The 2015 Ageing Report

Economic and budgetary projections for the 28 EU Member States (2013–2060)

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Economic and budgetary projections for the 28 EU Member States (2013-2060)
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 Ekefeldt, 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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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, (1) 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; (2) 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

---

(1) 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 1st for future 1+10 projection exercises, the impact of this agreement is not reflected in AR15 spending projections.

model(s), reflecting current pension legislation. \(^{(1)}\) 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.

\(^{(1)}\) 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).
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. (4) 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. (5) Consequently, the gender gap is projected to narrow substantially in the period up to 2060. The total

(4) Eurostat’s population projection (EUROPOP2013) was published on 28 March 2014.
(5) 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, (6) 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.

(6) 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).
Executive Summary

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, 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). 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).

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.

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(1) 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.

(2) 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

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. 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 five 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.

\(^{(*)}\) See footnote 3.
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.
The TFP risk scenario primarily affects pension expenditure, projected to rise by ½ 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 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 conservable 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, (10) 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. (11)

Over the period 2013-2060, the increase in the EU is 1 ½ pp. of GDP and in the EU and EA, compared with a projected increase of 3 ½ pp. of GDP in the 2012 Ageing Report (see Graph 6). The largest
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.
### Executive Summary

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

<table>
<thead>
<tr>
<th>Age-related spending, percentage points of GDP, 2013–2060</th>
<th>Pensions</th>
<th>Health-care</th>
<th>Long-term care</th>
<th>Education</th>
<th>Strictly age-related items</th>
<th>Unemployment benefits</th>
<th>Total age related items</th>
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<tr>
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<tr>
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<td>1.7</td>
</tr>
</tbody>
</table>

(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 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 have 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

<table>
<thead>
<tr>
<th>Country</th>
<th>Pension</th>
<th>Health Care</th>
<th>Long-term Care</th>
<th>Education</th>
<th>Strictly age-related items</th>
<th>Unemployment Benefits</th>
<th>Total Age Related Items</th>
</tr>
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<tr>
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<td>0.8</td>
<td>0.8</td>
</tr>
</tbody>
</table>
| Source: Commission services, EPC.
### Table 3: Overview of the 2015 long-term budgetary projections – AWG risk scenario

<table>
<thead>
<tr>
<th>Category</th>
<th>Pensions</th>
<th>Health-care</th>
<th>Long-term care</th>
<th>Education</th>
<th>Strictly age-related items</th>
<th>Unemployment benefits</th>
<th>Total age-related items</th>
</tr>
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<tr>
<td><strong>2013 level CH</strong></td>
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<td>3.4</td>
<td>3.3</td>
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<td><strong>2013-40 CH</strong></td>
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<tr>
<td><strong>2013 level CH</strong></td>
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<td>1.9</td>
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<tr>
<td><strong>2013-40 CH</strong></td>
<td>6.6</td>
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<td><strong>2013-60 CH</strong></td>
<td>5.7</td>
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<td>6.0</td>
<td>0.4</td>
<td>0.4</td>
<td>2.1</td>
</tr>
</tbody>
</table>

**Source:** Commission services, EPC.

(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.
Part I

Underlying demographic and macroeconomic assumptions
1. DEMOGRAPHIC ASSUMPTIONS

1.1. POPULATION PROJECTIONS

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

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

As was the case with the previous EUROPOP2010 and EUROPOP2008 demographic projections, the EUROPOP2013 was made using a ‘convergence’ approach. (14) 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. (15)

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’. (16)

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 (17)) 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).

1.1.2. Mortality rates

Past trends

In the past decades mortality rates have decreased rapidly in the EU Member States, mainly as a result of improvements in healthcare and public health services, as well as increases in life expectancy. (18)

The EUROPOP2013 projection

The EUROPOP2013 projection assumes a process of convergence in the mortality rates across Member States to that of the forerunners over the very long-term. The total mortality rate (TMR) is projected to decrease from 9.62 in 2013 to 9.08 by 2030 and further to 8.66 by 2060 for the EU as a whole. In the euro area, a similar decrease is projected, from 9.37 in 2013 to 8.75 in 2060.

The mortality rate is projected to decrease 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 increase, whereas in the UK it is projected to remain stable. Consequently, mortality rates in all countries are expected to remain below the natural replacement rate of 2.1 in the period to 2060 (see Graph I.1.2).

1.1.3. Net migration

Past trends

Net migration has been a significant component of European population growth and change in recent decades. In the EU as a whole, net migration has been positive since 1995, with a peak in 2005 of 1.56 million. Since then, net migration has declined, reaching 0.92 million in 2014.

The EUROPOP2013 projection

The EUROPOP2013 projection assumes a process of convergence in the net migration rate across Member States to that of the forerunners over the very long-term. The net migration rate is projected to decrease from 0.12 in 2013 to 0.05 by 2030 and further to 0.02 by 2060 for the EU as a whole. In the euro area, a similar decrease is projected, from 0.09 in 2013 to 0.03 in 2060.

The net migration rate is projected to decrease 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 increase, whereas in the UK it is projected to remain stable. Consequently, net migration rates in all countries are expected to remain below the natural replacement rate of 2.1 in the period to 2060 (see Graph I.1.2).
Part I

Underlying demographic and macroeconomic assumptions – Demographic assumptions

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

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

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

**Graph I.1.8:** Projection of life expectancy at 65 in EUROPOP2013, women (in years)
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 (18) per country are characterised by high variability. Traditionally,

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

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 EUROP 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).
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 (1). Migration flows were measured in terms of net migration (2), 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) (3). 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

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(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.
Part I

Underlying demographic and macroeconomic assumptions - Demographic 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.

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

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.

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).
Graph 1.1.12: Projection of the total population (percentage and absolute change for the period 2013-2060)

Source: Commission services, Eurostat, EUROPOP2013.
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).

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

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Source: Commission services, Eurostat, EUROPOP2013.

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).

The increase in the total age-dependency ratio (people aged 20 below and 65 and above over the population aged 20-64) is projected to be even larger, rising from 64.9% to 94.5%. (19) 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).

(19) 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 1.1.13: Projected change of main population groups (in % change over the period 2013-2060)

Source: Commission services, Eurostat, EUROPPOP2013.
Graph I.1.14: Dependency ratios (in percentage)

Old-age dependency ratio (ratio of people aged 65 or above relative to the working-age population)

Dependency ratio of the oldest-old (ratio of people aged 80 or above relative to the working-age population)

Total dependency ratio (ratio of dependent people, both young aged below 20 and elderly aged 65 or above, relative to the working-age population (20-64))

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. (20) 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). (21) 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.

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(20) 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).

(21) 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 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).
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**Source:** Commission services, Eurostat, EUROPOP2013.
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. 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).

(22) The United Nations Population Division produces global population projections revised every two years. The latest projections are the 2012 Revision.
Graph 1.1.17: 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, 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 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). (24)

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. (25)

Projections show an average increase of approximately 2½ years in the effective retirement age for men. (26) 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.

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(23) Enacted until 1 April 2015 (see footnote 3).

(24) 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.

(25) All EU Member States except Luxembourg and Sweden, and Norway.

(26) Non-weighted average of the 26 Member States considered.
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 1.2.1: 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
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 1.2.3 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,\(^{(27)}\) 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.

\(^{(27)}\) Comparing with more 13 pp and 6 pp, respectively, for the age group 55-74.
Graph 1.2.3: Participation rates

Source: Commission services, EPC.
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.
Part I

Underlying demographic and macroeconomic assumptions – Macroeconomic assumptions

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

<table>
<thead>
<tr>
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<th>Total LF (20-64) (thousands persons)</th>
<th>Avg. annual growth rate of the LF</th>
<th>Impact on potential output growth (1)</th>
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(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 converge to the minimum of country specific Anchors 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. (50)

(50) The gradual convergence is assumed to be completed by 2040.
(51) Under the guidance of the EPC-OOWG 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.
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.

### 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 employment levels after the middle of the next decade.

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 1.2.7: Employment growth rates for the age group 20 to 64 (average annual values) (1)

Countries ranked in ascending order of average employment growth rates in the 2013-2060 period.

Source: Commission services, EPC
Graph 1.2.8: Employment projections, breakdown by age groups

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<tr>
<td>Young (20-24)</td>
<td>15.4%</td>
<td>28.5%</td>
</tr>
<tr>
<td>Prime age (25-54)</td>
<td>77.7%</td>
<td>73.0%</td>
</tr>
<tr>
<td>Older (55-64)</td>
<td>7.0%</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>EA - 2013</th>
<th>EA - 2060</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young (20-24)</td>
<td>15.4%</td>
<td>20.2%</td>
</tr>
<tr>
<td>Prime age (25-54)</td>
<td>78.1%</td>
<td>73.0%</td>
</tr>
<tr>
<td>Older (55-64)</td>
<td>6.5%</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

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.
2.2. LABOUR PRODUCTIVITY AND GDP

2.2.1. Main results of the projections – baseline scenario

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.
In the period 2013-2023, GDP growth is assumed to be higher than potential growth rates, reflecting the gradual closure of negative output gaps. (31) 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 growth 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%.

(31) 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. 8/2014).
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
Part I

Underlying demographic and macroeconomic assumptions – Macroeconomic assumptions

Total hours worked are projected to rise by 0.4% (annual average growth rate) in the period 2013 to 2020. (32) 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.

(32) 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.

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

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

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

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

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)

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). (33)

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.

(33) For a detailed presentation of all sensitivity tests and policy scenarios see Part I, Chapter 3, of this report.
## Table 12.3: Long-term projections (2015 and 2012 projections): labour force developments

<table>
<thead>
<tr>
<th></th>
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<td>64.1</td>
<td>47.6</td>
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<td>66.8</td>
<td>69.7</td>
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<td>ES</td>
<td>54.5</td>
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<td>53.4</td>
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<td>68.2</td>
<td>54.0</td>
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<td>53.4</td>
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<td>65.2</td>
<td>68.2</td>
<td>54.0</td>
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<td>33.5</td>
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<td>54.0</td>
<td>66.4</td>
</tr>
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<td>36.5</td>
<td>45.5</td>
<td>66.3</td>
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<td>33.5</td>
<td>41.7</td>
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<td>69.0</td>
<td>54.0</td>
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<td>61.5</td>
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<td>68.6</td>
<td>54.1</td>
<td>66.4</td>
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<td>45.5</td>
<td>66.0</td>
<td>69.0</td>
<td>33.5</td>
<td>41.7</td>
</tr>
<tr>
<td>NO</td>
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<td>77.6</td>
<td>53.4</td>
<td>62.6</td>
<td>75.1</td>
<td>78.0</td>
<td>54.0</td>
<td>66.4</td>
</tr>
<tr>
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<td>36.5</td>
<td>45.5</td>
<td>66.0</td>
<td>69.0</td>
<td>33.5</td>
<td>41.7</td>
</tr>
</tbody>
</table>

**Sources:** Commission services, EPC
Table 1.2.4: Long-term projections compared (2015 and 2012): potential GDP growth and its determinants

Due to growth in:

<table>
<thead>
<tr>
<th>GDP per change in</th>
<th>TFP</th>
<th>Capital</th>
<th>Labour</th>
<th>Total</th>
<th>Empl.</th>
<th>Share of</th>
<th>change in</th>
<th>GDP per</th>
</tr>
</thead>
<tbody>
<tr>
<td>average age pop.</td>
<td>hours worked</td>
<td>deepening</td>
<td>input</td>
<td>pop.</td>
<td>rate</td>
<td>working</td>
<td>average</td>
<td>growth</td>
</tr>
</tbody>
</table>

| Country | Factor | EU28 | BE | BG | CZ | DK | DE | EE | IE | EL | ES | FR | HR | IT | CY | LV | LT | LU | HU | MT | NL | AT | PL | PT | RO | SI | SK | FI | SE | UK | NO | EU28 |
|---------|-------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|         | Output | 1.4 | 2.7 | 1.3 | 0.9 | 1.6 | 1.8 | 1.3 | 0.8 | 2.4 | 0.0 | 0.9 | 0.8 | 1.2 | 1.9 | 0.9 | 0.9 | 1.6 | 1.5 | 1.8 | 1.0 | 0.5 | 0.9 | 0.0 | 1.5 | 0.0 | 0.0 | 1.5 | 1.0 | 1.6 | 1.4 | 1.4 | 0.9 |
|         | Input | 1.4 | 0.8 | 0.8 | 0.6 | 0.9 | 1.6 | 1.3 | 0.9 | 1.4 | 0.0 | 0.5 | 0.3 | 1.3 | 2.3 | 1.6 | 0.8 | 0.6 | 1.5 | 1.7 | 2.2 | 1.4 | 0.9 | 0.9 | 0.8 | 0.0 | 0.5 | 1.7 | 1.0 | 1.6 | 1.4 | 0.9 | 0.9 |
|         | Value | 0.4 | 0.7 | 0.5 | 0.3 | 0.1 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
|         | Share | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Source: Commission services, EPC
3. **SENSITIVITY TESTS**

### 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. 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). (35)

### Table I.3.1: Overview of sensitivity tests

<table>
<thead>
<tr>
<th>Unchanged policy scenarios</th>
<th>Changed policy scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td><strong>Labour force</strong></td>
</tr>
<tr>
<td>High life expectancy</td>
<td>Lower migration</td>
</tr>
<tr>
<td>A scenario with an increase of life expectancy at birth of two years by 2060 compared with the baseline projection.</td>
<td>A scenario with 20% less migration compared with the baseline projection.</td>
</tr>
</tbody>
</table>

*Source: Commission services, EPC*

### 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

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

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% 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 projected 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)

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

<table>
<thead>
<tr>
<th>Scenario</th>
<th>GDP growth in 2013-2060</th>
<th>GDP per hour worked</th>
<th>TFP</th>
<th>Capital deepening</th>
<th>Labour input</th>
<th>Total population</th>
<th>Employment rate</th>
<th>Share of working age population</th>
<th>Change in average hours worked</th>
<th>GDP per capita growth in 2013-2060</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>1.4</td>
<td>1.4</td>
<td>0.9</td>
<td>0.5</td>
<td>-0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>-0.2</td>
<td>-0.01</td>
<td>1.3</td>
</tr>
<tr>
<td>Lower TFP (risk scenario)</td>
<td>1.2</td>
<td>1.2</td>
<td>0.8</td>
<td>0.4</td>
<td>-0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>-0.2</td>
<td>-0.01</td>
<td>1.1</td>
</tr>
<tr>
<td>High life expectancy</td>
<td>1.4</td>
<td>1.4</td>
<td>0.9</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>0.1</td>
<td>-0.2</td>
<td>-0.01</td>
<td>1.3</td>
</tr>
<tr>
<td>Lower migration</td>
<td>1.3</td>
<td>1.4</td>
<td>0.9</td>
<td>0.5</td>
<td>-0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>-0.3</td>
<td>-0.02</td>
<td>1.2</td>
</tr>
<tr>
<td>Higher employment rate</td>
<td>1.4</td>
<td>1.4</td>
<td>0.9</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>0.1</td>
<td>-0.2</td>
<td>0.03</td>
<td>1.4</td>
</tr>
<tr>
<td>Higher employment rate older workers</td>
<td>1.5</td>
<td>1.4</td>
<td>0.9</td>
<td>0.5</td>
<td>0.1</td>
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<td>Higher labour productivity</td>
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<td>-0.1</td>
<td>0.1</td>
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<td>-0.01</td>
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<td>Lower labour productivity</td>
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<td>1.2</td>
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<td>0.1</td>
<td>-0.2</td>
<td>-0.01</td>
<td>1.1</td>
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<td>Policy scenario - Linking retirement age to Life expectancy</td>
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<td>1.4</td>
<td>0.9</td>
<td>0.5</td>
<td>0.0</td>
<td>0.1</td>
<td>0.2</td>
<td>-0.2</td>
<td>0.00</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Source: Commission services, EPC
Part I

Underlying demographic and macroeconomic assumptions – Sensitivity tests

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