			X
Greece			X
Netherlands			X
Slovak Republic			X

*Note:* In addition to the reported countries above, in CZ and UK the legislated increase in retirement age to cater for expected life expectancy increases but no automatic rule is legislated. In the UK, the State Pension age has been legislated to rise up to 68 by 2046. Moreover, the *Pensions Act 2014* provides for a regular review of the State Pension age, at least once every six years, taking into account life expectancy. The first review must be completed by May 2017.

\*Pension benefits evolve in line with life expectancy, through the coefficient of 'proratisation'; it has been legislated until 2035 and not thereafter.

\*\*Subject to parliamentary decision.

(Continued on the next page)



Box (continued)

**Germany:** The pension point value, which is generally adjusted annually in relation to the gross wage growth can be altered further on (mainly lowered) by two additional factors: the contribution factor and the sustainability factor:

- The *contribution factor* accounts for changes in the contribution rate to the statutory pension scheme and to the subsidised (voluntary) private pension schemes. An increase of contribution rates will reduce the adjustment of the pension point value.
- The *sustainability factor* that measures the change of the number of (standardized) contributors in relation to the number of (standardized) pensioners, links the adjustment of the pension point value to the changes in the statutory pension scheme's dependency ratio, the ratio of pensioners to contributors.

Additionally, Germany introduced a specific "*pension assurance law*". The pension point value will not decrease in case of decreasing wages. Theoretical decreases of the pension point value are temporarily frozen and will be counterbalanced with future lower increases of the pension point value starting from the year 2011.

**Finland:** The *life-expectancy coefficient* adjusts the pensions upon retirement to the changes in longevity as of 2010. The life expectancy coefficient is the difference of the remaining expected lifetime at age 62 in a particular year compared to the base year 2009, based on population statistics. It cuts the initial pension benefit accordingly. It is possible to counteract the effect of the life expectancy coefficient by postponing retirement.

**Spain:** The *sustainability factor* is an automatic link between the amount of retirement pension benefits and developments in life expectancy of pensioners. It will be applied only once on each pensioner when determining the initial amount of a new pension. It will come into effect in 2019. *New index for pension revaluation (IPR):* All contributory pensions, including minimum pensions and civil servants' pensions, will increase annually according to the Index for Pension Revaluation, instead of the CPI indexation traditionally used. Starting from 2014 the index will be established annually in the National Budget Law at a level consistent with a balanced budget of the Social Security system over the medium run.

**Italy:** Under the NDC regime the amount of pension is calculated as a product of two factors: the total lifelong contributions, capitalised with the nominal GDP growth rate (five-year geometric average) and the *transformation coefficient*, the calculation of which is mainly based on the probability of death, the probability of leaving a widow or widower, and the average number of years for which a survivor's benefit will be drawn. As a consequence, pension amount is proportional to the contribution rate and inversely related to retirement age - the lower the age, the lower the pension and vice-versa. The transformation coefficients are currently available for the age bracket 57-70. For retirement ages falling below (i.e. disability pensions) or above the range, the lowest and the highest transformation coefficients are respectively applied. Transformation coefficients are updated every three years (every two years as of 2021).

*Contribution and age requirements* for early and old age pensions, and old age allowances are *indexed to changes in life expectancy at 65*, as measured by the National Statistical Institute over the preceding three years. Indexation to life expectancy was first applied in 2013 by a purely administrative procedure. Subsequent retirement age indexations are envisaged every 3 years in line with the timing for the revision of the transformation coefficients (every two years as of 2021).

**France:** The amount of pensions in the basic private sector (CNAVTS) is partly depending on the *coefficient of proratisation* " $\text{Min}(1, D/T)$ " with D being the contributory period and T the reference length. The pension is reduced in due proportion whenever  $D < T$ . For people born in 1953 (who will be 63 in 2015), T equals 41.25 years, but *this value will increase in line with life expectancy* after the 2003 and 2014 reforms. This value will increase up to 43 years for people born in 1973.

(Continued on the next page)

Box (continued)

**Latvia, Poland, Sweden and Norway:** The NDC pension systems in Latvia, Poland, Sweden and Norway work on an actuarial basis. At the time of retirement an annuity is calculated by dividing the individual's account value by a *divisor reflecting life expectancy* at the specific date of retirement. An *increase in life expectancy reduces the annual benefit* so that the present value of total expected pension benefits is nearly invariant to changes in the cohort's remaining life expectancy and the individual's retirement age. In general, the individual can counteract the negative effect on the annuity caused by increasing life expectancy by postponing the date of retirement, thus giving strong incentives to prolong the working career.

Moreover, regardless of the demographic or economic development, the Swedish pension system ensures that it will be able to finance its obligations with a fixed contribution rate and fixed rules for calculation of benefits. This is done via an *automatic balancing mechanism* that is activated if the current liabilities of the system are greater than the calculated assets. In this case the indexation is reduced until the financial stability of the system is restored.

**Portugal:** As from 2015, the legal age for the entitlement to the old-age pensions shall vary according to the evolution of life expectancy at the age of 65. The statutory retirement age of 66 has been set by the Government for 2015. Every year the retirement age is increased by 2/3 of the increase in life expectancy at 65 registered 2 years before.

The sustainability factor adjusts pensions upon retirement to changes in life expectancy. The sustainability factor is given by the ratio between the average life expectancy at the age of 65 in 2000 (previously 2006) and the one that will occur in the year before the pension claim. The ratio is updated on an annual basis by the National Statistics Institute. According to the recent reform it is applied to individuals for whom the old age pension is attributed before the legal retirement age.

**Cyprus:** The statutory retirement age will be automatically adjusted every 5 years in line with changes in life expectancy at the statutory retirement age. The reform is to be applied for the first time in 2018 and the first revision will cover the period 2018-2023.

**Denmark:** Changes in the statutory retirement age for old-age pension due to increases in life expectancy have to be confirmed by Parliament 15 years before they take effect (12 years for changes in the VERP age). In the projection, it is assumed that Parliament confirms these increases in the retirement age.<sup>1</sup> A specific formula for calculating the pension age on the basis of future observed mean life expectancy for 60 year olds is enshrined in the legislation. Changes in the pension age shall be calculated every 5 years – based on the latest observed life expectancy – but confirmed by Parliament 15 years before they take effect for old-age pension (12 years for changes in the VERP age).

**Greece:** As from 2021, the minimum and statutory retirement ages will be adjusted in line with changes in life expectancy every three years. Upon its first implementation the change within the 2010-2020 ten-year period shall be taken into account. The (public) supplementary pension scheme became an NDC system on 1.1.2015.

**Netherlands** The eligibility age for the public pension state pension AOW will increase to 67 in 2023. After that year it will be linked to the remaining life expectancy at 65, as projected by Statistics Netherlands. Moreover, the increase in the eligibility age for occupational pensions will also be linked to life expectancy, using the same formula as used for the first pillar pensions.

**Slovak Republic:** Based on the 2012 pension reform, as from 2017, the retirement age will be automatically annually increased by the y-o-y difference of 5-year moving average of the unisex life expectancy.

<sup>1</sup> In case the parliament will not confirm the change in retirement age based on an increase in life expectancy, this would imply an underestimation of public pension expenditure in the Danish projections.

(Continued on the next page)

*Box (continued)*

**United Kingdom.** The Government has legislated for a review of the State Pension age (SPa) to take place at least once every six years. This review would be based on a technical assessment by the "Government Actuary's Department" and an additional report considering other relevant factors. Details of the core principle to guide that review were set out in Autumn Statement 2013: that people should expect to spend on average a third of their adult life (beginning from age 20) in receipt of the state pension, with at least ten years' notice provided and changes being phased in over two years. As legislated in the Pensions Act 2014, SPa is expected to rise up to 68 by 2046. Further increases in line with life expectancy gains would require primary legislation, which has not occurred so far.

Source: Commission services, EPC and information provided by the Member States.

Large differences in pension legislation can be observed not only with respect to indexation rules but also concerning official retirement ages and incentives to postpone retirement. Table II.1.4 shows the statutory retirement age, the early retirement age (in brackets) and reports whether the pension system has penalties for early retirement and bonuses to provide incentives for postponing retirement.

Table II.1.4: Statutory retirement ages, early retirement (in brackets) and incentives to postpone retirement

	MALE				FEMALE				Incentives	
	2013	2020	2040	2060	2013	2020	2040	2060	Penalty	Bonus
BE	65 (60.5)	65 (62)	65 (62)	65 (62)	65 (60.5)	65 (62)	65 (62)	65 (62)		X
BG	63.7 (63.7)	65 (65)	65 (65)	65 (65)	60.7 (60.7)	62.7 (62.7)	63 (63)	63 (63)		X
CZ*	62.7 (59.7)	63.7 (60)	66.5 (61.5)	69.3 (64.3)	59.7 (56.7)	61.7 (58.7)	66.5 (61.5)	69.3 (64.3)	X	X
DK*	65 (60)	66 (63)	70 (67)	72.5 (69.5)	65 (60)	66 (63)	70 (67)	72.5 (69.5)		
DE	65.3 (63)	65.8 (63)	67 (63)	67 (63)	65.3 (63)	65.8 (63)	67 (63)	67 (63)	X	X
EE	63 (60)	63.8 (60.8)	65 (62)	65 (62)	62 (59)	63.8 (60.8)	65 (62)	65 (62)	X	X
IE	65 (65)	66 (66)	68 (68)	68 (68)	65 (65)	66 (66)	68 (68)	68 (68)		
EL*	67 (62)	67 (62)	69.9 (64.9)	71.9 (66.9)	67 (62)	67 (62)	69.9 (64.9)	71.9 (66.9)	X	
ES	65 (63)	65.8 (63)	67 (63)	67 (63)	65 (63)	65.8 (63)	67 (63)	67 (63)	X	X
FR	65.8 (60.8)	67 (62)	67 (62)	67 (62)	65.8 (60.8)	67 (62)	67 (62)	67 (62)	X	X
HR	65 (60)	65 (60)	67 (62)	67 (62)	60.8 (55.8)	62.5 (57.5)	67 (62)	67 (62)	X	X
IT*	66.3	66.8	68.4 (65.4)	70 (67)	62.3	66.8	68.4 (65.4)	70 (67)		
CY*	65 (63)	65 (63)	67 (65)	69 (67)	65 (63)	65 (63)	67 (65)	69 (67)	X	
LV	62 (60)	63.8 (61.8)	65 (63)	65 (63)	62 (60)	63.8 (61.8)	65 (63)	65 (63)		
LT	62.8 (57.8)	64 (59)	65 (60)	65 (60)	60.7 (55.7)	63 (58)	65 (60)	65 (60)	X	X
LU	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)	65 (57)		
HU	62 (62)	64.5 (64.5)	65 (65)	65 (65)	62 (62)	64.5 (64.5)	65 (65)	65 (65)		X
MT	62 (61)	63 (61)	65 (61)	65 (61)	62 (61)	63 (61)	65 (61)	65 (61)		
NL*	65.1 (65.1)	66.3 (66.3)	69.3 (69.3)	71.5 (71.5)	65.1 (65.1)	66.3 (66.3)	69.3 (69.3)	71.5 (71.5)		
AT	65 (62)	65 (62)	65 (62)	65 (62)	60 (58.8)	60 (60)	65 (62)	65 (62)	X	X
PL	65.3 (65.3)	67 (67)	67 (67)	67 (67)	60.3 (60.3)	62 (62)	67 (67)	67 (67)		
PT*	65 (55)	66.4 (55)	67.7 (55)	68.8 (55)	65 (55)	66.4 (55)	67.7 (55)	68.8 (55)	X	X
RO	64.7 (59.7)	65 (60)	65 (60)	65 (60)	59.7 (54.7)	61.4 (56.4)	63 (58)	63 (58)		
SI	65 (58.3)	65 (60)	65 (60)	65 (60)	63.5 (58)	65 (60)	65 (60)	65 (60)	X	X
SK*	62 (60)	62.8 (60.8)	65.4 (63.4)	67.8 (65.8)	58.3 (56.3)	62.8 (60.8)	65.4 (63.4)	67.8 (65.8)	X	X
FI	66 (62)	66 (63)	66 (63)	66 (63)	66 (62)	66 (63)	66 (63)	66 (63)	X	X
SE	67 (61)	67 (61)	67 (61)	67 (61)	67 (61)	67 (61)	67 (61)	67 (61)		
UK	65 (65)	66 (66)	66.7 (66.7)	68 (68)	61 (61)	66 (66)	66.7 (66.7)	68 (68)		X
NO	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)	67 (62)		

(1) An in-depth peer review was carried out by the AWG and the Commission at four meetings during September-December 2014. The projections incorporate pension legislation in place at that time. No further reform measures has been legislated in EU Member States by 1 April 2015 (except Portugal). Statutory retirement ages and early retirement ages as reported in the country fiche. Age requirement for early retirement is not necessarily the only eligibility criteria and it is often associated to contribution requirement (or other equivalent parameters) significantly higher than those foreseen for the statutory retirement age.

CZ - Statutory retirement age depending on the number of children. Values for women with 2 children are reported.

IT - In 2013, female SRA refers to private sector employees (the self-employed 63.8, public employees 66.3). In bracket the minimum age for early retirement under the NDC system (a minimum amount of pension of 2.8 times the old age allowance is also required). Early retirement is also allowed regardless of age, with a contribution requirement of 42.5 years (41.5 for female) in 2014, indexed to changes in life expectancy.

PT - Early retirement suspended for employees in the social security scheme in 2013. Since January 2015 retirement age is reduced by 4 months a year exceeding the 40th for workers with insurance careers longer than 40 years (applied to worker aged more than 60 in 2015). Reform not considered in the pension projections.

SE - Retirement age flexible from age of 61 without an upper limit. Under the Employment Protection Act, an employee is entitled to stay in employment until his / her 67th birthday.

\*Countries where statutory retirement age is legislated to increase in line with increase in life expectancy. Reported retirement ages calculated according to life expectancy increases as from EUROPOP 2013 demographic projections.

Actuarial equivalence is not considered as a penalty/bonus.

Source: Commission services, EPC.

These 3 parameters of the pension system, the statutory retirement age, the early retirement schemes and the presence of incentives, influence the retirement behaviour of individuals. <sup>(44)</sup> Early retirement schemes and/or other government measures that provide pension income before reaching the official retirement age threshold create an opportunity to exit the labour market in advance. One way to increase the effective exit age

from the labour market (and also the effective retirement age) in line with an increase in the statutory retirement would hence be to extend the required years of contributions or to improve incentives to stay longer on the labour market, e.g. by restricting early retirement as well increasing employment opportunities for older workers or applying penalties and bonuses in the pension calculation for those who exit the market earlier/late (e.g. France). Another way is to introduce financial incentives to stay longer in the labour market to be entitled to a higher amount of pensions after retirement.

<sup>(44)</sup> Needless to say the exit from the labour market is influenced also by other policies and institutional factors like the adoption of active labour market policy, active ageing, etc.

Table II.1.5: Average effective exit age from the labour market by gender

	MALE					FEMALE				
	2014	2020	2040	2060	Change 2014 -2060	2014	2020	2040	2060	Change 2014 -2060
BE	61.9	62.1	62.1	62.1	0.2	62.1	62.3	62.4	62.4	0.3
BG	63.8	64.8	64.8	64.8	1.0	62.0	62.5	62.5	62.5	0.5
CZ*	63.1	63.4	64.9	66.3	3.2	60.7	61.4	64.4	66.3	5.6
DK*	65.6	66.2	67.3	67.9	2.3	63.4	65.3	66.1	67.7	4.4
DE	65.1	65.4	65.7	65.7	0.6	64.2	64.6	65.3	65.3	1.0
EE	64.4	64.7	65.4	65.4	1.0	64.2	64.6	65.0	65.0	0.8
IE	64.9	65.3	66.0	66.0	1.2	64.8	65.4	66.1	66.1	1.2
EL*	64.4	64.9	66.9	67.5	3.1	64.5	64.8	66.3	67.1	2.6
ES	62.8	64.8	66.1	66.2	3.4	64.1	65.8	66.6	66.7	2.6
FR	60.8	62.3	63.1	63.1	2.3	60.9	62.3	63.1	63.1	2.2
HR	62.4	62.6	64.0	64.0	1.6	61.4	61.9	63.7	63.7	2.3
IT*	62.4	65.9	66.4	67.3	4.9	62.1	65.5	66.4	67.5	5.4
CY*	64.9	66.4	67.0	67.7	2.7	62.8	65.6	66.4	67.4	4.5
LV	64.6	65.0	65.3	65.3	0.7	64.0	64.7	65.3	65.3	1.3
LT	62.8	63.6	64.3	64.3	1.5	61.9	62.8	63.8	63.8	1.9
LU	60.2	60.2	60.2	60.2	0.0	60.9	60.9	60.9	60.9	0.0
HU	63.0	64.7	65.3	65.3	2.3	63.0	64.4	64.9	64.9	1.9
MT	62.0	63.1	64.0	64.0	2.0	61.0	62.0	62.6	62.6	1.6
NL*	65.5	66.6	67.5	68.1	2.7	63.7	64.6	65.5	66.2	2.5
AT	62.5	64.0	64.2	64.2	1.8	61.0	62.2	63.2	63.2	2.1
PL	63.9	66.0	66.0	66.0	2.1	60.2	62.0	65.8	65.8	5.6
PT*	64.3	65.3	66.5	66.7	2.4	63.9	65.1	66.0	66.2	2.3
RO	64.0	64.0	64.0	64.0	0.0	62.3	62.4	62.6	62.6	0.3
SI	62.5	64.1	64.1	64.1	1.6	60.0	63.6	63.6	63.6	3.7
SK*	61.6	61.9	63.6	66.2	4.6	59.7	61.7	63.3	65.9	6.2
FI	63.6	64.1	64.1	64.1	0.5	63.1	63.9	63.9	63.9	0.7
SE	65.8	65.6	65.6	65.6	-0.2	64.5	64.4	64.4	64.4	0.0
UK	64.9	64.9	65.6	65.8	0.9	63.6	64.2	65.8	65.8	2.2
NO	65.6	65.6	65.6	65.6	0.0	64.7	64.7	64.7	64.7	0.0
EU	63.6	64.4	65.0	65.3	1.7	62.6	63.6	64.5	64.8	2.3
EA	63.2	64.2	64.9	65.2	2.0	62.6	63.8	64.5	64.8	2.3

(1) In order to ensure high quality and comparability of the pension projection results, an in-depth peer review was carried out by the AWG and the Commission at four meetings during September-December 2014. The projections incorporate pension legislation in place at that time. No further reform measures has been legislated in EU Member States by 1 April 2015 (except Portugal, see the Note to Table II.1.4). The average effective exit age from the labour market calculation is based on the Cohort Simulation Model cumulated exit probabilities for the reference age group 51-74.

\*Countries where the statutory retirement age is legislated to increase in line with increase in life expectancy.

Source: Commission services, EPC.

Average effective exit ages from the labour market as the result of the factor mentioned above, are shown in Table II.1.5. In most of the countries, latter figures are lower than the statutory retirement age.

The statutory retirement age under current legislation (as from Table II.1.4) and the effective exit age from the labour market (as from Table II.1.5) have been reported by gender. <sup>(45)</sup> As a result of recent reforms in many Member States, retirement ages for males and females will gradually converge for all Member States except for Bulgaria and Romania. In almost every Member State, statutory retirement ages and

effective exit ages from the labour market will rise substantially until 2060, with major steps often taking place within this decade. When looking at EU and EA aggregates the average effective exit age for both men and women is estimated to increase by almost 1 year by 2020 and another additional year in the following 40 years. This is either due to already legislated pension reforms setting a specific retirement age in the future or to the fact that Member States have introduced a connection between retirement ages and life expectancy in their legislations (Czech Republic, Denmark, Greece, Italy, Cyprus, Netherland, Portugal and the Slovak Republic). <sup>(46)</sup> Yet, in most of the Member States, the rise in the statutory retirement ages does not fully reflect the total expected change in life expectancy.

<sup>(45)</sup> The statutory retirement ages are applied as such in the projections. Figures concerning the average effective exit age from the labour market for 2014 - 2060 are projected figures based on the commonly agreed macroeconomic assumptions for this projection round and the Cohort Simulation Model.

<sup>(46)</sup> See also Box II.1.1 on sustainability factors in pension systems.

Table II.1.6: Duration of retirement by gender

	MALE					FEMALE				
	2014	2020	2040	2060	Change 2014 -2060	2014	2020	2040	2060	Change 2014 -2060
BE	20	20.7	22.9	24.9	4.9	23.7	24.4	26.4	28.3	4.6
BG	14.8	15	17.7	20.3	5.5	19.9	19.9	22.6	25.2	5.3
CZ*	17.2	18	19	20.4	3.2	22.7	23.5	23.2	23.6	0.9
DK*	16.9	17.5	18.7	19.7	2.8	22	21.1	22.4	22.6	0.6
DE	18.1	18.7	20	21.8	3.7	21.9	21.7	23.7	25.6	3.7
EE	15.6	15.9	18.5	21	5.4	21	20.9	23.1	25.1	4.1
IE	18.2	18.8	19.9	21.7	3.5	21.1	21.8	23	24.9	3.8
EL*	18.9	18.8	19.2	20.1	1.2	21.8	21.5	22.6	23.6	1.8
ES	20.2	19.3	20.3	22	1.8	23.5	22.2	22.9	24.5	1
FR	22.1	21.9	23	24.8	2.7	26.5	26.1	26.9	28.4	1.9
HR	17.2	17.3	19.2	21.7	4.5	22.3	22.2	22.8	25.1	2.8
IT*	21	18.3	20.1	20.9	-0.1	24.7	22.6	23.5	23.3	-1.4
CY*	18.4	18.1	19.1	19.9	1.5	22.7	20.5	22.4	23.3	0.6
LV	13.9	14.8	17.7	20.4	6.5	19.3	19.4	21.9	24.2	4.9
LT	15.5	15.9	18.8	21.5	6	21.7	21.7	23.3	25.5	3.8
LU	22.6	23.3	25.4	27.3	4.7	25.6	26.2	28.1	29.8	4.2
HU	15.8	15.5	18.2	20.8	5	19.8	19.9	21.7	24.1	4.3
MT	20.7	20.4	21.5	23.3	2.6	24.9	24.7	25.8	27.6	2.7
NL*	18.1	17.1	18.1	19.8	1.7	21.9	21.7	22.8	24.6	2.7
AT	20.3	19.4	21.4	23.3	3	24.7	24.5	25.6	27.4	2.7
PL	16.2	15.7	18.2	20.5	4.3	23.8	22.9	21.9	24	0.2
PT*	18.5	18.3	19.5	20.6	2.1	22.2	21.9	22.9	24.7	2.5
RO	15.3	16.2	18.9	21.5	6.2	20.2	21.1	23	25.6	5.4
SI	18.7	18.7	20.9	22.9	4.2	25.3	22.5	24.5	26.4	1.1
SK*	16.8	17.7	19.1	20	3.2	22.7	21.9	23.6	23.3	0.6
FI	18.6	19.3	21.3	23.2	4.6	23.3	23	24.9	26.6	3.3
SE	17.9	18.4	20.2	21.8	3.9	22.1	22.7	24.7	26.5	4.4
UK	18.5	19.1	20.1	21.8	3.3	21.8	22.5	22.8	24.6	2.8
NO	17.7	18.2	20	21.7	4	21.2	21.8	23.8	25.6	4.4
EU	18.1	18.1	19.9	21.7	3.7	22.6	22.3	23.7	25.3	2.7
EA	18.7	18.7	20.4	22.1	3.3	23.1	22.6	24.1	25.6	2.6

(1) Duration of retirement is calculated on the basis of life expectancy at average effective exit age from the labour market as from the EUROPOP 2013.

\*Countries where statutory retirement age is legislated to increase in line with increase in life expectancy.

Source: Commission services, EPC.

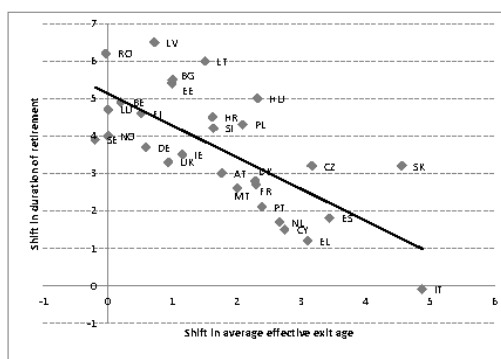
Indeed, when looking at Table II.1.6, where data on estimated duration of retirement are reported, it is evident that at both EU and EA level, current pension legislation entails 3 additional years of retirement for men and around 2 for women by 2060. <sup>(47)</sup> Not surprisingly in those Member States that have legislated an automatic, or other kind of link to life expectancy (Italy, Cyprus, Czech Republic, Denmark, Greece, Netherland, Portugal and Slovak Republic) the duration of retirement is estimated to increase less or even to decline (Italy). On average, in these countries, the duration of retirement is projected to be almost 2 year lower (1.9 for men and 0.9 years for women) compared to the EU average, reflecting generally higher increases in the statutory retirement age than life

expectancy in the coming decade (i.e. the legislated increase for women in the Czech Republic).

Graph II.1.2 and Graph II.1.1 show, by gender, the inverse relationship that exists between the increase in the effective retirement age and the shift in duration of retirement.

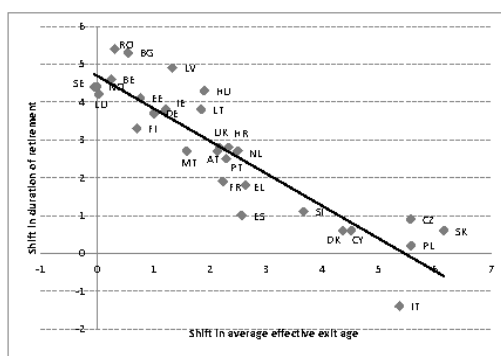
<sup>(47)</sup> Duration of retirement is measured as remaining years of life at average effective exit age from the labour market as from life expectancy data calculated in the EUROPOP 2013.

Graph II.1.1: Increase in the average effective exit age from the labour market versus shift in duration of retirement over the period 2013 – 2060 - MEN



Source: Commission services, EPC.

Graph II.1.2: Increase in the average effective exit age from the labour market versus shift in duration of retirement over the period 2013 – 2060 - WOMEN



Source: Commission services, EPC.

Luxemburg (men and women) and Belgium, France, and Romania (women).

Men are estimated to spend 28.3% of their adult life at retirement in 2014 and 31.5% in 2060 when looking at EU level (EA: 29.3 in 2014, 31.9% in 2060) (see Table II.1.8).<sup>(49)</sup> Women are already spending more than 30% of their adult life at retirement (33.6% for EU and 34.1% for EA). The share for women is projected increase by the half compared to men (1.5% at EU level and 1.3% at EA level) in 2060, after a gradual decrease till 2020. The highest values in 2060 are registered for Luxemburg (39.3% for men and 41.0% for women) while values higher than 38% are calculated for Belgium, France and Malta (women).

Similar evidence on the potential pressures on the sustainability of the pension system are reported in Table II.1.7 and Table II.1.8, where indicators on the duration of retirement over the length of working career and over adult life have been calculated.<sup>(48)</sup> The share of retirement compared to working career is estimated to increase by around 7 percentage points (from 43.5% to 50.4% at EU level and from 45.5% to 51.4% in the EA) for men. The estimated increase for women is around 3 percentage points (from 58.0% to 61.8% at EU level and from 59.1% to 62.3% in the EA) but starting from a share close to 60%. Values higher than 70% in 2060 are registered for

<sup>(48)</sup> The average length of the working career is calculated as the difference between the average exit age and the average entry age.

<sup>(49)</sup> Adult life spent at retirement is defined as the ratio between life expectancy at the average effective exit age from the labour market and the estimated age of death (coherent with life expectancy at effective retirement age) minus 18.

Table II.1.7: Duration of retirement over average length of working career by gender

	MALE					FEMALE				
	2014	2020	2040	2060	Change 2014 -2060	2014	2020	2040	2060	Change 2014 -2060
BE	51.1	52.8	58.3	63.4	12.3	61.8	63.7	68.9	73.9	12.1
BG	36.1	36.0	42.4	48.7	12.6	54.0	53.8	61.2	68.2	14.2
CZ*	42.1	43.8	44.6	46.4	4.4	64.6	65.9	59.9	58.2	-6.3
DK*	39.3	40.4	42.1	43.7	4.4	54.6	50.2	52.2	50.8	-3.8
DE	41.0	42.2	44.9	48.9	7.8	52.2	51.5	55.4	59.8	7.6
EE	36.3	36.9	42.3	48.0	11.7	50.7	50.3	55.1	59.8	9.2
IE	42.5	43.6	45.3	49.4	6.9	51.0	52.0	54.0	58.5	7.5
EL*	45.2	44.4	43.4	44.8	-0.5	53.9	52.8	53.6	54.9	1.0
ES	49.7	45.2	46.2	49.9	0.2	57.1	51.9	52.6	56.2	-0.9
FR	56.3	53.8	55.4	59.8	3.5	70.7	67.2	67.9	71.7	1.0
HR	43.1	43.1	46.2	52.2	9.2	60.3	59.7	58.5	64.4	4.1
IT*	54.7	43.7	47.4	48.3	-6.4	68.7	57.8	58.8	56.7	-12.1
CY*	41.9	40.1	41.8	42.9	1.0	56.5	47.9	51.4	52.3	-4.2
LV	32.3	34.2	40.6	46.8	14.5	47.4	47.1	52.4	57.9	10.6
LT	38.1	38.5	44.8	51.2	13.1	57.0	55.7	58.4	63.9	6.9
LU	59.8	62.2	67.8	72.9	13.0	69.8	71.9	77.1	81.7	12.0
HU	39.5	37.2	43.0	49.2	9.7	52.8	51.3	55.2	61.3	8.5
MT	49.1	47.3	48.9	53.0	3.9	62.3	60.9	62.6	66.9	4.7
NL*	40.8	37.8	39.2	42.3	1.6	52.4	51.5	52.8	56.1	3.7
AT	48.0	44.3	48.7	53.0	5.0	63.3	60.9	62.2	66.6	3.4
PL	38.9	35.9	41.6	46.9	8.0	67.2	61.7	53.4	58.6	-8.6
PT*	44.1	42.6	44.2	46.5	2.4	54.1	52.0	53.3	57.2	3.1
RO	37.8	40.1	46.8	53.2	15.4	55.4	58.0	62.9	70.0	14.6
SI	46.9	45.4	50.7	55.6	8.7	69.1	56.1	61.1	65.8	-3.3
SK*	42.0	44.3	45.9	45.2	3.2	67.0	61.7	63.5	58.7	-8.4
FI	44.7	45.9	50.7	55.2	10.4	57.8	56.2	60.8	65.0	7.1
SE	39.9	41.3	45.4	49.0	9.1	51.8	53.4	58.1	62.4	10.6
UK	40.9	42.3	43.8	47.3	6.4	51.3	52.5	51.2	55.3	4.0
NO	39.4	40.9	44.9	48.8	9.4	48.7	50.5	55.1	59.3	10.6
EU	43.5	43.0	46.5	50.4	6.9	58.0	56.1	58.3	61.8	3.7
EA	45.5	44.5	47.7	51.4	5.9	59.1	56.3	59.1	62.3	3.2

(1) Duration of retirement calculated on the basis of life expectancy at average effective exit age from the labour market as from EUROPOP 2013.

\*Countries where statutory retirement age is legislated to increase in line with increase in life expectancy.

Source: Commission services, EPC.



Table II.1.8: Percentage of adult life spent at retirement by gender

	MALE					FEMALE				
	2014	2020	2040	2060	Change 2014 -2060	2014	2020	2040	2060	Change 2014 -2060
BE	31.3	31.9	34.2	36.1	4.8	34.9	35.5	37.3	38.9	4.0
BG	24.4	24.3	27.4	30.2	5.8	31.2	30.9	33.7	36.1	5.0
CZ*	27.6	28.4	28.8	29.7	2.1	34.7	35.1	33.3	32.8	-1.9
DK*	26.2	26.6	27.5	28.3	2.1	32.7	30.8	31.8	31.2	-1.4
DE	27.8	28.3	29.5	31.4	3.6	32.1	31.8	33.4	35.1	3.0
EE	25.2	25.4	28.1	30.7	5.5	31.2	31.0	32.9	34.8	3.6
IE	28.0	28.4	29.3	31.1	3.2	31.1	31.5	32.4	34.1	3.1
EL*	28.9	28.6	28.2	28.9	-0.1	31.9	31.5	31.9	32.5	0.5
ES	31.1	29.2	29.7	31.3	0.2	33.8	31.7	32.0	33.5	-0.3
FR	34.0	33.1	33.8	35.5	1.4	38.2	37.1	37.3	38.6	0.4
HR	27.9	28.0	29.4	32.0	4.1	33.9	33.6	33.3	35.4	1.5
IT*	32.1	27.7	29.3	29.8	-2.3	35.9	32.2	32.7	32.0	-3.9
CY*	28.2	27.2	28.0	28.6	0.4	33.6	30.1	31.7	32.1	-1.5
LV	23.0	24.0	27.2	30.1	7.1	29.6	29.3	31.6	33.8	4.3
LT	25.7	25.8	28.9	31.7	6.0	33.1	32.6	33.7	35.8	2.7
LU	34.9	35.6	37.6	39.3	4.4	37.4	37.9	39.6	41.0	3.6
HU	26.0	24.9	27.8	30.5	4.5	30.6	30.0	31.6	34.0	3.4
MT	32.0	31.1	31.9	33.6	1.6	36.6	36.0	36.6	38.2	1.6
NL*	27.6	26.0	26.8	28.3	0.7	32.4	31.8	32.4	33.8	1.4
AT	31.3	29.6	31.6	33.5	2.2	36.5	35.6	36.2	37.8	1.3
PL	26.1	24.7	27.5	29.9	3.8	36.0	34.2	31.4	33.4	-2.6
PT*	28.6	27.9	28.7	29.7	1.2	32.6	31.7	32.3	33.9	1.3
RO	24.9	26.0	29.1	31.9	6.9	31.3	32.2	34.0	36.5	5.1
SI	29.6	28.8	31.2	33.2	3.6	37.6	33.0	34.9	36.6	-1.0
SK*	27.8	28.7	29.5	29.3	1.5	35.2	33.4	34.2	32.7	-2.5
FI	29.0	29.5	31.6	33.5	4.5	34.0	33.4	35.2	36.7	2.7
SE	27.2	27.9	29.8	31.4	4.2	32.2	32.8	34.7	36.3	4.1
UK	28.3	28.9	29.7	31.3	3.0	32.3	32.8	32.3	34.0	1.6
NO	27.1	27.7	29.6	31.3	4.2	31.2	31.8	33.8	35.4	4.2
EU	28.3	28.1	29.7	31.5	3.1	33.6	32.8	33.7	35.1	1.5
EA	29.3	28.8	30.3	31.9	2.6	34.1	33.0	34.1	35.4	1.3

(1) Adult life spent at retirement is defined as the ratio between the life expectancy at average effective exit age and the estimated age of death (coherent with life expectancy at effective retirement age) minus 18.

\* Countries where the statutory retirement age is legislated to increase in line with increase in life expectancy.

Source: Commission services, EPC.