The 2009 Ageing Report:

Economic and budgetary projections for the EU-27 Member States (2008-2060)

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The 2009 Ageing Report: economic and budgetary projections for the EU-27 Member States (2008-2060)

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This report has been prepared as part of the mandate the Economic and Financial Affairs (ECOFIN) Council gave to the Economic Policy Committee (EPC) in February 2006, to update and further deepen its common projection exercise of age-related expenditure projections on the basis of a new population projection provided by Eurostat.

The report presents projections of the budgetary impact of the ageing population in the 27 EU Member States over the period 2008–2060.

In accordance with its normal practice, the EPC mandated a working group, the Ageing Working Group (AWG) under the chairmanship of Henri Bogaert, to take forward the work needed to discharge this remit.

This report is presented by the EPC and the European Commission (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 (EUROPOP2008) were carried out by Eurostat. Valuable contributions were also made by staff of the OECD, the IMF and the ECB.

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SUMMARY AND MAIN CONCLUSIONS

Overview of the 2009 projection of age-related expenditure

The mandate and broad principles

Being active, healthy and participative well into old age is now a realistic prospect for very large numbers of citizens for the first time in European history. But an ageing population also raises challenges for our societies and economies, culturally, organisationally and from an economic point of view. Policy makers worry about how living standards will be affected as each worker has to provide for the consumption needs of a growing number of elderly dependents. The seriousness of the challenge depends on how our economies and societies respond and adapt to these changing demographic conditions. Looking ahead, policy makers need to ensure long-term fiscal sustainability in the face of clearly anticipated risks, as well significant uncertainty. This is all the more true as Europe is in the midst of the deepest recession in decades, which is putting an unprecedented stress on workers and companies and is set to have a major impact on the sustainability of public finances.

In 2001, the Stockholm European Council emphasised the need for the Council to "*regularly review the long term sustainability of public finances, including the expected strains caused by the demographic changes ahead*". In 2006, the ECOFIN Council gave a mandate to the Economic Policy Committee (EPC) to update and further deepen its common exercise of age-related expenditure projections by autumn 2009, on the basis of a new population projection by Eurostat, which was released in April 2008.

In light of this mandate, the EPC developed a work programme with broad arrangements to organise the budgetary projection and reach agreement on its assumptions and methodologies. The projections of all expenditure items are made on the basis of common macroeconomic assumptions endorsed by the EPC and of a 'no policy change' assumption, i.e. reflecting only already enacted legislation. This report presents the expenditure projections covering pensions, health care, long-term care, education and unemployment transfers for all Member States.

The work was carried out by the EPC Working Group on Ageing Populations (AWG), which gathered experts from the 27 Member States and Norway and the European Commission represented by the Directorate-General for Economic and Financial Affairs (DG ECFIN). DG ECFIN has provided analysis and calculations. The European Central Bank, the OECD and IMF have also contributed. Eurostat has played a central role by preparing demographic projections (EUROPOP2008). Other Commission services have also been associated with the work, especially the Directorate-General for Employment, Social Affairs and Equal Opportunities and the Health and Consumer Protection Directorate-General. The EPC and its AWG coordinated the work with their counterparts in other Council formations, in particular the Social Protection Committee. In the preparation of the population projection, Eurostat actively consulted national statistical institutes in the Member States.

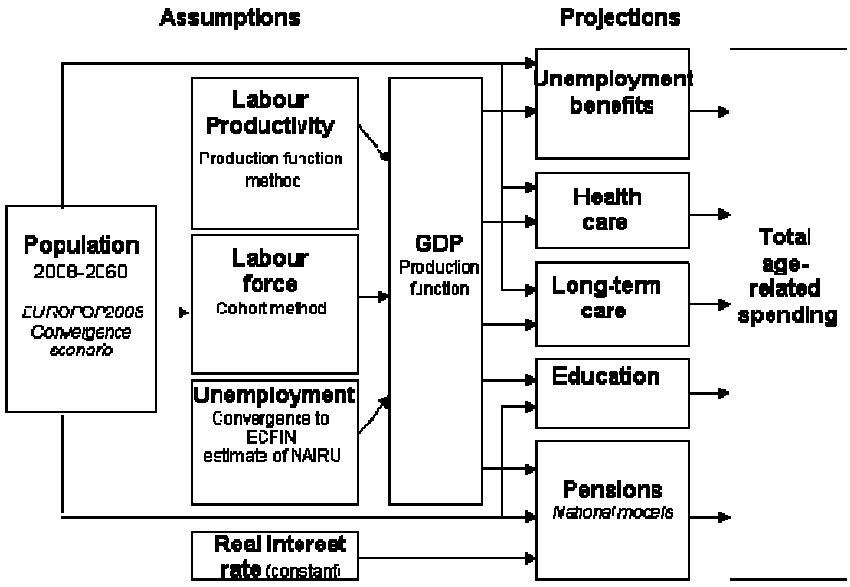
This is the third time since 2001 that long-run economic and budgetary projections aimed at assessing the impact of ageing population have been released. This projection exercise builds on, updates and further improves the previous exercises so as to enhance comparability across countries, consistency across expenditure items and the economic basis for the

underlying assumptions. The work has been guided by the principles of simplicity, comparability, consistency, prudence and transparency.

The projections feed into a variety of policy debates at EU level. In particular, they are used in the annual assessment of the sustainability of public finances carried out as part of the Stability and Growth Pact; in the context of the open method of co-ordination on pensions; and in the analysis on the impact of ageing populations on the labour market and potential growth. They are also of great relevance for the Lisbon strategy.

The report is structured in two parts. The first describes the assumptions underlying the population projection, the labour force projection and the other macroeconomic assumptions. The second part presents the projection of expenditure on pensions, health care, long-term care, education and unemployment transfers. A statistical annex gives a country-by-country overview of the main assumptions and results.

Graph 1 - Overview of the 2009 projection of age-related expenditure



Source: Commission services, EPC.

Coverage and general overview

Graph 1 presents an overview of the projection of age-related expenditure for the period 2008 to 2060. The starting point was the population projection EUROPOP2008, produced by Eurostat. Using this, the EPC agreed a common set of assumptions and methodologies to make projections for exogenous macroeconomic variables: the labour force (participation, employment and unemployment rates), labour productivity and the real interest rate. GDP was calculated combining these assumptions.

On this basis, separate budgetary projections were run for five age-related expenditure items. Member States run the projections for pensions using their own national models. The Commission services (DG ECFIN) ran the projections for health care, long-term care, education and unemployment on the basis of projection models for each expenditure item. For each expenditure item, the same projection model was used for the 27 Member States and for Norway. The results of this set of projections were aggregated to provide the overall age-related public expenditure over the next 50 years.

Use of and limitations of long-term projections

To understand the challenges for policy makers, it is useful to begin by considering the age-structure of the population today and how it will look in coming decades. The long-term projections provide an indication of the timing and scale of economic changes that would result from an ageing population in a 'no-policy change' scenario. The projections 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 governments by demographic trends.

The long-term projections are not forecasts. Projecting demographic and economic developments over the next 50 years is one of the most daunting analytical tasks facing policy makers. The uncertainty surrounding the projections is high and the longer the projection period, the higher the degree of uncertainty. Although we know a lot, relatively speaking, about workers and pension beneficiaries for the next 20 years, substantial uncertainty remains, for example, on migration flows, the health status of the elderly or the incidence of disability. The projection results are strongly influenced by the underlying assumptions. Finally, given the current juncture of financial and economic crisis, there is also considerable uncertainty concerning medium-term economic developments.

Main results

Demographic projection

Demographic change is transforming the EU: longer lives, low fertility and inward migration are its key aspects. The extent and speed of population ageing depend on future trends in these three factors. Demographic factors are subject to less variation than economic factors over the short run, however they have exhibited much less stability over the medium term of say, 25 years.

Only a modest recovery in total fertility rates, which remain low…

Only a modest recovery in the total fertility rate, which is the average number of births per woman over her lifetime, is assumed for the EU, from 1.52 births per woman in 2008 to 1.57 by 2030 and 1.64 by 2060. In the euro area, a similar increase is assumed, from 1.55 in 2008 to 1.66 in 2060. In all countries, the fertility rate would remain below the natural replacement rate of 2.1 births per woman that is needed in order for each generation to replace itself. This will result in slow growth, and in most cases actual declines in, the population of working-age.

The fertility rate is projected to increase in all Member States, except in the few where total fertility rates are currently above 1.8, namely France, Ireland, Sweden, Denmark, the UK and Finland, where it is assumed to decrease but remain above 1.85, or remain stable. The largest increases in fertility rates are assumed to take place in Slovakia, Poland and Lithuania, which had the lowest rates in the EU in 2008; here, the increase would occur gradually, approaching the current EU average rates only in 2060.

… while life expectancy continues to increase…

Mortality risks fell dramatically during the 20th century, bringing more years of active life for both men and women. Life expectancy has been rising steadily, with an increase of two and a half years per decade in the countries holding the record of highest life expectancy. If the pace of future progress in the reduction of mortality remains the same as it has been over past decades, most people in the EU will live very long lives. For the EU as a whole, life expectancy at birth for men would increase by 8.5 years over the projection period, from 76 years in 2008 to 84.5 in 2060. For women, life expectancy at birth would increase by 6.9 years, from 82.1 in 2008 to 89 in 2060, implying a narrowing gap in life expectancy between men and women.

The largest increases in life expectancy at birth would take place in the most recent EU Member States, according to the assumptions. Life expectancy for men in 2008 is lowest in Estonia, Latvia, Lithuania, Hungary, Slovakia, Poland, Bulgaria and Romania, where it ranges between 66 and 71 years. It is assumed that some catching-up will take place, with increases in life expectancy of more than 10 years over the projection period – a bigger increase than in the rest of the EU. Overall however, life expectancy at birth is projected to remain below the EU average in all new Member States - except in Cyprus - throughout the projection period, especially for men.

A compression of the spread of life expectancy across the Member States is assumed. For life expectancy at birth for men, it would narrow from 13.1 years in 2008 (from a high of 79 years in Sweden to a low of 65.9 in Lithuania) to 5 years in 2060 (85.5 years in Italy compared with 80.4 in Lithuania). For women, the reduction in the differential is smaller, from 7.7 years in 2008 (84.3 in France to 76.6 in Romania) to 4.1 years in 2060 (90.1 in France to 86.5 in Bulgaria).

Life expectancy at the age of 65 would increase by 5.4 years for men and by 5.2 years for women over the projection period, for the EU as a whole. In 2060, life expectancy at age 65 would reach 21.8 years for men and 25.1 for women. Most children today would live into their 80s and 90s.

… and inward net migration to the EU continues, but on a decelerating trend

Over the projection period, annual net inflows to the EU are assumed to total 59 million people, of which the bulk (46.2 million) would be concentrated in the euro area. The trend is assumed to decelerate over the projection period, falling from about 1,680,000 people in 2008 (equivalent to 0.33% of the EU population) to 980,000 by 2020 and thereafter to some 800,000 people by 2060 (0.16% of the EU population). Migration already plays the predominant role in population growth today: in many Member States, the size of net migration determines whether the population still grows or has entered a stage of decline. The zero migration population scenario shows how the labour force (aged 15 to 64) would gradually fall behind the level in the baseline scenario in the absence of net migration: by 2030, the labour force would be 10% lower and 20% lower in 2060. Making the best use of the global labour supply through net migration will be increasingly important and requires ensuring that immigrants are effectively integrated into the EU's economy and society.

Net migration flows are assumed to be concentrated in a few destination countries: Italy (12 million cumulated to 2060), Spain (11.6 million), Germany (8.2 million), and the UK (7.8

million). According to the assumptions, the change of Spain and Italy from origin to destination countries is confirmed in coming decades. Estonia, Lithuania, Latvia, Poland, Bulgaria and Romania, which are currently experiencing a net outflow, would see it taper off or reverse in the coming decades.

Population structures become increasingly dominated by old people rather than young

The population of the EU as a whole would be slightly larger in 2060 than today, but much older. The population would increase (from 495.4 million in 2008) by almost 5% by 2035, when it would peak (at 520.1 million). A steady decline would then take place, with the population shrinking by nearly 3%, to 505.7 million by 2060.

Half of the population today is 40 years-old or more. In 2060, half of the population will be aged 48 years or above. The number of elderly persons aged 65 or above already surpasses the number of children (below 15) in 2008, but their numbers are relatively close. In 2060, there would be more than twice as many elderly than children. In 2008, there are about three and a half times as many children as very old people (above 80). In 2060, children would still outnumber very old persons, but by a small margin: the number of very old people would amount to 80% of the number of children.

Elderly people would account for an increasing share of the population, according to the projection; this is due to sustained reductions in mortality in past and future decades. The ageing process can be characterised as ageing from the top, as it largely results from projected increases in longevity, moderated by the impact of positive net migration flows and some recovery in fertility.

While the EU population is projected to be slightly larger in 2060 than in 2008, there are wide differences in population trends across Member States: about half of them would gain population (Belgium, Denmark, Ireland, Spain, France, Cyprus, Luxembourg, the Netherlands, Austria, Portugal, Finland, Sweden and the UK), while the population would fall in the other half (Bulgaria, the Czech Republic, Germany, Estonia, Greece, Italy, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia and Slovakia).

The projections show a significant reduction in the population aged 15-64 …

The working-age population, which is conventionally defined as aged between 15 and 64 years, would start to decline as of 2010 and, over the whole projection period, it would drop by 15 per cent in the EU. However, 7 Member States would see their working-age population expand: Belgium, Ireland, France, Cyprus, Luxembourg, Sweden and the UK, mostly due to migration (except in the case of France and Ireland where fertility is relatively high). The number of children is projected to decline gradually from 2020 onwards.

… and an increase in the number of elderly persons aged 65 or more…

The number of elderly people will increase very markedly, according to the projection. It will almost double, rising from 85 million in 2008 to 151 million in 2060 in the EU. The number of oldest-old (aged 80 years and above), is projected to increase even more rapidly, almost tripling from 22 million in 2008 to 61 million in 2060. The progressive ageing of the elderly population itself is a notable aspect of population ageing.

… leading to a doubling of the old-age dependency ratio in the EU

As a result of these unprecedented demographic trends, the old-age dependency ratio, calculated as the ratio of people aged 65 or above relative to the working-age population aged 15-64, is projected to more than double in the EU from 25.4% to 53.5% over the projection period. The largest increase is expected to occur during the period 2015-35, with year-on-year increases above 2 percentage points. This means that the EU would move from having 4 persons of working-age for every person aged over 65 to a ratio of only 2 to 1. When adding the number of children to the calculation, the ratio of dependent to active is projected to rise by nearly 30 percentage points. These population trends underpin future trends in the labour market which are of crucial importance for economic growth. An indicator of the challenges ahead is the ratio of non workers to workers, or the economic dependency ratio.

Labour force assumptions

Labour participation rates to increase …

For the EU as a whole, the participation rate (of people aged 15 to 64) is projected to increase by 3.5 percentage points, from 70.6% in 2007 to 74.1% in 2060. For the euro area, a similar increase is projected, from 70.8% in 2007 to 74.5% in 2060. Almost all of the increase is projected to materialise before 2020.

The biggest increase in participation is projected for older workers, aged between 55 and 64 (around 20 percentage points for women and 10 p.p. for men in the EU27), and a slightly higher increase in the euro area (22 p.p. for women and 13 p.p. for men). The gap between male and female participation rates would gradually narrow, especially in countries where it is currently wide.

… but labour supply will decline because of the future population trends

The labour force in the EU would increase by 3.7% between 2007 and 2020, according to the projection. In numbers, this means roughly 8.6 million people. In the euro area, an increase of almost 5% is projected, about 7.4 million people. This is mainly due to the rise in the labour supply of women. However, the positive trend in female labour supply is projected to reverse after 2020 and, as the male labour supply drops too, the overall labour force is expected to decrease by as much as 13.6%, equivalent to around 33 million people (24.4 million if compared with the number in 2007) in the EU. In the euro area, the reduction of labour supply between 2020 and 2060 would reach 12.6%, which translates into 20.4 million people (13 million if compared with the number in 2007).

At Member State level, a majority of countries would see their labour supply expand until 2020. However, eleven Member States (Denmark, the Netherlands, Finland, the Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovenia, Bulgaria and Romania) will even over the next decade record a reduction in labour supply. After 2020, most countries are projected to have a shrinking labour supply over the period 2020 to 2060, except Cyprus (+19.8%), Luxembourg (+19.5%), Ireland (+11%), the UK (+9.2%), France (+3.1%) and Sweden (+2.2%). The projected decrease in the labour force after 2020 is to be ascribed almost exclusively to negative demographic developments, given that labour participation rates are projected to continue their increase, albeit at a slower pace than during the period 2007 to 2020.

According to the assumptions, the unemployment rate would be reduced slightly…

Overall, a reduction in the EU unemployment rate of around 1 ½ percentage points is assumed (from 7.2% in 2007 to 5.7% in 2020). A fall of a similar magnitude is assumed for the euro area (from 7.5% in 2007 to 5.9% in 2020).

… the employment rate would increase…

According to the assumptions, the employment rate (of people aged 15 to 64) in the EU would increase from 65.5% in 2007 to 66.6% in 2010, 69% in 2020, and almost 70% in 2060. In the euro area, the trend would be similar and the employment rate would surpass 70% at the end of the projection period.

Reflecting recent positive trends, the employment rate of women is assumed to rise from 58.4% in 2007 to 63.4% in 2020 and to 65.1% in 2060. The increase in the employment rate will be even larger for older workers (55-64), from 44.9% in 2007 to 54.5% in 2020 and further to 59.8% in 2060. For the euro area, the increase in the employment rate of older workers (55-64) is higher than in the EU, rising by 17.7 p.p. compared with 14.9 p.p. in the EU and reaching 60%.

… but the number of workers would shrink.

However, the number of people employed[1] would record an annual growth rate of only 0.4% until 2020, before reversing to a negative annual growth rate of a similar magnitude until 2060. As a result of increasing employment rates, on the one hand, and a decreasing number of people, on the other hand, overall employment in the EU is projected to shrink by about 19 million people over the entire projection period. Increasing labour force participation rates in most countries and rising net immigration levels in some can only moderate the fall in employment caused by the ageing of the population and the negative population growth of the period 2020 to 2060.

Labour input (hours of work) is projected to decline

According to the projection, the labour input, measured by total hours of work in the EU, would increase by 5.4% until 2020. A reversal would start in 2020 and hours worked are expected to fall by 12.9% between 2020 and 2060. Over the entire projection period, total hours of work are projected to decline by 8.2%. For the euro area, a milder fall is projected (-5.7% between 2007 and 2060). In annual average growth rates, hours of work are projected to fall by 0.2% in the EU and by 0.1% in the euro area, over the period 2007 to 2060. These trends reflect projected employment trends and a composition effect, due to the increasing share of employed persons working part-time (mainly due to the increase in women in employment who are more likely to work part-time).

In line with different demographic trends, a reduction in labour input is projected in 18 Member States over the period 2007 and 2060, with drops of 20% and more in Bulgaria, the Czech Republic, Germany, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia. In contrast, a few Member States would see an increase in hours worked (Belgium, Ireland, Spain, France, Cyprus, Luxemburg, Sweden and the UK).

[1] According to the European Labour Force Survey definition.

The ratio of elderly non-workers to workers will rise steeply

It is important to consider the ratio of elderly non-workers to workers, or the effective economic old-age dependency ratio, when assessing the impact of ageing on budgetary expenditure, above all for pension public schemes. For the EU27, the ratio is projected to rise sharply from 37% in 2007 to 72% in 2060. This means that Europe would move from having a ratio of nearly 4 elderly non workers for 10 workers in 2007 to a ratio of more than 7 to 10. In the euro area, a similar change is projected, with the effective old-age dependency ratio rising from 39% in 2007 to 73% in 2060. Extremely high values are projected in some EU countries. In Poland and Romania, the projections point to a situation in which by 2060, there will be as many or even more inactive old persons than people working. The ratio will be 90% or more in Bulgaria, Lithuania, Hungary, Malta and Slovakia. By contrast, it is projected to be smaller than two thirds in Denmark, Ireland, France, Cyprus, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, the UK and Norway.

Macroeconomic assumptions: labour productivity and potential growth rates

Total factor productivity is assumed to converge to 1.1%

Total factor productivity (TFP) drives labour productivity growth in the long-run. A prudent assumption was set: Member States' TFP growth rates are assumed to converge to a long-term historical average in the EU of 1.1%, as was seen over the period 1970 to 2004, which is close to productivity growth in the US over the same period. The speed of convergence is determined by the relative income position of the Member States. Specifically, the lower the current GDP per capita, the higher the real catching-up potential, which materialises by a period of higher TFP growth.

A sharp decline in potential growth rate is projected

Even without incorporating the potential negative impact of the current economic crisis, the annual average potential GDP growth rate in the EU is projected to fall from 2.4% in the period 2007-2020, to 1.7% in the period 2021-2030 and to a meagre 1.3% in the period 2041-2060. Output growth rates in the euro area are very close to those in the EU27 over the projection period, as the area represents more than two thirds of total EU27 output. While all EU Member States would experience a future slowdown in their potential growth rates, owing to the adverse impact of demographic trends, growth rates would differ substantially from country to country.

The sources of economic growth are also projected to change: labour productivity will become the key driver of growth in the EU

For the EU, labour productivity growth is projected to remain fairly stable at close to 1.7%. The small increase in the growth rate expected until the 2030s is due to the higher productivity growth assumed in Member States that are catching up. Total hours of work - the labour input - are projected to increase up to the 2020s. Thereafter, demographic ageing, with a reduction in the working-age population, is expected to act as a drag on growth. Over time, labour productivity will become the only driver of growth in the EU.

In the first half of the projection period, the main source of the divergence across countries is productivity growth, due to different rates at the outset of the projection and different trends according to the catching-up potential. In the latter part of the projection period,

developments in the labour input have a dominant role in explaining divergent patterns, working through different demographic developments.

Budgetary projections

Results of the long-term age-related public expenditure projections

The budgetary projections point to sizeable fiscal challenges coming from a higher share of the total population in older age cohorts and a decline in the economically active share of the population. The fiscal impact of ageing is projected to be substantial in almost all Member States, with effects becoming apparent already during the next decade. On the basis of current policies, age-related public expenditure is projected to increase on average by about 4 ¾ percentage points of GDP by 2060 in the EU - and by more than 5 percentage points in the euro area (see Table 1). Most of the projected increase in public spending over the period 2007-2060 will be on pensions (+2.4 p.p. of GDP), health care (+1.5 p.p. of GDP) and long-term care (+1.1 p.p. of GDP). Potential offsetting savings in public spending on education and unemployment benefits are likely to be very limited (-0.2 p.p. of GDP for each item).

In terms of the different Member States situation, the following points can be made:

- The age-related increase in public spending will be very significant in nine Member States (Luxembourg, Greece, Slovenia, Cyprus[2], Malta, Romania, the Netherlands, Spain and Ireland) with a projected increase of 7 p.p. of GDP or more, although for some countries the large increase will be from a fairly low level. These Member States have so far made only limited progress in reforming their pension systems or have maturing pension systems.

- For a second group of countries – Belgium, Finland, the Czech Republic, Lithuania, Slovakia, the UK, Germany and Hungary[3] - the age-related increase in public spending is more limited, ranging from 4 p.p. to 7 p.p. of GDP. Several of these countries have taken significant steps in reforming public expenditure systems that contribute to limit the increase in future expenditure. [4]

- Finally, the increase is more moderate, 4 p.p. of GDP or less, in Bulgaria, Sweden, Portugal, Austria, France, Denmark, Italy, Latvia, Estonia and Poland; this is also thanks to the implementation of substantial pension reforms. For many of them, the projected increase in expenditure on health-care and generally on long-term care is higher than increases in pensions.

[2] The projections do not take into account legislation enacted on March 6 2009 involving reform of the Social Insurance Fund, including stricter criteria for eligibility for pension benefits. Details of this reforms and their significant impact on the public finances are outlined in the stability programme of Cyprus for 2008-2012 of March 13 2009.

[3] A part of the increase in gross pension expenditures from 2007 to 2060 in Hungary is explained by the introduction of pension taxation as of 2013 and so does not reflect an increase in expenditures effectively burdening the budget. Taxes on public pensions in 2060 are calculated to be 0.7% of GDP.

[4] The projection results for public spending on long term care use the methodology agreed by the AWG/EPC. In the case of Germany, it does not reflect current legislation where benefit levels are indexed to prices only. A scenario which reflects current rules projects that public spending would remain constant as a share of GDP over the projection period. The increase of the total age related costs would then be lower than 4 p.p. of GDP.

Coping with the challenge posed by an ageing population will require determined policy action along the three-pronged strategy decided by the Stockholm European Council in 2001, i.e.: (i) reducing debt at a fast pace; (ii) raising employment rates and productivity; and (iii) reforming pension, healthcare and long-term care systems.

These results reveal that in some countries, there is a need to take due account of future increases in government expenditure, including through modernisation of social expenditure systems. In others, policy action has been taken, significantly limiting the future increase in government expenditure. A comprehensive assessment of risks to the long-term sustainability of public finances, including the identification of relevant policy responses, will be made in the 2009 update of the Commission's Sustainability Report.

Pension reforms implemented in recent years in some Member States are having visible positive impacts (most recently in the Czech Republic, Hungary, Denmark and Portugal). They have sharply reduced the projected increase in public pension expenditure in recent years, diminishing the budgetary impact of ageing. Nonetheless, in some countries, the scale of reforms has been insufficient and they need to be pursued further to cope with the inexorable increasing share of older persons in Europe. At the same time, implementing other measures, for instance promoting higher employment rates of older workers that contribute to more adequate retirement incomes in the future might be required in order to ensure the lasting success of already implemented pension reforms.

There is an inherent degree of uncertainty when making projections over the very long-term. Sensitivity test were carried out so as to verify the robustness of the projection results with respect to changes in key determinants of economic and budgetary variables. The sensitivity tests show that budgetary projections are relatively robust to varying assumptions on figures such as the employment rate, the labour productivity growth rate or the assumption on life expectancy, if the figures are marginally changed, as this does not fundamentally alter the conclusions drawn on the basis of the baseline projection results. These tests cannot fully capture the possible effects, however, that policy changes or changes in the relative scarcity of labour and capital may have on future factor inputs, for example, by lowering the structural rate of unemployment in individual Member States. However, the tests also show that the impact differs across the Member States. For instance, the impact on pension expenditure of changes in the assumption on life expectancy or on the productivity growth rate depends on the design of the public pension scheme. The sensitivity tests provide interesting information on the relative robustness of particular pension schemes to specific factors and may also be of use to assess the impact of possible policy changes. For the other age-related expenditure items, a set of alternative scenarios were also run in order to get a fuller understanding of the results.

At the current juncture, uncertainty over the medium-term economic prospects is exceptionally high. For this reason, additional scenarios were run to capture the potential impact of the economic crisis, by simulating both temporary and permanent shocks to economic activity. These simulations show that there might be a sizeable adverse economic and budgetary impact over the long-term compared with the baseline scenario, and that the impact would be higher the longer it takes to get back on track. Hence, these additional simulations provide useful information on the sensitivity of the projection results with respect to shocks, which is crucial for its interpretation notably at times characterized by unusually large uncertainties.

Table 1 - Age-related government expenditure, 2007-2060, percentage points of GDP

	Pensions			Health care			Long-term care			Unemployment benefits			Education			Total			
	Level	Change	Change	Level	Change	Change	Level	Change	Change	Level	Change	Change	Level	Change	Change	Level	Change	Change	
	2007	2007 2035	2007 2060	2007	2007 2035	2007 2060	2007	2007 2035	2007 2060	2007	2007 2035	2007 2060	2007	2007 2035	2007 2060	2007	2007 2035	2007 2060	
BE	10.0	4.4	4.8	7.6	1.0	1.2	1.5	0.7	1.4	1.9	-0.4	-0.4	5.5	-0.1	0.0	26.5	5.6	6.9	**BE**
BG	8.3	0.7	3.0	4.7	0.6	0.7	0.2	0.1	0.2	0.1	0.0	0.0	3.3	-0.5	-0.2	16.6	0.8	3.7	**BG**
CZ	7.8	-0.2	3.3	6.2	1.4	2.2	0.2	0.2	0.4	0.1	0.0	0.0	3.5	-0.5	-0.3	17.9	0.9	5.5	**CZ**
DK	9.1	1.4	0.1	5.9	0.8	1.0	1.7	1.1	1.5	1.0	-0.2	-0.2	7.1	0.4	0.2	24.8	3.6	2.6	**DK**
DE	10.4	1.4	2.3	7.4	1.4	1.8	0.9	0.7	1.4	0.9	-0.3	-0.3	3.9	-0.5	-0.4	23.6	2.6	4.8	**DE**
EE	5.6	-0.2	-0.7	4.9	0.7	1.2	0.1	0.0	0.1	0.1	0.0	0.0	3.7	-0.4	-0.2	14.3	0.1	0.4	**EE**
IE	5.2	2.8	6.1	5.8	0.9	1.8	0.8	0.4	1.3	0.8	0.1	0.1	4.5	-0.4	-0.3	17.2	3.7	8.9	**IE**
EL	11.7	7.7	12.4	5.0	0.9	1.4	1.4	0.8	2.2	0.3	-0.1	-0.1	3.7	-0.3	0.0	22.1	9.1	15.9	**EL**
ES	8.4	3.4	6.7	5.5	1.0	1.6	0.5	0.5	0.9	1.3	-0.4	-0.4	3.5	-0.3	0.1	19.3	4.3	9.0	**ES**
FR	13.0	1.4	1.0	8.1	1.0	1.2	1.4	0.5	0.8	1.2	-0.3	-0.3	4.7	0.0	0.0	28.4	2.7	2.7	**FR**
IT	14.0	1.2	-0.4	5.9	0.9	1.1	1.7	0.5	1.3	0.4	0.0	0.0	4.1	-0.6	-0.3	26.0	2.0	1.6	**IT**
CY	6.3	5.4	11.4	2.7	0.4	0.6	0.0	0.0	0.0	0.3	-0.1	-0.1	6.1	-1.2	-1.2	15.4	4.5	10.8	**CY**
LV	5.4	0.7	-0.4	3.5	0.4	0.6	0.4	0.2	0.5	0.2	0.0	0.0	3.7	-0.6	-0.3	13.2	0.6	0.4	**LV**
LT	6.8	1.9	4.6	4.5	0.7	1.1	0.5	0.2	0.6	0.1	0.0	0.0	4.0	-1.0	-0.9	15.8	1.8	5.4	**LT**
LU	8.7	8.0	15.2	5.8	0.9	1.2	1.4	0.7	2.0	0.4	0.0	0.0	3.8	-0.5	-0.5	20.0	9.1	18.0	**LU**
HU	10.9	0.6	3.0	5.8	0.7	1.3	0.3	0.1	0.4	0.3	-0.1	-0.1	4.4	-0.7	-0.4	21.6	0.7	4.1	**HU**
MT	7.2	2.5	6.2	4.7	2.2	3.3	1.0	0.9	1.6	0.4	0.0	0.0	5.0	-1.2	-1.0	18.2	4.4	10.2	**MT**
NL	6.6	3.4	4.0	4.8	0.9	1.0	3.4	2.8	4.7	1.1	-0.1	-0.1	4.6	-0.2	-0.2	20.5	6.9	9.4	**NL**
AT	12.8	1.2	0.9	6.5	1.2	1.5	1.3	0.6	1.2	0.7	0.0	0.0	4.8	-0.6	-0.5	26.0	2.3	3.1	**AT**
PL	11.6	-2.3	-2.8	4.0	0.7	1.0	0.4	0.2	0.7	0.1	-0.1	-0.1	4.4	-1.3	-1.2	20.5	-2.7	-2.4	**PL**
PT	11.4	0.9	2.1	7.2	1.0	1.9	0.1	0.0	0.1	1.2	-0.4	-0.4	4.6	-0.6	-0.3	24.5	1.1	3.4	**PT**
RO	6.6	5.0	9.2	3.5	0.7	1.4	0.0	0.0	0.0	0.2	0.0	0.0	2.8	-0.6	-0.5	13.1	5.0	10.1	**RO**
SI	9.9	4.9	8.8	6.6	1.4	1.9	1.1	0.9	1.8	0.2	0.0	0.0	5.1	-0.2	0.4	22.9	6.9	12.8	**SI**
SK	6.8	1.0	3.4	5.0	1.5	2.3	0.2	0.1	0.4	0.1	-0.1	-0.1	3.1	-1.0	-0.8	15.2	1.6	5.2	**SK**
FI	10.0	3.9	3.3	5.5	0.9	1.0	1.8	1.7	2.6	1.2	-0.2	-0.2	5.7	-0.2	-0.3	24.2	6.1	6.3	**FI**
SE	9.5	-0.1	-0.1	7.2	0.6	0.8	3.5	1.3	2.3	0.9	-0.1	-0.1	6.0	-0.3	-0.3	27.2	1.5	2.6	**SE**
UK	6.6	1.3	2.7	7.5	1.2	1.9	0.8	0.3	0.5	0.2	0.0	0.0	3.8	0.0	-0.1	18.9	2.7	5.1	**UK**
NO	8.9	4.3	4.7	5.6	1.0	1.3	2.2	1.2	2.7	0.2	0.2	0.2	7.9	0.1	0.1	24.9	6.8	9.0	**NO**
EU27	10.2	1.7	2.4	6.7	1.0	1.5	1.2	0.6	1.1	0.8	-0.2	-0.2	4.3	-0.3	-0.2	23.1	2.7	4.7	**EU27**
EA	11.1	2.1	2.8	6.7	1.0	1.4	1.3	0.7	1.4	1.0	-0.2	-0.2	4.2	-0.3	-0.2	24.3	3.2	5.2	**EA**
EU15	10.2	1.8	2.4	6.9	1.0	1.5	1.3	0.6	1.2	0.8	-0.2	-0.2	4.3	-0.3	-0.1	23.5	3.0	4.8	**EU15**
EU12	9.2	0.4	2.3	4.7	0.8	1.3	0.3	0.2	0.5	0.2	0.0	0.0	3.9	-0.9	-0.7	18.3	0.4	3.4	**EU12**
EU25	10.2	1.6	2.3	6.8	1.0	1.5	1.2	0.6	1.2	0.8	-0.2	-0.2	4.3	-0.3	-0.2	23.3	2.7	4.7	**EU25**
EA12	11.1	2.1	2.8	6.7	1.0	1.4	1.3	0.7	1.4	1.0	-0.2	-0.2	4.2	-0.3	-0.2	24.4	3.3	5.2	**EA12**
EU10	9.7	-0.5	1.0	4.9	0.9	1.4	0.4	0.2	0.6	0.2	0.0	0.0	4.2	-1.0	-0.8	19.2	-0.4	2.1	**EU10**

Source: Commission services, EPC.

The projection results for public spending on pensions

For the EU, the projections show an increase in public pension expenditures of 2.4 p.p. of GDP over the period 2007-2060. For the euro area, a slightly larger increase of 2.8 p.p. of GDP is projected. The diversity across Member States is very large. Public pension expenditure (social security pensions) is projected to increase by more than 10 p.p. of GDP in 3 Member States (Greece, Cyprus, and Luxembourg). Spending is expected to grow by between 5 and 10 p.p. of GDP in another five Member States (Ireland, Malta, Spain, Romania, Slovenia). In most Member States (Belgium, Bulgaria, the Czech Republic, Germany, France, Lithuania, Hungary, the Netherlands, Austria, Portugal, Slovakia, Finland, the UK), the change of the ratio is below 5 p.p. By contrast, in Denmark, Sweden, Latvia, Italy, and Estonia the ratio either stays at the 2007 level or drops below it. Some countries are projecting a decrease over the entire period of projections (Poland, Estonia, Denmark, Italy and Latvia), although this masks an increase over part of the projection period (such as in the case of Italy).

The lion's share of the projected increase in public pension expenditure is due to old-age and early pensions, while, given their limited size, a smaller increase is projected for other pension expenditure, mainly disability and survivor pensions, which increase only slightly (0.1. p.p. of GDP) in the euro area. As regards disability and survivor pensions, they are projected to increase only in 8 countries (Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, the UK and Norway), although these increases would be slight.

The demographic transition to an older population is the main driver behind the projected increase in public pension expenditure. This effect alone would push up expenditures very significantly in all Member States (especially in Slovenia, Romania, Poland, Greece, although more limited in the UK, Estonia, Sweden, Latvia). However, some factors, also related to past reforms of pension systems, are expected to mitigate the increase:

- *a tightening of the eligibility for a public pension* (through higher retirement age and/or reduced access to early retirement and better control of alternatives to early retirement like disability pensions) would constrain public pension expenditure in nearly every Member State. In the large majority of countries, it reflects implemented pension reforms, often phased-in over a long period, that lead to higher participation rates of older workers during the projection period. For instance, pension reforms that have strengthened the link between pension benefits and pension contributions (or raised the threshold for qualifying for a 'full' pension), can also contribute to raising the retirement age. Trend increases in female labour force participation also lead to an increase in the effective retirement age in a large majority of countries;

- *higher employment rates* are projected as reforms that provide stronger work incentives reduce structural unemployment rates in a number of countries;

- *reduced generosity of pensions relative to wages*. It is captured at an aggregate level by the pension benefit ratio, i.e. the average pension as a share of the average wage. This effect shows very considerable differences across EU Member States. In some (Denmark, Ireland, Greece, Cyprus, Romania, the UK), average pensions relative to wages remain unchanged or even increase over the projection period, while in most others, and especially in Bulgaria, Estonia, France, Italy, Latvia, Austria, Poland, Portugal, Slovakia, and Sweden they are projected to have fallen significantly by

2060. While resulting in budgetary savings, the adequacy of pensions should be kept under review. Inadequate pension levels may lead to future demands for ad-hoc government interventions to address declines in public pensions relative to wage developments and the risk of poverty of pensioners. Generally, several issues merit attention: (i) removing supply-side barriers to allow persons to continue to work as they grow older; (ii) putting in place flexible mechanisms that allow older persons to choose to retire even beyond the statutory retirement age and affect the size of their eventual pension benefit; (iii) introducing incentives for employees/employers to prolong working lives/retain older workers in the workforce; (iv) allowing for part-time old-age retirement, as a way of combining adequate incomes for older persons with improving the labour supply in the economy, as well as making more attractive the continued contribution of older workers; (v) providing relevant and accessible information on the need for people to rely on a range of different income sources once retired in the future. Incentives for private savings can take many different forms, ranging from making contributions to private pensions schemes compulsory, to providing tax breaks for regular private pension savings.

A number of countries have implemented systemic pension reforms, shifting part of the previously public pillar to a mandatory funded private pillar (Bulgaria, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia and Sweden). At present, these private pillars are making very small disbursements since they mainly only started to be implemented during the previous decade, but their importance will increase in the future. Some countries (e.g. Sweden, Denmark and the Netherlands) also rely on second pillar occupational pension to a certain extent. Third pillar non-mandatory pension schemes are increasingly being introduced, but their importance is generally small. There are potential policy issues with 'privatizing pensions'. While it reduces explicit public finance liabilities and improves the sustainability of public finances, moving towards an increasing role for private sector pension provision creates new challenges and risks for both pensioners and policy makers. In particular, the importance of appropriate regulation of private pension funds and of careful surveillance of their performance for securing adequate retirement income becomes a more and more demanding political task, as the current financial and economic crisis has made adamantly clear. Furthermore, since many occupational and private pensions are to a very large part funded, their contribution to future retirement income will be affected by the crisis. Large losses in equity prices can have strong lasting effects on the future pension benefit.

In sum, the projections reveal that pension policies in a majority of EU Member States are: (i) reducing the generosity of public pension schemes to make these programmes financially more sustainable in view of the demographic trends; (ii) pushing up the statutory retirement age in a gradually phased way for old-age pensions; (iii) restricting access to early retirement schemes by strengthening the incentives to prolong working lives, which leads to a containment of the increase in old-age and early pensions spending. The projections show no increase in disability and survivor pensions, embodying an assumption of lower take-up rates of these transfers. However, a number of countries (Greece, Cyprus, Luxembourg, Malta, Spain, Romania and Slovenia) have made only limited progress so far in reforming their pension systems or are experiencing maturing pension systems and escalating spending. For them, there is an urgent need for a modernisation of pension systems, to start bending back the curve of long-term costs.

The projection results for public spending on health care

Projecting public spending on health care over the long-run for 27 Member States (and Norway) is a highly complex exercise, given the uncertainties regarding future trends in the drivers of spending, the limited availability of comparable data and the complex institutional settings of national health care systems. The model used in the exercise attempts to quantify in the most accurate way, given data limitations, the impact of demographic changes and of the evolution of a number of non-demographic drivers on public health care expenditure.

According to the “AWG reference scenario” (a prudent scenario which takes into account the combined impact of ageing, potential improvements in health status, and the effect of changes in the national income), public expenditure on health care is projected to grow by 1.5% of GDP (from 6.7% in 2007 to 8.2% in 2060) in the EU on average, while for individual countries the increase ranges from less than 1% of GDP in Norway, Cyprus, Bulgaria and Sweden to more than 3% of GDP in Malta.

The projected increase in health care spending is driven mostly by the change in the demographic structure of the population. Its impact is measured by the "pure demographic scenario" which projects an average increase of 1.7% of GDP. However, as empirical evidence suggests, it is the health status, rather than age, which is the predominant causal factor behind health care spending. Under more optimistic assumptions about the health status evolution (illustrated by the "constant health scenario"), the demographic pressure on health care expenditure could be reduced by over a half, to only 0.7% of GDP. Caution should be exercised, however, as there is inconclusive evidence that a strong improvement in health status will benefit older persons, especially as regards chronic illnesses.

The increase in living standard conditions is another important driver of health care costs, affecting the demand for health care mainly through higher expectations on quantity and quality of care to be provided by the State. Using an estimate for income elasticity of demand of 1.1%, the projections predict that an extra 0.4% of GDP increase will be added to the pure demographic effect.

The impact of the most important demand side factors is quantified by the model with a high degree of plausibility. As for modelling supply side drivers, in particular many efforts have been devoted during this exercise to analyse the technological impact but the degree of uncertainty on the results remains too high. Stylised scenarios show that future developments both in wages and investment in technology, the two main components of health care costs, can be expected to push expenditure further up above the levels projected by the scenarios which take account of demand-side factors only. Analysis of past trends in health care expenditure suggests that technological developments are responsible for a significant part of overall costs growth, which may result in a significant increase in spending which is not captured in the projection. On the other hand, depending on budget constraints of publicly financed health systems, cost-saving technical progress might play a role in the future. In this context, the effective management of technology seems to be of utmost importance; otherwise the expenditure savings resulting from lower unit costs could easily be outstripped by the costs of meeting additional demand for new and better treatments. In any case, the increase in expenditure resulting from higher quality treatments in the future can be expected to be borne by those generations that benefit from these technological developments.

The projection results for public spending on long-term care

An ageing population will have a strong upward impact on public spending for long term care. This is because frailty and disability rise sharply at older ages, especially amongst the very old (aged 80+) which will be the fastest growing segment of the population in the decades to come.

According to the "AWG reference scenario" based on current policy settings, public spending on long-term care is projected to double, increasing from 1.2% of GDP in 2007 to 2.3% of GDP in 2060 in the EU as a whole. The projected absolute changes range from less than ¼ % of GDP in Bulgaria, Estonia, Cyprus, Portugal and Romania to more than 2% of GDP in Greece, the Netherlands, Finland, Sweden and Norway, reflecting very different approaches to the provision/financing of formal care. Given that the initial level of spending affects to a large extent the projected increase in p.p. of GDP, an increase in relative terms (from 60% of the initial level in the UK to over 200% in Romania, Malta and Slovakia) illustrates somewhat better the degree of the challenge facing European societies.

There is significant uncertainty as regards future developments in public expenditure on long-term care and there may be scope for higher expenditure as the no-policy change assumption embodied in the projection does not take into account possible future societal trends. With an ageing population, the number of disabled elderly people who rely on informal care only would nearly double in the EU27, and increase by more than 120% in seven Member States: the Czech Republic, Ireland, Cyprus, Luxemburg, Poland, Romania and Slovakia. Without policy changes in the provision of long-term care, a growing gap may occur between the number of elderly citizens with disability who are in need of care and the actual supply of formal care services. On top of an ageing population, this gap could further grow as changes in family structure and the growing participation of women to the labour market may constrain the future supply of informal care provision within households and families. On the other hand, the continued increase of life expectancy would bring a higher potential supply of informal care by old partners and retired children. In brief, for countries which today have less developed formal care systems, the headline projected increase in public spending on long-term care could only partially capture the pressure on public finances, as societal demand for future policy changes in favour of more formal care provision will emerge and be difficult to resist.

Public expenditure is sensitive to trends in the prevalence of disability among the elderly. An improved disability status would lead to a lower number of disabled persons by age in the future who would have some need for care. This would moderate any future increase in expenditure due to ageing populations; compared with the AWG reference scenario, the projected change in spending would be 0.1 p.p. lower if the disability status of elderly citizens improves broadly in line with the projected increase in life expectancy. The available evidence indicates that the ageing of the population and the extended longevity of people can be expected to lead to increasing numbers of elderly with severe disability and in need of long-term care in some Member States, so it would not be prudent for policy makers to anticipate strong moderation of future expenditure on account of future reductions in disability.

The unit (per patient) cost of formal care in an institution is relatively higher than the cost of a unit of care provided in the home of the beneficiary (linked to the degree of disability), which translates into higher increases in long-term care expenditure projected when additional long-term care services are provided in institutions rather than at home.

However, improvements in health status can reduce disability and policy measures which either limit the need for formal care amongst elderly citizens with disabilities or favour more efficient formal care provision at home or in institutions may contribute to limiting the expected increase in public expenditure.

The projection results for public spending on education

The ratio of children and young people to the working-age population is expected to shrink over the coming decades, pointing to fewer students relative to the working population. The baseline scenario estimating the pure consequences of expected demographic changes indicates a potential for a small decline in public expenditure on education in the EU as a whole (from 4.3% of GDP in 2007 to 4.1% of GDP in 2060) and in almost all the Member States.

However, the baseline projection does not take into account that public expenditure on education as a share of GDP could even increase, when incorporating the assumptions that there will be changes in education policy aiming at the necessary improvement in the quality of education, reduction in class sizes, increases in the attainment level of education of future generations, implementing life long learning initiatives or attempts to prevent the outflow of qualified staff by offering faster growing salaries. Indeed, current objectives on education policy and targets in EU Member States, such as the recently adopted targets for higher educational attainment and reduced drop-out rates, suggest that educational spending might well increase rather than fall.

The projection results for public spending on unemployment transfers

In order to more broadly assess the total impact of ageing on public finances, and to guarantee consistency with the underlying macroeconomic scenario, projections on unemployment benefit expenditure were carried out. The number of unemployed persons in relation to the number of people who are working is expected to shrink over the projection period. On this basis, unemployment benefit spending in the EU is projected to be slightly lower over the long run (moving from 0.8% of GDP in 2007 to 0.6% in 2060). This figure rests on the assumption that structural unemployment will stay unaltered in the face of significant demographic change. If the structural unemployment rate, on the other hand, would fall by more than the one percentage point assumed in the sensitivity test, a correspondingly higher decrease in spending on unemployment transfers might materialize.

The potential impact of the economic crisis on the long-term budgetary projection results

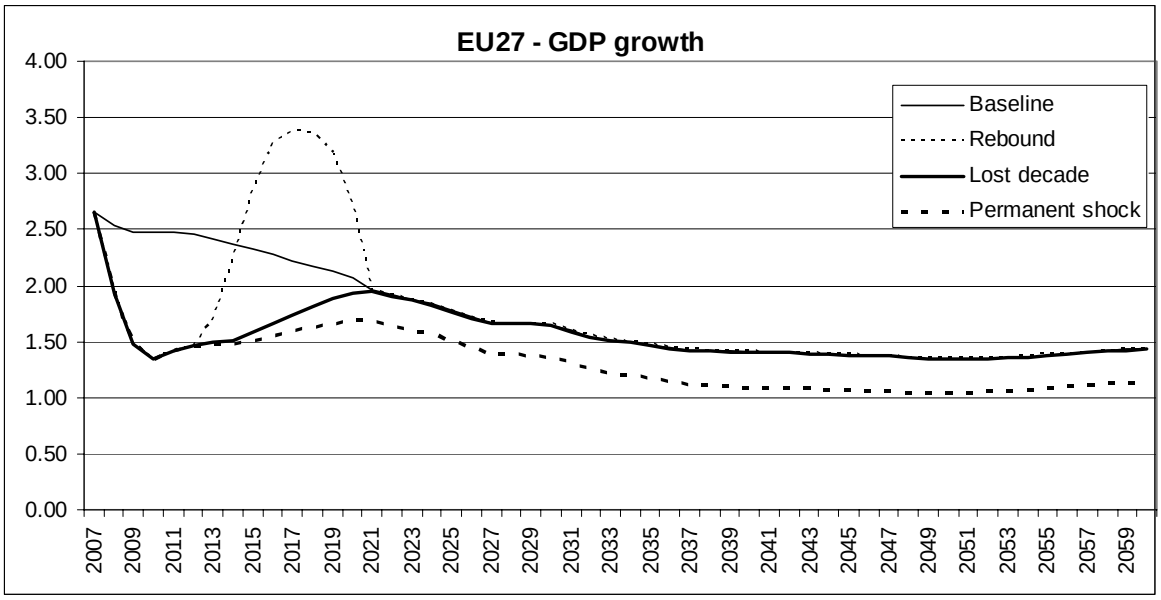
The financial and economic crisis that started to take hold in 2008 has led to an unusually sharp and rapid deterioration in economic activity. The current slowdown has gradually transformed into a world recession, particularly affecting the US and also the economies of most EU countries. New risks have emerged and have made many economists fear that the crisis may continue to weigh on economic performance for some time to come, and that any recovery will only be in sight after a protracted period of time. This has prompted the question of the extent to which the worsened short-term outlook would also have implications over the medium- and longer-term.

The AWG/EPC macroeconomic scenario was finalized in 2008 and does not incorporate the sharp deterioration of economic activity in Europe. Factoring in this large deterioration in macroeconomic prospects would imply a downward revision of EU GDP over a number of years at the beginning of the projections, although it would only have limited effects over the remainder of the period up to 2060, at least to the extent that long-run growth potential is only temporarily affected. In order to simulate the order of magnitude of the risks related to the ongoing economic crisis, alternative simulation scenarios were devised that complement the baseline scenario of the AWG.

Two types of shocks were considered. First, temporary shocks are simulated in two alternative scenarios: a rather optimistic 'rebound', recovery included for illustrative purposes, and in addition a 'lost decade' scenario. These scenarios entail two different assumptions on the duration of the shock. The 'rebound recovery' assumes that the European economy will rebound soon and will already have returned to the pre-crisis level of GDP in 2020. The "lost decade" scenario, assumes that it could take until 2020 to get back to the growth rates (but not the GDP level) set in the AWG baseline. Second, a permanent shock to the growth potential of the EU economies is simulated in a "worst case" scenario. This assumes that the current crisis will lead to a permanently higher unemployment rate (1 p.p.) and a permanently lower labour productivity growth rate (about 1.5%) compared with the baseline (1.7%).

The temporary shock scenarios have an impact on the long-term growth potential. Potential GDP growth for the EU27 coincides with the AWG baseline from 2020. Over the projection period 2007-2060, the average revision of potential GDP growth in the 'lost decade' scenarios is 0.2 p.p. per year for the EU27. In the 'permanent shock' worst case scenario, a larger downward revision of the average annual GDP growth by 0.4 p.p. over the whole projection period would materialize (see Graph 2). The loss in GDP per capita in the 'lost decade' scenario relative to the baseline is around 8% in 2020 and this loss is carried over the rest of the projection period, since the growth projection remains broadly unchanged as of 2020. In the 'rebound' scenario, there is no loss in wealth accumulation since the recovery is assumed to be materialized completely by 2020. Finally, a more marked reduction in the GDP per capita level is observed in the 'permanent shock' scenario where GDP per capita in 2060 is 18% lower than in the AWG baseline, reflecting persistently lower growth.

Graph 2 – Potential GDP growth under different shocks (annual growth rate)



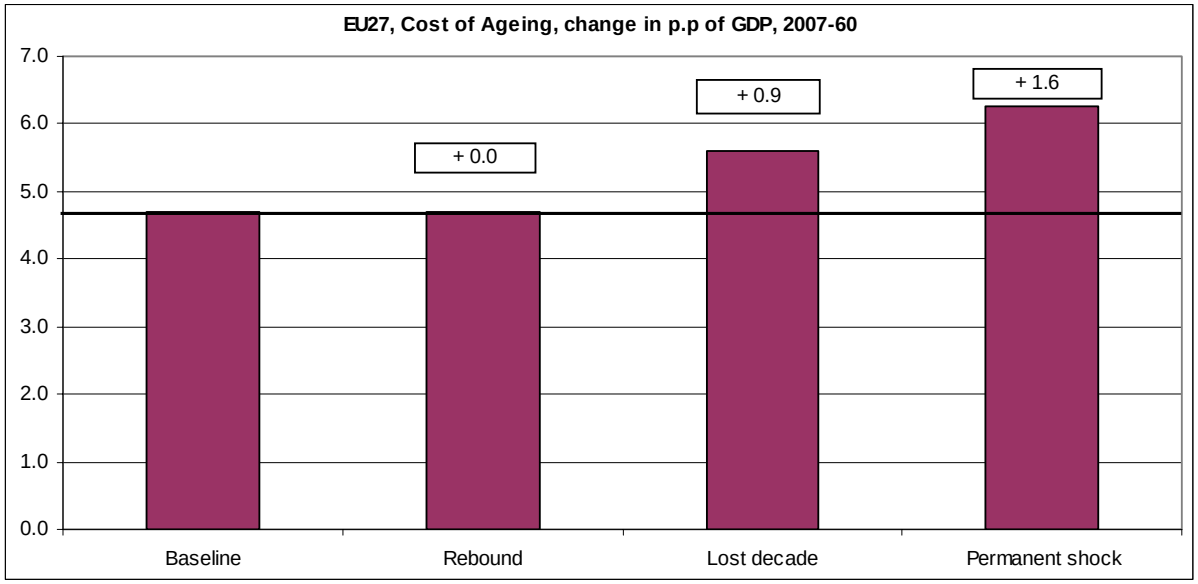
Source: Commission services.

In terms of budgetary impact, the question of whether the shock is temporary or permanent determines its potential magnitude. An assessment of the public budget impact of these alternative scenarios has been carried out based on elasticities calculated for the sensitivity analysis. This provides only a preliminary indication of the impact of the alternative crisis scenarios. The 'lost decade' scenario reveals that the age-related government expenditure increases faster over the first decade of the projection period, and then stabilises relative to the AWG baseline. Between 2007 and 2020, the total increase in age-related expenditure would be 0.9 p.p. of GDP higher relative to the AWG baseline that would persist for a number of years and vanish in the long run. The 'permanent shock' scenario shows a constant widening of the expenditure-to-GDP ratio compared with the baseline. Between 2007 and 2020, age-related public expenditure would increase by 1.1 p.p. of GDP more relative to the AWG baseline. Over the entire projection period however, the public age-related spending-to-GDP ratio would be 1.6 p.p. of GDP higher compared with the AWG baseline (see Graph 3).

In sum, these simulations illustrate that at this juncture, characterized by very subdued economic activity and exceptional uncertainty as to the prospects, there is a very real need to put in place all necessary policies to avoid the current financial crisis turning into a permanent shock to the key determinants of potential growth (employment and labour productivity) as this would have a strong negative impact on future GDP, per capita income levels and budgetary conditions. Europe's ability to get out of the slump fast and restore sound public finances will depend crucially on its ability to deploy targeted and well co-ordinated policy responses, as stressed by the European Economic Recovery Plan[5] and illustrated by the 'rebound' scenario.

[5] COM (2008) 800 final. 26 November 2008.

Graph 3 - Potential budgetary impact of the economic crisis



Source: Commission services.

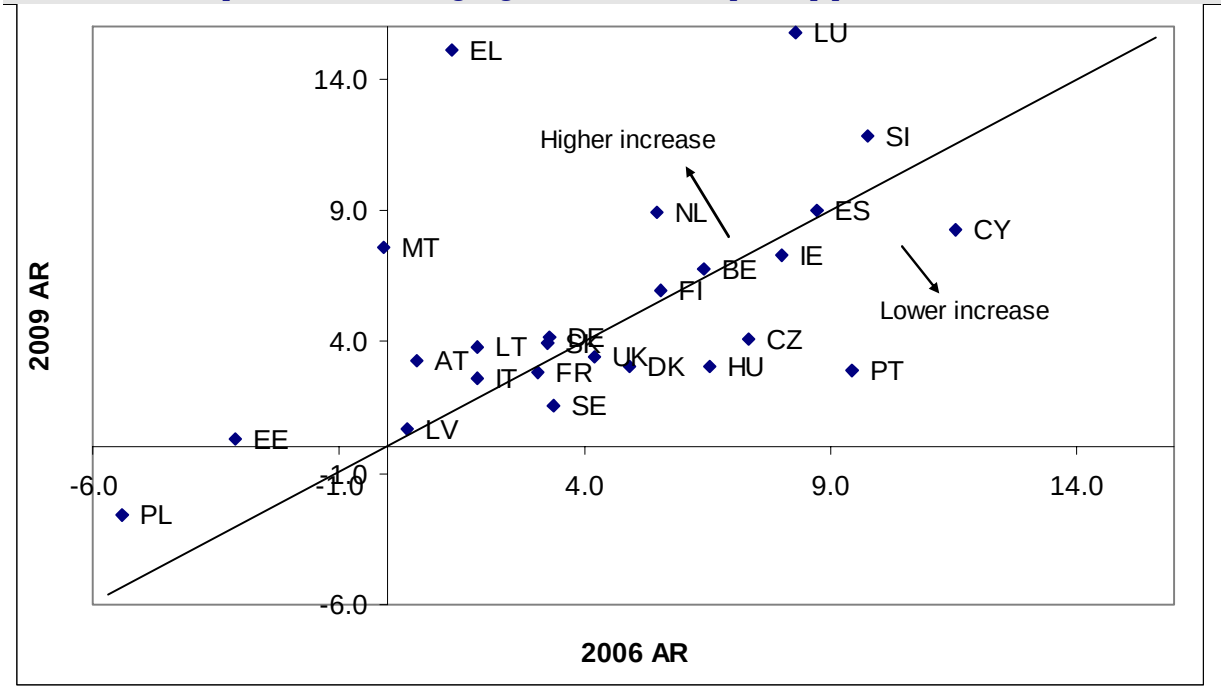
The current situation must be used as an opportunity to combine determined efforts to overcome the recession with reforms that will restore confidence in the longer-term outlook for public finances, by strengthening investment in a more sustainable economy and society and by putting ageing-related spending on a sustainable path. This is particularly important if Europe wants to exploit the narrow window of opportunity – a period of about ten years during which employment growth remains possible – before dependency ratios begin to rise rapidly. Hence, getting the policy response right in a co-ordinated manner would limit the loss of wealth creation in Europe and would also lead to less expenditure than would otherwise be the case. Indeed, delays in implementing the needed policies would require stronger measures to achieve the same fiscal outcome by mid-century. It will be particularly important, therefore, to intensify the reform agenda in view of the longer-term challenges outlined above, so as to emerge stronger from the current economic crisis, and to get our economies back on a path of long-term growth. For this to happen, a comprehensive exit strategy built on structural reforms across the board will be necessary to restore credibility and confidence in the public finances. Once out of the crisis, in planning a new fiscal course, due account needs to be taken of the diagnosis of the problems related to ageing. To start to bend back the curve of long-term costs, and to get our economies back on a path of long-term growth, modernization of pensions and health care as well as expanding the degree to which existing factors of production have been used so far is the key.

Comparison with the previous projection exercise

The increase in the age-related public expenditure/GDP ratio for the EU25 and the EA12 is slightly higher compared with the previous projections in the 2006 Ageing Report. Over the period 2007-2050, the increase in the EU25 is 4.2 p.p. of GDP and in the euro area 5.0 p.p. of GDP, compared to the projected increase in the previous exercise over the same period of 3.7 and 4.1 p.p. of GDP respectively (see Graph 4).[6]

[6] It should be noted that the pension projection for Greece is included in the current projection exercise, which was not the case in the 2006 Ageing Report. Excluding the Greek pension projection would reduce the EU25 public pension aggregate from 2.3 p.p. of GDP to 1.9 p.p. of GDP over the period 2007-2050.

Graph 4 - The Cost of Ageing in '09 and '06 compared, p.p. of GDP, 2007-50



Source: Commission services.

Note: Bulgaria and Romania were not part of the 2006 exercise and pension projections for Greece were not available.

Compared with the projections in the 2006 Ageing Report, age-related public expenditure is now projected to increase more over the period 2007-2050 in 16 Member States (Belgium, Germany, Estonia, Greece, Spain, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Austria, Poland, Slovenia, Slovakia and Finland). By contrast, it is now projected to increase less in 9 Member States (the Czech Republic, Denmark, Ireland, France, Cyprus, Hungary, Portugal, Sweden and the UK). In some cases, the results are almost identical and the - positive or negative difference - is rather small. This is the case for all those countries where the observed rates are depicted on the line shown in the graph or very close to it.

The largest downward revisions have occurred in Portugal, Hungary, Cyprus and the Czech Republic reflecting large expenditure-reducing pension reforms in Portugal and the Czech Republic. Large upward revisions (2 p.p. of GDP or more) are reported in Greece, Luxembourg, Malta, Estonia, Austria, Poland and Lithuania reflecting primarily revised projected changes in pension expenditure stemming from reform reversals and improved modelling techniques.

The budgetary projections provide the basis for assessing risks to the long-term sustainability of public finances at the EU level

Overall, the updated age-related expenditure projections provide a considerably enhanced basis for the assessment of the risks to the long-term sustainability of Member States' public finances. In the latter half of 2009, the Commission intends to present the first update of the Sustainability Report making use of this updated set of projection results.

1. MACROECONOMIC ASSUMPTIONS

1.1. Population projection

Projecting demographic and economic developments in the next fifty years is one of the most daunting analytical tasks facing policy makers. A high uncertainty surrounds the projections and the longer the projection period, the highest the uncertainty. Demographic factors are subject to less variation than economic factors over the short run, however they have exhibited much less stability over the medium-long term of say 25 years. The population projection, called EUROPOP2008, is made for the 27 EU countries based on assumptions on future trends in fertility, life expectancy and migration. It was released by Eurostat in April 2008.

1.1.1. Fertility

1.1.1.1. Past trends

Fertility has declined sharply in past decades. The total fertility rate for the EU, or the average number of births per woman, has dropped from the "baby boom" peak[7] above 2.5 births per woman in the second half of the 1960s, to well below the replacement level of 2.1 births per woman that is needed in order for each generation to exactly replace itself. Such low levels of fertility sustained for decades have triggered the process of population ageing, with smaller numbers of births leading to decreasing populations of children and, over time, of young people and adults of working age.

Total fertility rates are below the replacement level in all Member States but the pace and timing of their decline differs across countries. In some countries, it took place in the late 1960s while in others it happened in the 1990s and 2000.[8] Postponement of the first childbirth accounts for the reduction in total fertility rates to a large extent, but it is also accompanied by an increase in the share of children without siblings and by higher frequency of childlessness among women in their 30s and 40s.

In a few Member States, total fertility rates are above 1.8, namely Denmark, France, Ireland, Finland, Sweden and the UK. In contrast, a number of Member States have very low fertility rates, below 1.4 births per woman: Bulgaria, the Czech Republic, Germany, Estonia, Greece, Spain, Italy, Latvia, Lithuania, Hungary, Austria, Poland, Romania, Slovenia and Slovakia. Recent trends since 2000 also differ across Member States. Fertility rates are still falling in Germany, Cyprus, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania and Slovakia. By contrast, there are recent increases in a large number of countries: Bulgaria, the Czech Republic, Denmark, Estonia, Greece, Spain, France, Latvia, Finland, Sweden, and the UK.

Several forces will shape the future trends in fertility, e.g. the trend in ideal family size and the strength of the desire of having children as compared to other goals in life, the trend in education and work, changing government policies and macro-level conditions such as child

[7] The baby boom of the 1950s-1960s is an aberration rather than a precursor of the near future, see Technical Panel on Assumptions and Methods (2007).

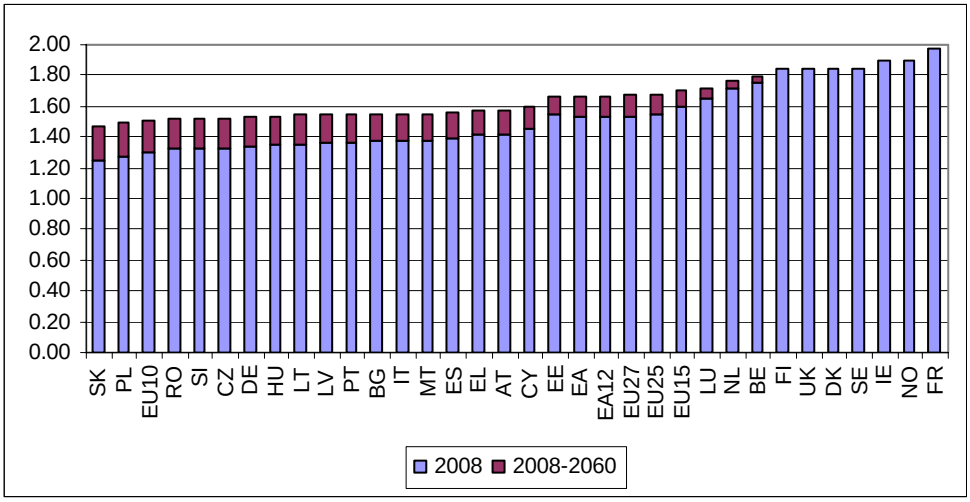
[8] Fertility rates fell below replacement levels in the late 1960s in Sweden, Denmark, Finland, Luxembourg, Germany, Hungary, Latvia and the Czech Republic. The fall took place somewhat later in Belgium, Netherlands, Austria, the UK, France (1972-73) and Italy (1975) and much later in Greece, Spain, Portugal (1981-82) and Ireland (2000), Malta (1980), Poland and Slovakia (1989).

care facilities and housing, the changing nature and stability of partnerships and changing bio-medical conditions.

1.1.1.2. The EUROPOP2008 assumptions

Eurostat assumes the postponement of childbearing will slow down and fertility will start recuperating. By 2060, a modest recuperation of fertility would take place: for the EU, the total fertility rate would rise from 1.54 births per woman in 2008 to 1.60 by 2030 and further to 1.64 by 2060, see Graph 5. In the euro area, a similar increase would take place, from 1.55 in 2008 to 1.67 in 2060. According to the projection, the total fertility rate would increase in all Member States, except Ireland and France where it would fall, but remain above 1.85, and in Denmark, Finland, Sweden and the UK where it would remain stable. Hence, total fertility rates would remain below the natural replacement rate in all countries in the period to 2060, as the recuperation assumed is moderate. The largest increases in total fertility rates are projected to take place in Slovakia, Poland, Romania and Slovenia which have the lowest rates in the EU in 2008. The increase is projected to occur gradually, with rates in these countries approaching the current EU average only in 2060.

Graph 5 - Projection of total fertility rates in EUROPOP2008 (number of births per woman)



Source: Commission services.

1.1.2. Life expectancy

1.1.2.1. Past trends

Over very long time periods, life expectancy has increased in most developed countries.[9] In the EU, there have been significant increases in life expectancy at birth since 1960. Eurostat data for the period 1960 to 2000 show significant increases in life expectancy at birth in all Member States, especially for women. The increase is even more pronounced in euro area Member States. These increases in longevity accelerate the growth of the proportion of elderly people relative to that of children or adults in working age, which is furthermore slowed down or reduced by the sustained reduction of fertility over the past decades.

[9] Since the 19th century, improvements in living conditions and medical advances have led to increases in life expectancy at birth. The decline in mortality rates accelerated in the early years of the 20th century, with significant improvements made in reduction of infant and child mortality and in survival rates of young adults.

In the EU, the difference between female and male life expectancy has diminished since 1990, due to faster improvements in life expectancy for men. In the euro area, this process started in 1980, and the difference between men and women is also smaller than in the EU as a whole.

The gains in life expectancy at birth have differed across countries between 1980 and 2000. Women have gained 5 years or more in Germany, Italy, Luxembourg, Malta, Austria and Portugal. Smaller increases below 2.5 years were observed in Bulgaria, Denmark, Estonia, Latvia, Lithuania and the Netherlands. Over the same period, gains in life expectancy for men have been five years or more in Germany, France, Italy, Luxembourg, Malta, Austria, Portugal, Finland and the UK, while increases below 2.5 years have occurred in Bulgaria, Estonia, Greece, Latvia, Lithuania, Hungary, Romania and Slovakia.

There is no consensus among demographers on trends over the very long term. A number of driving forces are pushing, e.g. progress in bio-medical technology and whether (and at what age) there is a natural biological limit to longevity, the effectiveness of health care systems and changes in private life style such as reduction of smoking rates or increased prevalence of obesity. Possible new infectious diseases and negative environmental change could also drive future trends in mortality.

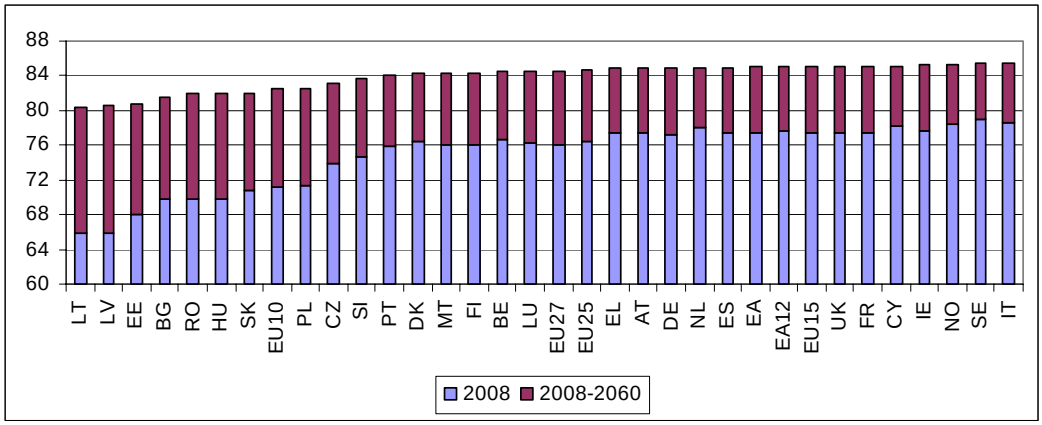
Past population projections from official sources have, however, underestimated the future gains in life expectancy at birth, and some commentators have argued that governments may be underestimating the potential budgetary impact of ageing populations because of that bias. Indeed, official projections 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 are considered harder to achieve. 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 2006, life expectancy at birth for women ranges from 76.2 in Romania to 84.4 years in Spain and France, and for men ranging from 65.3 in Lithuania to over 78.8 in Cyprus and Sweden. In contrast with past projections, the EUROPOP2008 projection assumes continuing increases in life expectancy, where improvements in mortality come from older ages.

1.1.2.2. The EUROPOP2008 assumptions

Large increases in life expectancy at birth would be sustained during the projection period, albeit with a considerable degree of diversity across Member States. In the EU, life expectancy at birth for men would increase by 8.4 years over the projection period, from 76 in 2008 to 84.5 in 2060. For women, life expectancy at birth would increase by 6.9 years for women, from 82 in 2008 to 89 in 2060, implying a continuation of the convergence of life expectancy between men and women.

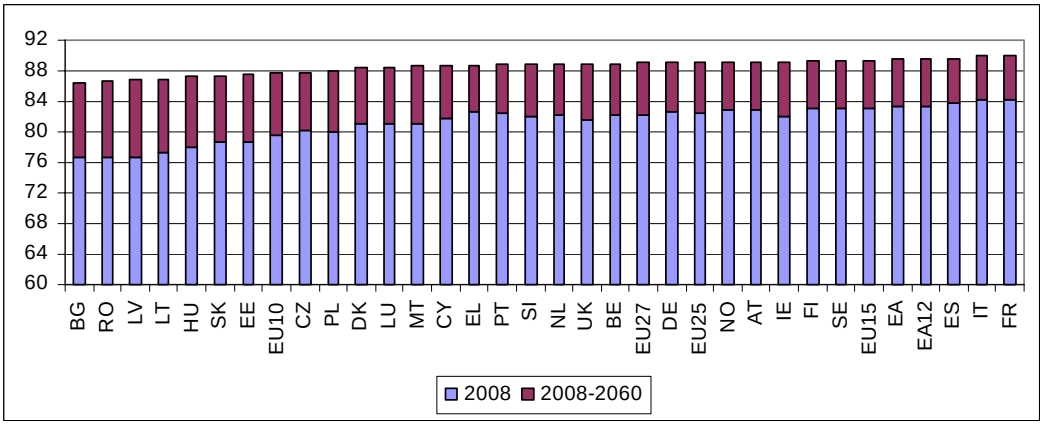
The largest increases in life expectancy at birth, for both men and women, are projected to take place in the new Member States. Life expectancy for men in 2008 is lowest in Estonia, Latvia, Lithuania, Hungary, Slovakia, Poland, Bulgaria and Romania between 66 and 71 years. Some catch-up takes place over the projection period in these countries, with projected increases in life expectancy of 12 to 14.5 years, the highest in the EU. Still, by 2060 the life expectancy in all new Member States, especially for men, would remain below the average in the EU, with the exception of Cyprus.

Graph 6 - Projection of life expectancy at birth in EUROPOP2008, men (in years)



Source: Commission services.

Graph 7 - Projection of life expectancy at birth in EUROPOP2008, women (in years)

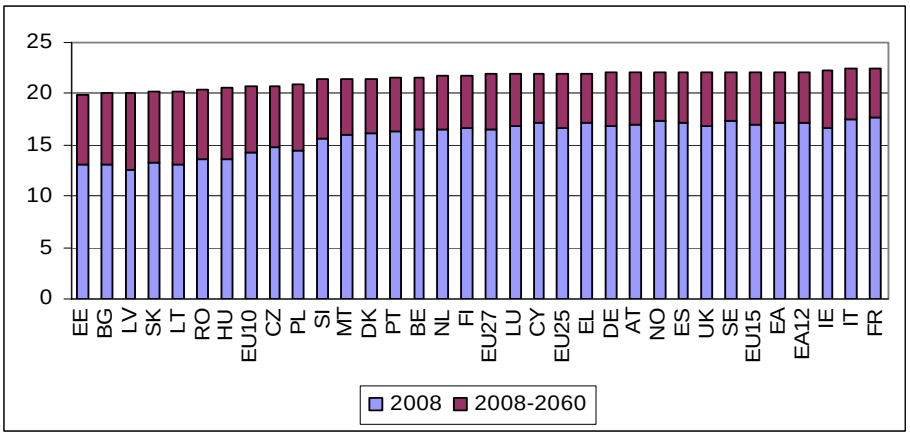


Source: Commission services.

Given the assumptions, the spread of life expectancy across the Member States is compressed over time, from 13.1 years in 2008 at birth for men (Sweden 79 years and Lithuania 65.9 years) to 5 years in 2060 (85.5 years in Italy compared with 80.4 years in Lithuania). For women, the reduction of the difference in life expectancy at birth is lower, from 7.7 years in 2008 (84.3 years in France and 76.6 years in Romania) to 4.1 year in 2060 (90.1 years in France and 86.5 years in Bulgaria).

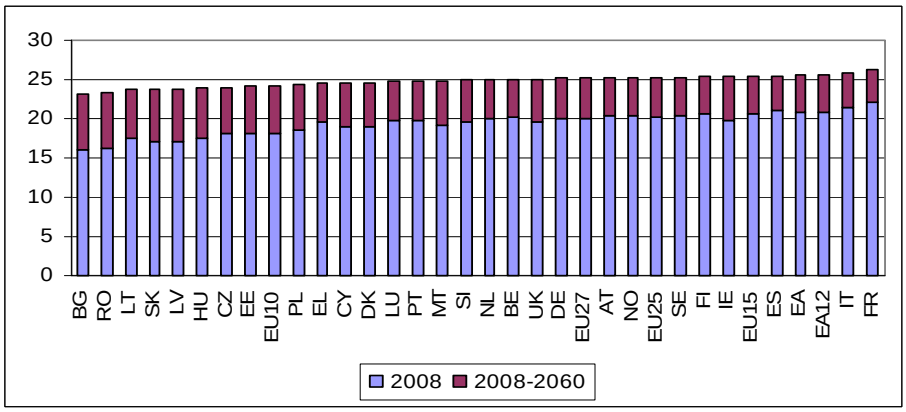
In the EU, life expectancy at age 65 is projected to increase by 5.5 years for men and by 5.2 years for women over the projection period. In 2060, life expectancy at age 65 would reach 21.8 years for men and 25.1 for women, according to the projection. The difference in life expectancy between male and female in 2060 would be of 3.3 years, smaller than the 4.5 year difference in life expectancy at birth.

Graph 8 - Projection of life expectancy at 65 in EUROPOP2008, men (in years)



Source: Eurostat, EUROPOP2008.

Graph 9 - Projection of life expectancy at 65 in EUROPOP2008, women (in years)



Source: Eurostat, EUROPOP2008.

1.1.3. Net migration flows

1.1.3.1. Past trends

European countries gradually become a destination for migrants. Recently, southern countries became net receiving countries during the 1990s and several countries in Central and Eastern Europe are currently both source and destination of migrants. During the last decade, net inflows[10] started rising, from over 500,000 people in 1998 to more than 2 million in 2003. Some of this increase, however, does not only reflect new entries of migrants, but also large-scale regularisation programmes which made parts of the immigrant population, illegally residing in the EU, visible in official statistics. Net flows show a recent tendency to stabilise, decreasing to a level of 1,880,000 in 2007.

The variability of net migration flows across countries is huge. Traditionally, Germany, France and the UK recorded the largest number of arrivals in the EU, but there has been a recent rise of migration flows to Italy, Spain and Ireland that have switched from countries of origin of immigrants to destination countries. Spain recorded the highest net inflows in the EU in 2006, after recording net outflows during the 1960s and most of the 1970s and 80s.

[10] 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.

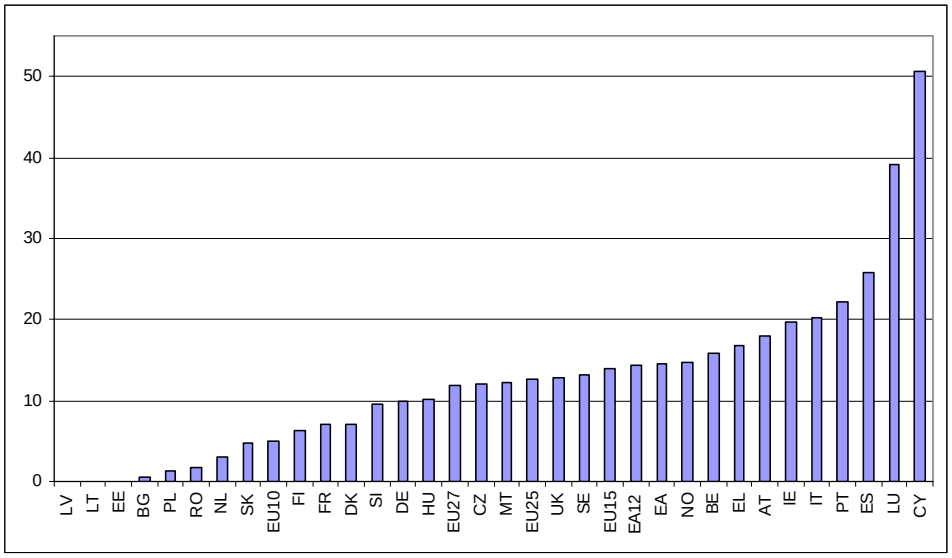
Future trends in migration are perhaps the hardest to anticipate, as they depend from future events across the world ranging from economic and social factors to political developments and family ties. The following very broad driving forces can be identified: trends in migratory pressure resulting from changes in countries of origin, trends in the attractiveness of recipient countries, costs of migration and the effectiveness of controls of undocumented migrants

1.1.3.2. The EUROPOP2008 assumptions

Over the projection period, annual net inflows are assumed to add up to a cumulated net migration to the EU of 59 million people over the entire projection period, of which the bulk is concentrated in the euro area (46.2 million). The increasing trend is assumed to decelerate over the projection period, from about 1,680,000 people in 2008 (equivalent to 0.33% of the EU population) to 980,000 by 2020 and thereafter to some 800,000 people by 2060 (0.16% of the EU population).

The bulk of migration is concentrated in the euro area (46.2 millions). Net migration flows are projected to concentrate in a few destination countries: Italy (12 millions cumulated up to 2060), Spain (11.6 millions), Germany (8.2 millions), and the UK (7.8 millions). In relative terms, cumulated net migration flows would account for 12% of the 2008 population for the EU as a whole, and above 20% in a few Member States (Ireland, Italy, Portugal, Spain, Luxemburg and Cyprus). For most countries that currently experience a net outflow (Estonia, Lithuania, Latvia, Poland, Bulgaria and Romania), this is projected to taper off or reverse in the coming decades.

Graph 10- Projection of net migration flows in EUROPOP2008 over the period 2008-2060, cumulated as a percentage of the population in 2008



Source: Eurostat, EUROPOP2008.

1.1.4. EUROPOP2008 population projection

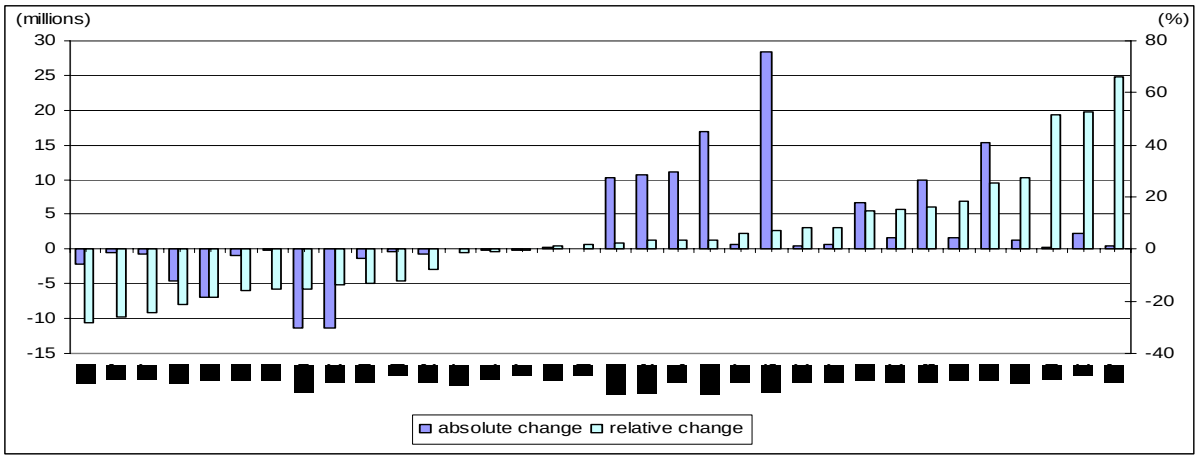
According to the projection, the population of the EU as a whole would be slightly larger in 2060, but much older than it is now. The total population is projected to increase (from 495.4 millions in 2008) up to 2035 by almost 5%, when it will peak (at 520.1 million). Thereafter, the population would shrink by nearly 3%. While about half of the EU countries would continue to grow over the projection period, the population of the other half would shrink, by

13% to 25% with the exception of Greece, Italy and Malta with reductions in total population of about 1%.

More important than the change in population size is the evolution of its age structure. The main feature over the projection period is the ageing of the population, illustrated by the population pyramids.[11] Elderly people would account for an increasing share of the population, according to the projection; this is due to gains in life expectancy sustained for decades and assumed to continue over the projection period. Hence, as the elderly cohorts become more numerous, the top of the pyramid becomes larger. At the same time, the base of the age pyramid becomes smaller due to persisting below-replacement fertility rates causing the young cohorts to be smaller. As a consequence, the shape of the age-pyramids gradually changes from pyramids to pillars.

Another illustration of the ageing of the population is the change in median age projected. In the EU, the median age would rise from 40.4 years in 2008 to 47.9 years in 2060. The ageing process can be characterised as ageing from the top of the pyramid, as it will largely result from projected increases in longevity, despite projected positive net migration flows and some recuperation of fertility.

Graph 11 - Projection of the total population (percentage and absolute change for the period 2008-2060)



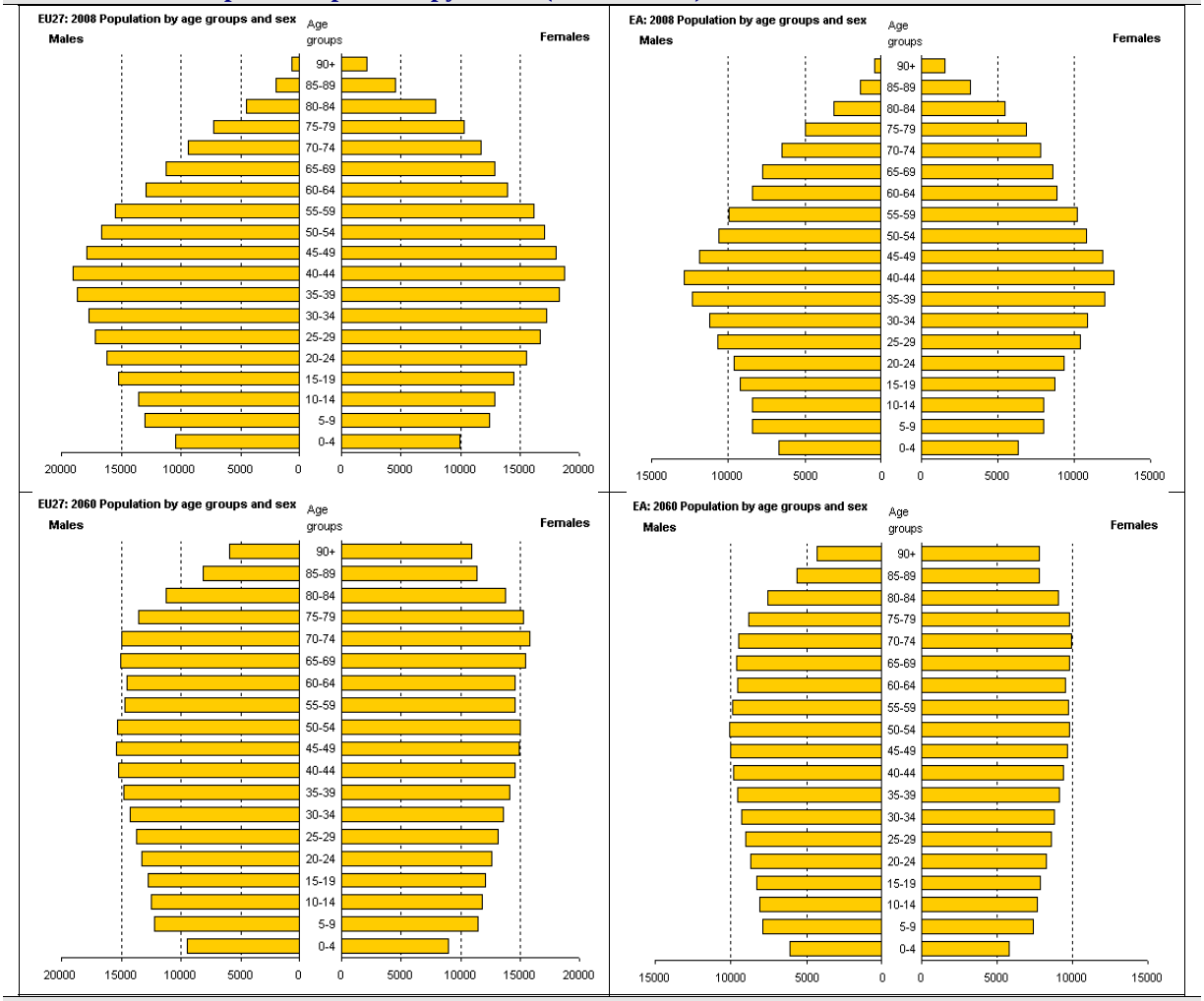
Source: Eurostat, EUROPOP2008.

According to the projection, the number of children would decline gradually from 2020 onwards. The population of working-age would reach a maximum in 2010 and is expected to decline steadily thereafter. It would drop by 15 per cent in the EU over the projection period. Still, the working-age population is projected to increase in seven Member States (Belgium, Ireland, France, Cyprus, Luxembourg, Sweden and the UK).

The elderly population (aged 65 and above) would increase very markedly throughout the projection period. Their number would almost double, rising from 85 million in 2008 to 151 million in 2060 in the EU. The number of very old people aged 80 years and above is projected to increase even more; from 22 million in 2008 to 61 million in 2060 in the EU, i.e. almost triple during the projection period.

[11] Population pyramids show the population density by sex and by age group.

Graph 12- Population pyramids (in thousands), EU27/EA, in 2008 and 2060



Source: Eurostat, EUROPOP2008.

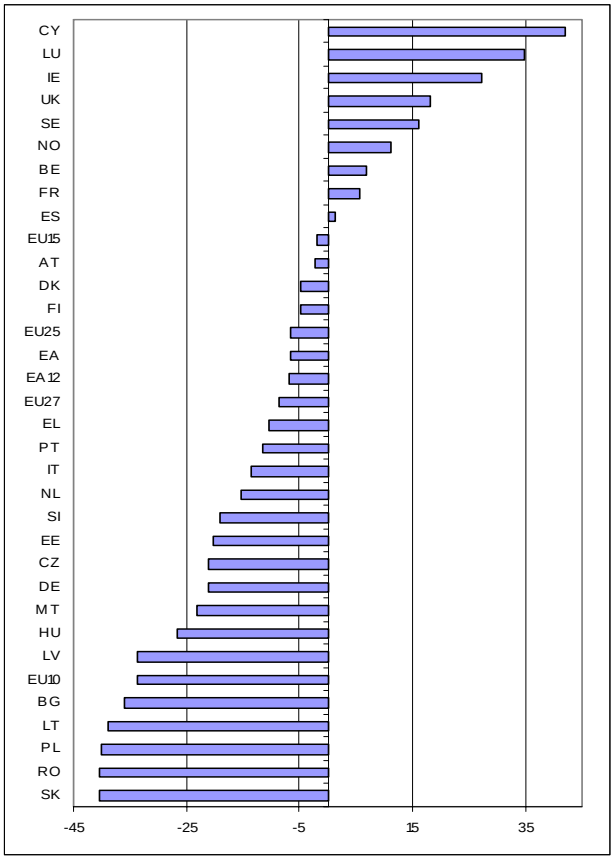
Table 2 - Peaks and troughs for the size of the total population and the working-age population

	Total population (in millions)							Working-age population (in millions)						
		Peak		% change	Trough		% change		Peak		% change	Trough		% change
	2007 - value	value	year	2007 - peak	value	year	peak - trough	2007 - value	value	year	2007 - peak	value	year	peak - trough
BE	10.6	12.3	2060	16.2%	10.6	2007	-13.9%	7.0	7.2	2022	3.5%	7.0	2007	-3.4%
BG	7.7	7.7	2007	0.0%	5.5	2060	-28.6%	5.3	5.3	2007	0.0%	3.0	2060	-44.5%
CZ	10.3	10.5	2021	2.5%	9.5	2060	-9.8%	7.3	7.4	2008	0.4%	5.2	2060	-29.7%
DK	5.4	5.9	2060	8.7%	5.4	2007	-8.0%	3.6	3.6	2009	0.4%	3.4	2041	-5.4%
DE	82.3	82.3	2007	0.0%	70.8	2060	-14.0%	54.6	54.6	2007	0.0%	38.9	2060	-28.7%
EE	1.3	1.3	2007	0.0%	1.1	2060	-15.6%	0.9	0.9	2007	0.0%	0.6	2060	-31.4%
IE	4.3	6.8	2060	56.5%	4.3	2007	-36.1%	3.0	3.9	2040	33.0%	3.0	2007	-24.8%
EL	11.2	11.6	2026	3.6%	11.1	2060	-4.0%	7.5	7.6	2010	0.7%	6.2	2060	-18.4%
ES	44.5	53.4	2045	20.1%	44.5	2007	-16.7%	30.6	34.2	2025	11.8%	28.4	2060	-17.0%
FR	61.5	71.8	2060	16.7%	61.5	2007	-14.3%	40.1	41.2	2060	2.7%	40.1	2007	-2.6%
IT	59.1	62.0	2038	4.9%	59.1	2007	-4.7%	39.0	39.5	2011	1.2%	32.7	2060	-17.1%
CY	0.8	1.3	2060	69.6%	0.8	2007	-41.0%	0.5	0.8	2060	43.0%	0.5	2007	-30.1%
LV	2.3	2.3	2007	0.0%	1.7	2060	-26.3%	1.6	1.6	2007	0.0%	0.9	2060	-42.9%
LT	3.4	3.4	2007	0.0%	2.5	2060	-24.7%	2.3	2.3	2007	0.0%	1.3	2060	-41.9%
LU	0.5	0.7	2060	53.7%	0.5	2007	-34.9%	0.3	0.4	2060	36.9%	0.3	2007	-27.0%
HU	10.1	10.1	2007	0.0%	8.7	2060	-13.4%	6.9	6.9	2007	0.0%	4.8	2060	-30.3%
MT	0.4	0.4	2028	6.2%	0.4	2060	-6.3%	0.3	0.3	2009	1.8%	0.2	2060	-23.0%
NL	16.4	17.3	2036	5.6%	16.4	2007	-5.3%	11.0	11.1	2011	0.6%	9.6	2060	-13.6%
AT	8.3	9.1	2046	10.1%	8.3	2007	-9.2%	5.6	5.8	2020	3.3%	5.2	2060	-10.6%
PL	38.1	38.1	2007	0.0%	31.1	2060	-18.3%	27.0	27.2	2011	1.0%	16.3	2060	-40.0%
PT	10.6	11.5	2045	8.3%	10.6	2007	-7.6%	7.1	7.3	2022	2.0%	6.3	2060	-12.8%
RO	21.6	21.6	2007	0.0%	16.9	2060	-21.5%	15.0	15.0	2007	0.0%	9.1	2060	-39.7%
SI	2.0	2.1	2019	2.4%	1.8	2060	-13.6%	1.4	1.4	2011	0.5%	1.0	2060	-32.5%
SK	5.4	5.4	2019	0.7%	4.5	2060	-16.3%	3.9	3.9	2011	1.1%	2.4	2060	-38.9%
FI	5.3	5.6	2031	5.5%	5.3	2007	-5.3%	3.5	3.5	2010	1.0%	3.0	2060	-13.9%
SE	9.1	10.9	2060	19.3%	9.1	2007	-16.2%	6.0	6.3	2050	5.2%	6.0	2007	-5.0%
UK	60.9	76.7	2060	26.0%	60.9	2007	-20.6%	40.4	45.0	2050	11.5%	40.4	2007	-10.3%
NO	4.7	6.0	2060	29.0%	4.7	2007	-22.5%	3.1	3.5	2060	13.1%	3.1	2007	-11.6%
EA12	314.5	336.9	2038	7.1%	314.5	2007	-6.6%	209.4	212.7	2013	1.6%	183.0	2060	-14.0%
EA	317.7	340.4	2038	7.1%	317.7	2007	-6.7%	211.6	215.0	2013	1.6%	185.0	2060	-14.0%
EU27	493.3	520.7	2035	5.6%	493.3	2007	-5.3%	331.9	335.9	2012	1.2%	283.3	2060	-15.6%
EU15	389.9	425.6	2044	9.1%	389.9	2007	-8.4%	259.4	263.9	2019	1.7%	237.7	2060	-9.9%
EU10	74.1	74.1	2014	0.1%	62.8	2060	-15.3%	52.2	52.4	2010	0.4%	33.6	2060	-35.9%
EU25	464.0	494.7	2038	6.6%	464.0	2007	-6.2%	311.5	315.9	2012	1.4%	271.3	2060	-14.1%

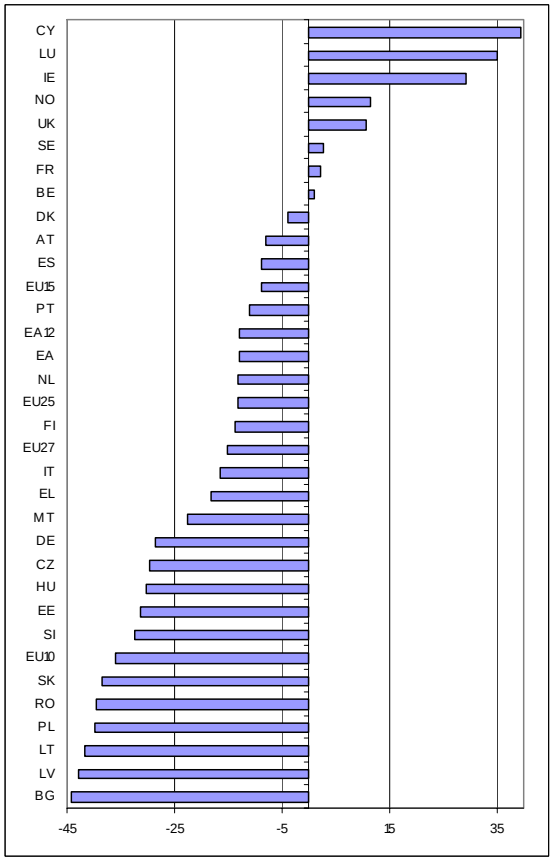
Source: Eurostat, EUROPOP2008.

Graph 13– Projected change of main population groups (in % change over the period 2008-2060)

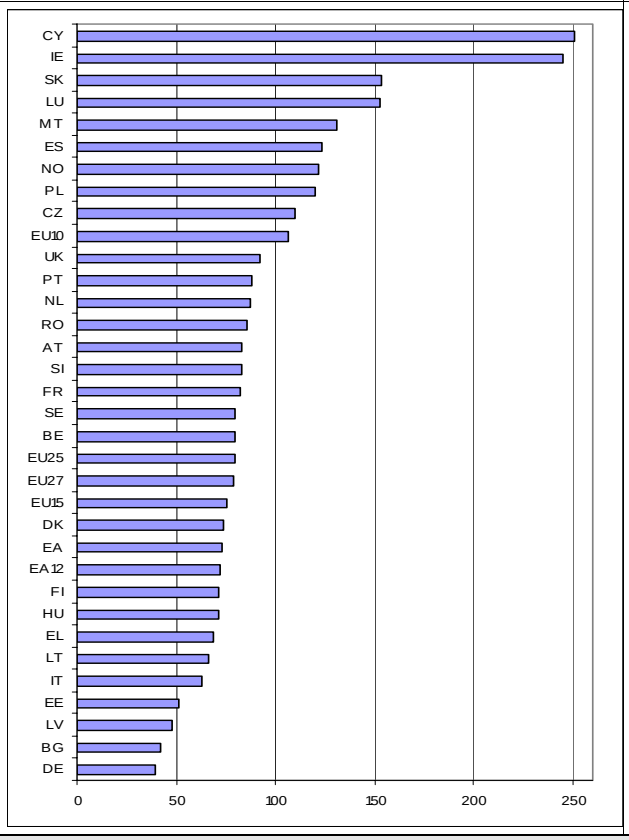
Children (below 15)



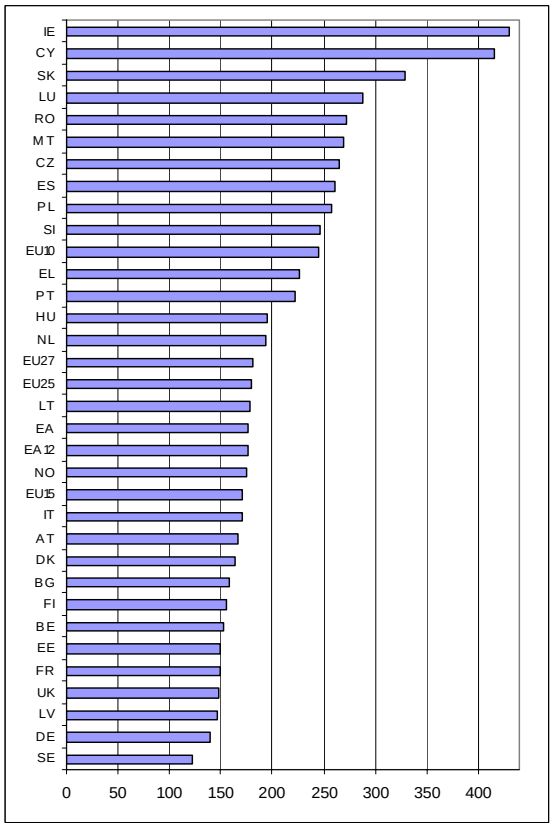
Working-age (15-64)



Elderly (65 and above)



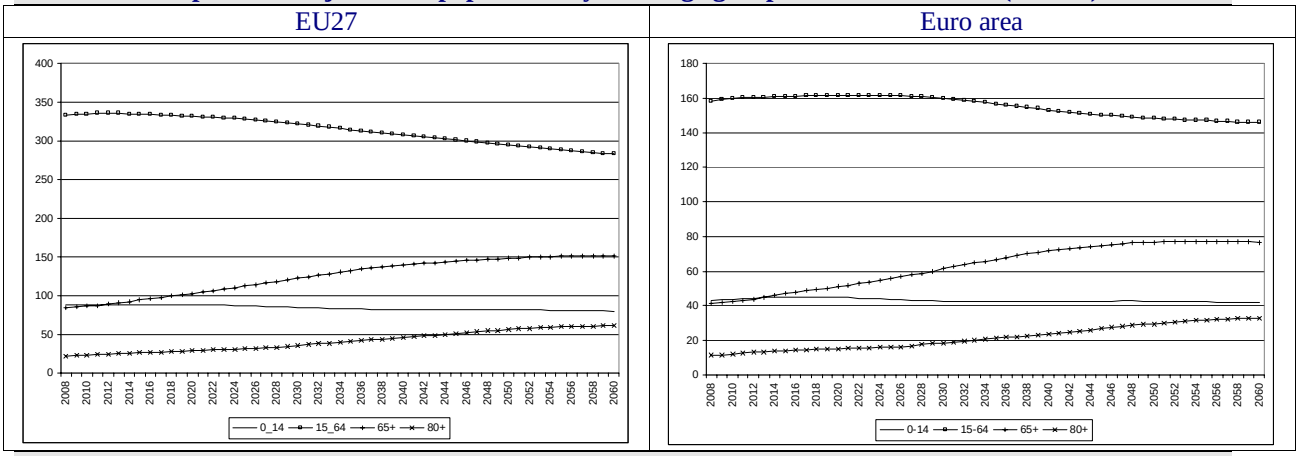
Oldest-old (80 and above)



Source: Eurostat, EUROPOP2008.

The magnitude of changes in the share of the population in different age groups, according to the projection, would make the population in 2060 hard to recognise for a present observer. In 2008, the number of children is about 3 and a half time as large as the number of elderly aged 80 years and above. In 2060, children would still outnumber very old persons, but by a small margin: the number of oldest-old would amount to 80% of the number of children. Today, the number of persons aged 65 or above already surpasses the number of children, but their numbers are relatively close. In 2060, the number of elderly would more than double the number of children. Another notable aspect of population ageing is the progressive ageing of the older population itself, as the oldest-old are growing faster than any other segment of the population.

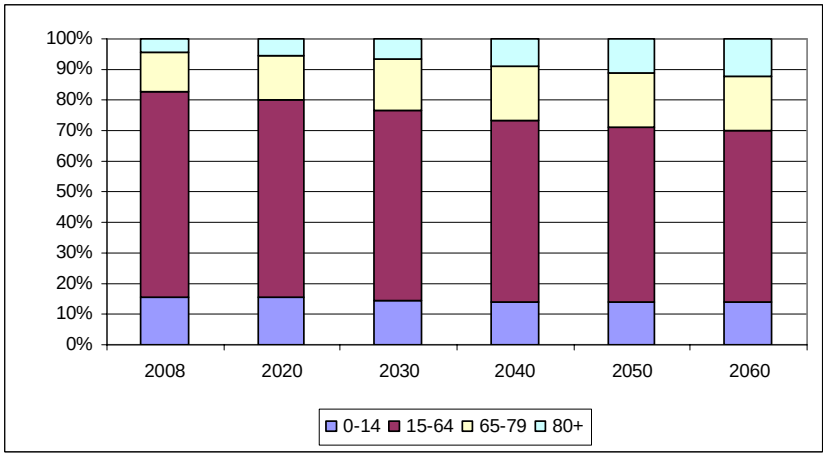
Graph 14 - Projection of population by main age groups, EU27, Euro area (in 000s)



Source: Eurostat, EUROPOP2008.

These changes are reflected in declining share of the working-age population and in the increasing shares of the older population. The proportion of children (below 15) is projected to remain nearly constant by 2060 in the EU27 and the euro area. Those aged 65 and over would account for a much larger share in 2060 (30% of the population), and among the elderly, those aged 80 and over would account for 12% and become almost as numerous as the children (14%).

Graph 15 – Projection of changes in the structure of the population by main age groups, EU27 (in %)



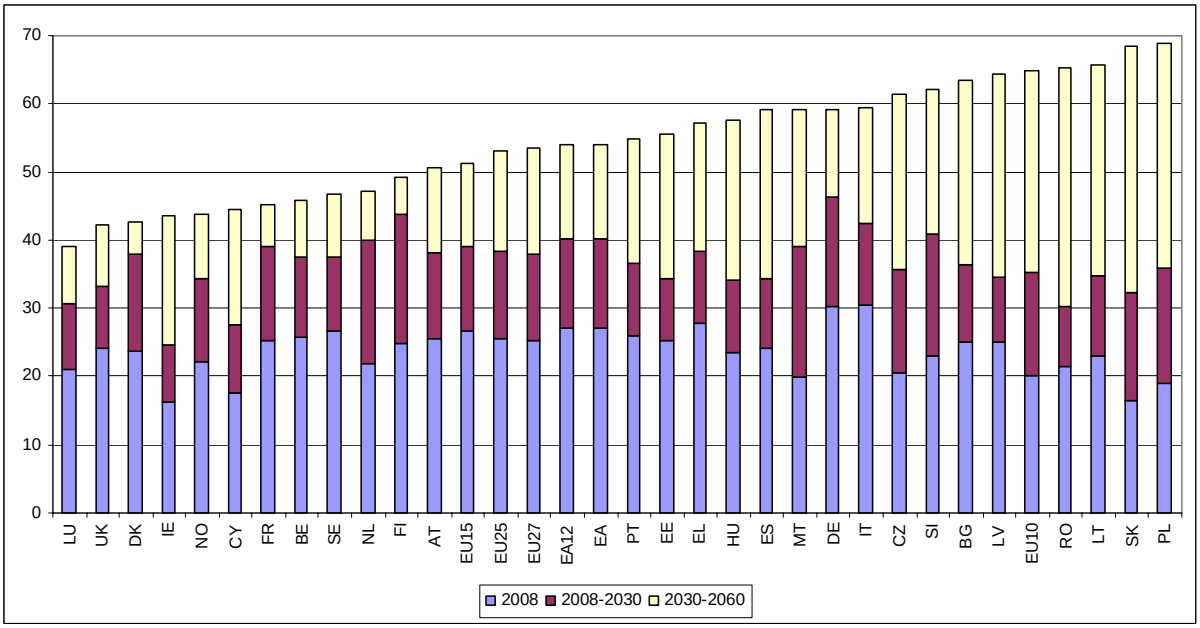
Source: Eurostat, EUROPOP2008.

As the reduction in the proportion of the working-age population and the increase in the proportion of the elderly unfold, the support ratio of dependants to people of working-age soars. The old-age dependency ratio, calculated as the ratio of people aged 65 or above relative to the working-age population, is projected to more than double from 25.4% to 53.5% in the EU over the projection period. The largest increase is projected to occur during the period 2012 to 2035, when year-on-year increases of over 2% are projected. This entails that the EU would move from having 4 working-age people for every dependent person aged over 65 years to a ratio of 2 to 1.

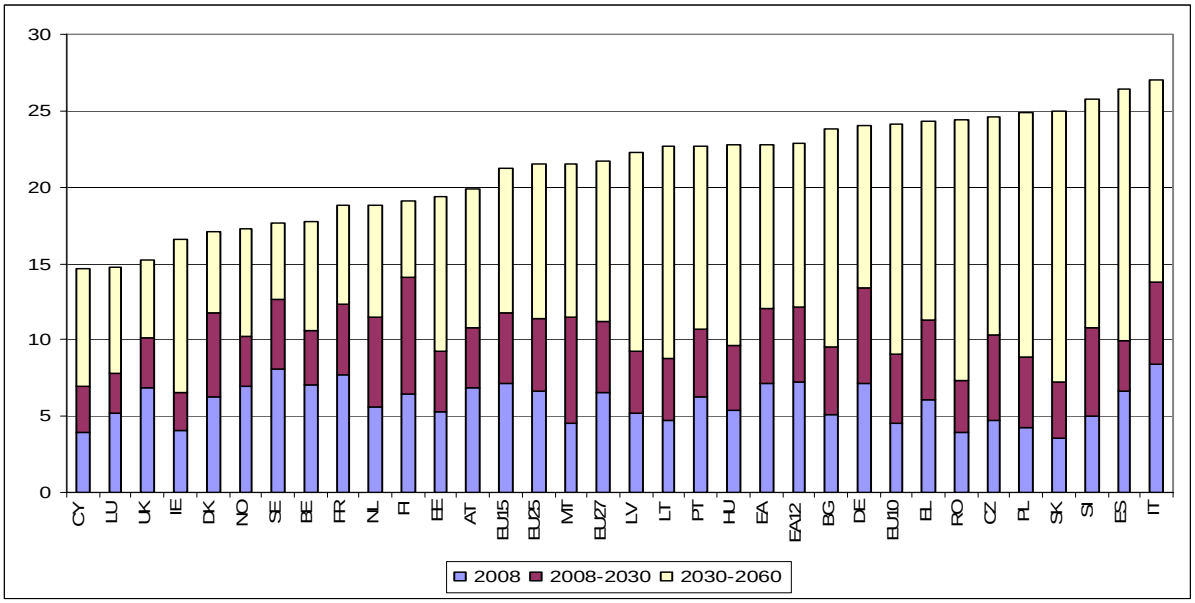
The dependency ratio of the oldest-old, calculated as the number of people aged 80 and above over the working-age population, is expected to increase more than three-fold, from 6.5% to 22% over the projection period. The addition of the number of children to the calculation results in further increases in the ratio of dependent to active. The total dependency ratio, calculated as the ratio of dependent people, both children aged below 15 and elderly aged 65 and above, over the population aged 15 to 64 is projected to rise by nearly 30 percentage points, from 48.7% to 78.5%.

Graph 16 - Dependency ratios (in percentage)

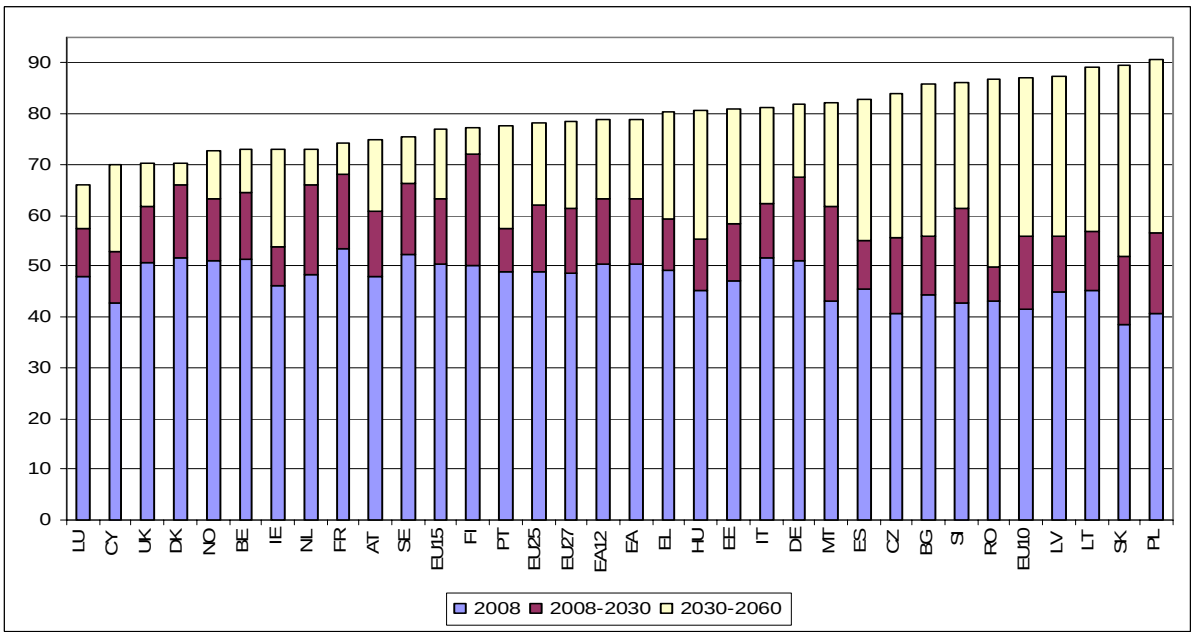
Old-age dependency ratio (ratio of people aged 65 or above relative to the working-age population)



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 children aged below 15 and elderly aged 65 or above, relative to the working-age population)



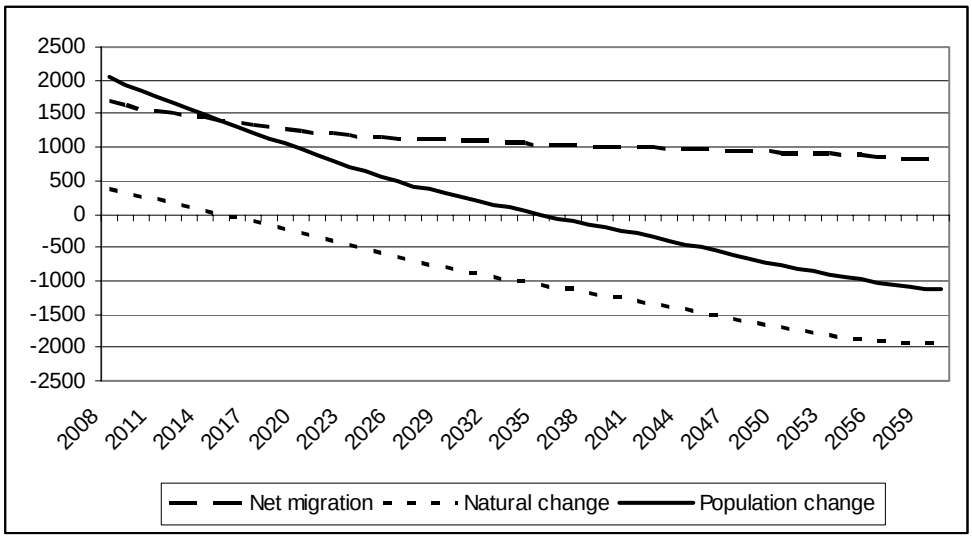
Source: Eurostat, EUROPOP2008.

1.1.5. The role of migration

According to the projection, as of 2015, the population for the EU as a whole will no longer grow due to natural change, as the number of deaths per year will outnumber the births. As natural change becomes negative, positive net migration is the only factor driving population growth. As of 2035, net migration flows, although positive, would not be sufficiently large to compensate the natural decrease of the population and the population is expected to decline.

The role of migration in population growth is already predominant today: in many Member States, the size of net migration determines whether the country has a growing population or has entered a stage of population decline. In the beginning of the projection period, 8 Member States have shrinking populations: Bulgaria, Germany, Estonia, Latvia, Lithuania, Hungary, Poland and Romania. While in Germany and Hungary positive net migration partially compensates the natural decrease of population, negative net migration accompanies the natural decrease in the other countries and hence further aggravates the decline in their population. In the 19 Member States where populations are growing, this is mostly due to the migration balance, with the exceptions of Ireland, France and the Netherlands where the rate of natural increase is larger than the rate of migration. By 2020, 17 Member States would see their population grow. In half of them, it would be due to net migration: the Czech Republic, Greece, Spain, Italy, Malta, Austria, Poland, Portugal and the EU27 as a whole. By 2060, of the 8 Member States with growing populations, only Ireland, Luxembourg and the UK would record a natural increase in the population.

Graph 17 - Change in overall population: natural change and net migration, EU27, in thousands



Source: Eurostat, EUROPOP2008.

The estimation of the net migration necessary to keep the ratio of working-age population-to-total population constant at their 2008 level indicates that the EU as a whole would need significant net immigration – over 25 million additional inflows over the period 2008 to 2020, which would bring the total immigration flows, including the inflows which are already incorporated in the population projection, to nearly 44 million or 9% of the population in 2008. Bulgaria, the Czech Republic, Germany, Latvia, Lithuania, Malta, Poland, Slovenia, Slovakia and Finland would need additional net immigration flows above 8% of their 2008 population to maintain their current labour force-to-population ratios, bringing the total immigration flows to 10% or above. This exercise is an illustration of the magnitude of the migration inflows that would be necessary as a supply of labour, in absence of other changes such as increases in the labour force participation rates.

Table 3 - Estimation of net migration needs by 2020

					In order to keep the ratio labour force to population in 2020 at 2008 level				
	WAP 2020	*of which: cumulated migration since 2008*		WAP as % 2008 POP	WAP needed	Additional migrants needed		Total migrants	
	000s	000s	*in % WAP*		000s	000s	*as% 2008POP*	000s	*as% 2008POP*
BE	7218	554	*7.7*	66	7478	260	*2.4*	815	*7.6*
BG	4701	7	*0.2*	69	4980	279	*3.6*	286	*3.7*
CZ	6863	348	*5.1*	71	7495	632	*6.1*	980	*9.5*
DK	3575	117	*3.3*	66	3735	160	*2.9*	277	*5.1*
DE	52639	2098	*4.0*	66	53946	1307	*1.6*	3405	*4.1*
EE	843	-1	*-0.2*	68	892	48	*3.6*	47	*3.5*
IE	3548	514	*14.5*	68	3699	151	*:*	665	*15.1*
EL	7453	507	*6.8*	67	7753	299	*2.7*	807	*7.2*
ES	33892	5451	*16.1*	69	35150	1258	*2.8*	6709	*14.8*
FR	40426	1272	*3.1*	65	42755	2329	*3.8*	3600	*5.8*
IT	39273	3264	*8.3*	66	40477	1203	*2.0*	4467	*7.5*
CY	644	116	*17.9*	70	669	24	*:*	140	*17.6*
LV	1423	-6	*-0.4*	69	1485	63	*2.8*	57	*2.5*
LT	2178	-15	*-0.7*	69	2216	38	*1.1*	23	*0.7*
LU	368	54	*14.7*	68	373	4	*:*	59	*12.1*
HU	6468	278	*4.3*	69	6808	340	*3.4*	617	*6.1*
MT	278	14	*4.9*	70	298	21	*5.0*	34	*8.3*
NL	10901	123	*1.1*	67	11386	486	*3.0*	608	*3.7*
AT	5786	412	*7.1*	68	5890	104	*1.3*	516	*6.2*
PL	25436	31	*0.1*	71	26973	1536	*4.0*	1568	*4.1*
PT	7273	645	*8.9*	67	7469	196	*1.8*	841	*7.9*
RO	14145	16	*0.1*	70	14557	411	*1.9*	428	*2.0*
SI	1346	65	*4.9*	70	1441	95	*4.7*	160	*7.9*
SK	3746	57	*1.5*	72	3926	180	*3.3*	237	*4.4*
FI	3354	122	*3.6*	67	3664	310	*5.9*	432	*8.2*
SE	6085	466	*7.7*	66	6473	388	*4.2*	854	*9.3*
UK	42025	2294	*5.5*	66	43588	1563	*2.6*	3857	*6.3*
EU27	*331887*	*18804*	*5.7*	*67*	*345574*	*13687*	*2.8*	*32491*	*6.6*

Note: WAP is the working-age population, WAP/POP is the ratio working-age population to total population
Source: Eurostat, EUROPOP2008.

As another illustration of the role of migration, the zero migration population scenario prepared by Eurostat assumes no net migration. This assumption involves no migration flows at all. Assuming zero net migration, the working-age population would gradually fall behind the level in the baseline scenario: by 2030, the EU labour force would be 10% lower than in the baseline and 20% lower by 2060.

These exercices are purely illustrative and do not take into account a number of crucial factors, such as (i) the temporary nature of the alleviation, as the immigrant population itself ages over time, and (ii) the fact that it examines the size of the labour force, while for the impact on the economy, the participation rates and labour productivity of the immigrant population relative to the overall population need to be taken into account. They show that it is increasingly important to make the best use of global labour supply through immigration, which requires ensuring that immigrants are effectively integrated into the EU's labour market and society.

1.1.6. Population ageing in the EU in a global context

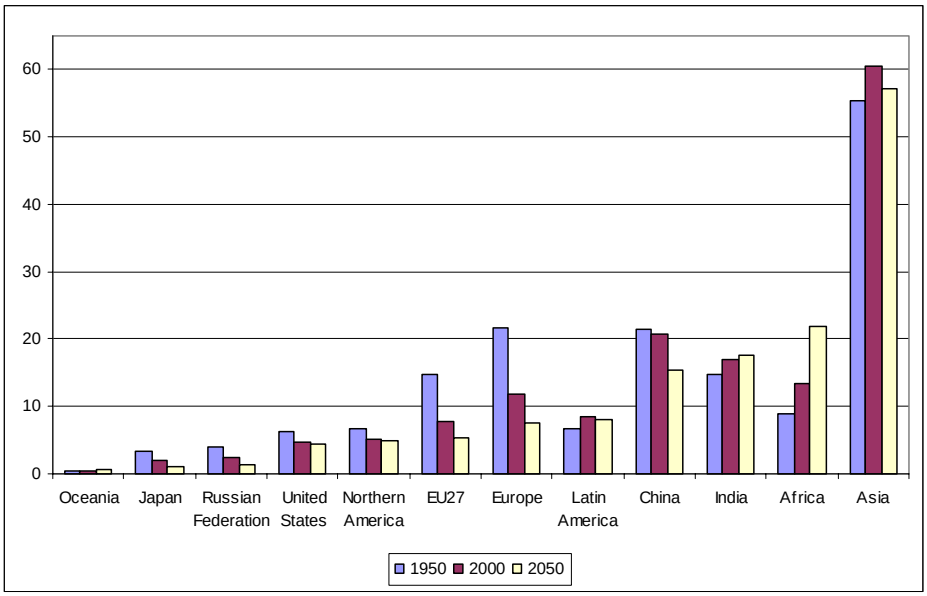
This section reviews the demographic prospects for the EU in a global context, based on the 2008 UN population projection.[12] The share of the population of what is the EU today halved from about 15% of the world population in 1950 to 8% in 2000, and it is projected to shrink to

[12] The United Nations Population Division produces global population projections revised every two years. The 2008 Revision was released on 11 March 2009.

close to 5% in 2050. The share of populations of Japan and the US has also declined over the last five decades. In contrast, the share of the population in Africa, Asia or Latin America has risen.

Over the period 2000 to 2050, the share of the population in Asia is projected to account for close to 60% of the world population, however it will grow more slowly than the world population and its share is projected to fall by 3 p.p. This is particularly true for China, where the share of the population is projected to fall by 5 p.p. The population in Africa is projected to increase much faster than during the period until 2005 and is expected to account for close to 22% of the world population in 2050. Latin America, Northern America and Oceania will roughly keep their share in the growing world population.[13]

Graph 18 - Population of main geographic areas and selected countries as percentage of the world population, 1950, 2000, 2050



Source: UN World Population Prospects: The 2008 Revision
Note: The UN definition of Europe is broader than the EU27; it also includes the following countries: Belarus, the Republic of Moldova, the Russian Federation, Ukraine, the Channel Islands, Faeroe Islands, Iceland, the Isle of Man, Norway, Albania, Andorra, Bosnia and Herzegovina, Croatia, Gibraltar, the Holy See, Montenegro, San Marino, Serbia, The former Yugoslav Republic of Macedonia, Liechtenstein, Monaco and Switzerland.

Most countries in Asia or in Latin America and the Caribbean have still growing working-age populations as a proportion of their total population. However, their populations are expected to age more rapidly than in developed countries due to the rapid fertility reductions experienced. The median age for Latin America and the Caribbean is projected to increase from 26 years in 2005 to 41.7 years in 2050, under the medium variant of the population projection. In Asia, the median age is expected to increase from 27.6 years to 40.2 years over the same period. In contrast to countries in other major areas, most countries in Africa still have young populations. Assuming that their fertility rates decline as projected, the increase in the number of children is projected to slow down, while their population of working-age continues to rise fast, hence they would enter a period of favourable demographics with an increase in the proportion of adults of working-age relative to the proportion of dependents, both children and elderly. Their ageing is projected to be moderate, with a median age increasing from 19 years in 2005 to 28.5 years in 2050.

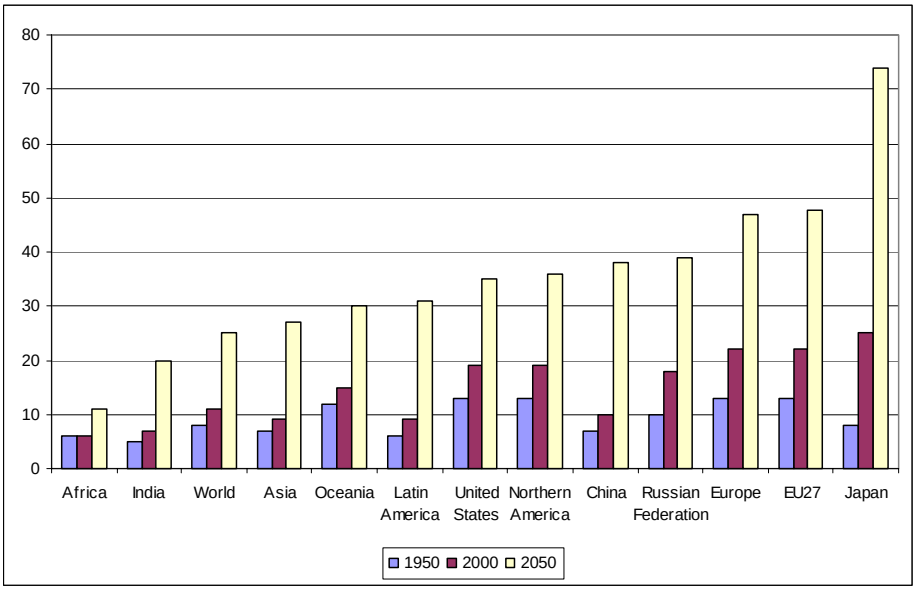
[13] The UN projects an increase in the world population from 6.1 billions in 2000 to 9.1 billions in 2050.

The proportion of the population of working-age is expected to decrease in every major area of the world, except in Africa. The proportion of elderly is expected to increase markedly in all regions of the world, doubling in Africa and increasing more than two-fold in Asia and Latin America and the Caribbean. As regards the old-age dependency ratio in the world, calculated as the number of people aged 65 and above over the working-age population, the UN projects the EU27 will have the highest old-age dependency ratio in the world in 2050 (48%) (compared with 50.4 according to EUROPOP2008). Other regions are expected to have ratios ranging from 11% in Africa, 27% in Asia, 31% in Latin America and 36% in Northern America.

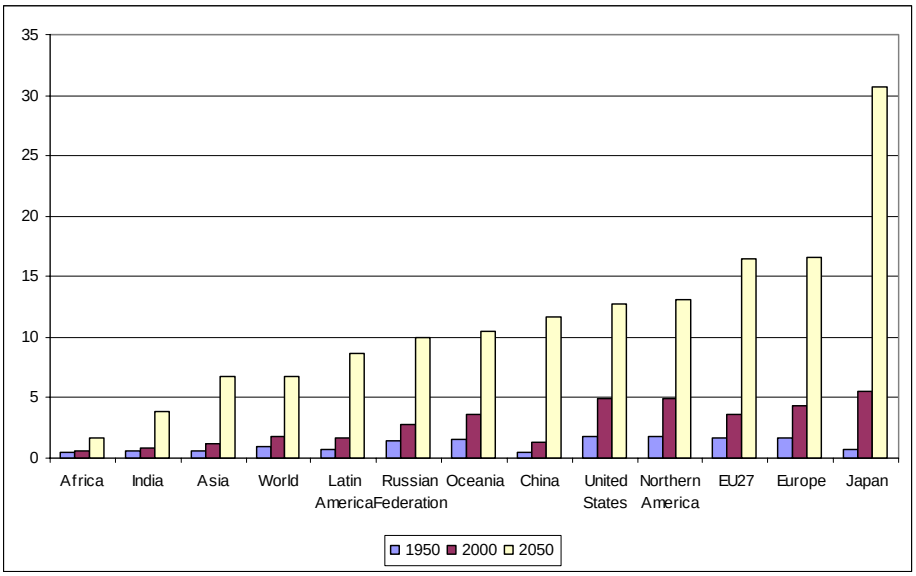
The EU of today already had the highest old-age dependency ratio in the world in 1950 (and it was higher still in the euro area), close to that of the US, and its increase has been the fastest over the period 1950 to 2000, rising by 10 percentage points. Still sharper increases are projected during the period 2000 to 2050 everywhere. The largest increases are projected to take place in Japan (by close to 50 p.p.), China and the EU27 (by almost 30 p.p.).

Graph 19 - Old-age dependency ratios by main geographic areas and selected countries (in percentage), 1950, 2000, 2050

People aged 65 or above relative to the working-age population



People aged 80 or above relative to the working-age population



Source: UN World Population Prospects: The 2008 Revision.

1.1.7. Comparison with the 2006 population projection

For the EU as a whole, EUROPOP2008 projects a population about 8% larger (or 43 million people) than the population projected and used in the 2006 exercise. The larger numbers mainly concern the working-age segment, but larger numbers of young and older are also projected. Most of the difference is due to significantly higher migration assumptions, which follow the recent increases observed in net migration inflows, especially in some Member States (Spain, Italy and the UK). Nevertheless, for some Member States (Germany, the Netherlands, Estonia, Lithuania, Latvia, Malta, Poland and Slovenia), net migration flows projected are lower compared to the 2006 projection. Overall, projected net migration flows to the EU are about 785,000 higher in 2010 than in the previous projection. The difference is reduced to about 90,000 in 2050. Cumulated net inward migration is projected to be 12.6 million higher in EUROPOP2008, which accounts for about a third of the (higher) total population projected by 2050.

As a result, lower increases in the old-age dependency ratio are projected in EUROPOP2008: 24.6 percentage points between 2008 and 2050 compared to 25.8 percentage points in the previous projection over the same period. Due to changes in assumptions, the projected increase in the old-age dependency ratio is significantly lower in the UK, Spain, Portugal, Cyprus, Ireland, Austria, Greece, Belgium and Italy while it is significantly higher in Malta, Latvia, Lithuania, Slovakia, Poland, the Netherlands, Germany, Slovenia and Estonia (in order of magnitude).

1.2. Labour force assumptions

1.2.1. Overview

Even if the evolution of the labour force differs from one country to another, this projection caters for some common stylised facts which can be summarised as follows:

- the participation rates of prime-age male workers (aged 25 to 54 years), at around 90%, remain the highest of all groups;
- in contrast, the participation rates of men aged 55 to 64 years have declined steadily in the past decades, but there are signs of reversal in many countries since the turn of the century;
- the participation rates of women have steadily increased over the past 25 years;
- the participation rates of young people (aged 15 to 24 years) have declined, mostly due to longer schooling;
- looking forward, the increasing share of older workers in the labour force could put downward pressure on the overall participation rate.

Given these trends, the main drivers of future changes in the overall participation rate, in addition to changes in the age compositition of the population, are changes in the labour force attachment of prime-aged women, older workers (especially men) and, to a lesser extent, young people.

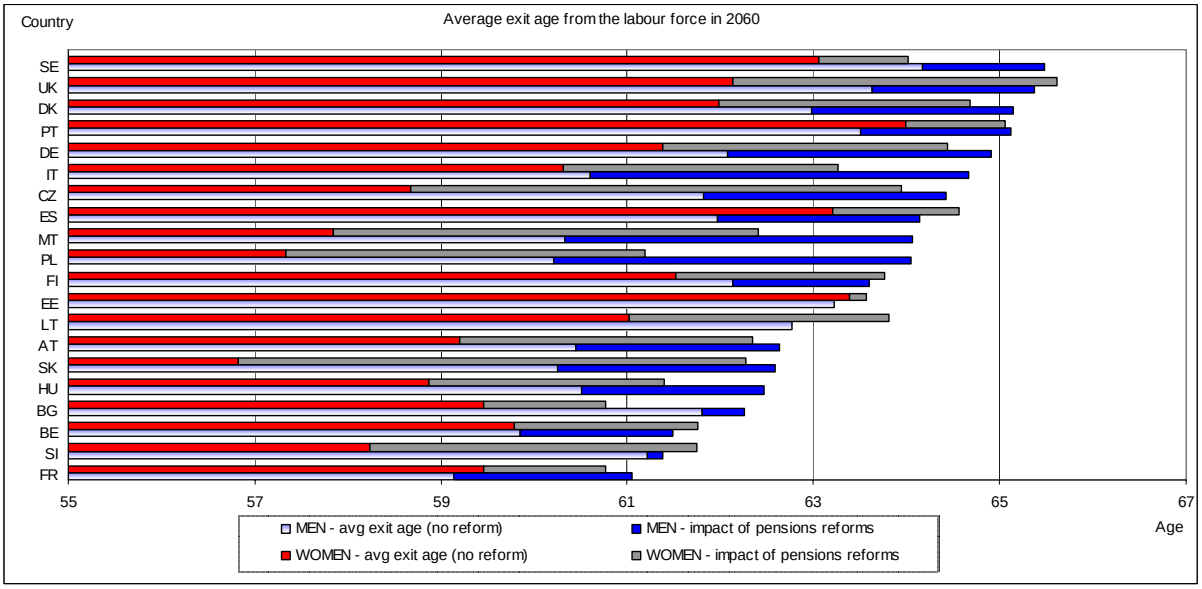
The baseline scenario takes into account the potential effect of recent pension reforms on the participation rates of older workers.[14] The expected postponement of retirement is summarised by the difference in the *average exit age* from the labour force in 2060. As a result of enacted pension reforms, the effective retirement age for men is expected to increase by more than three years in Germany, Italy, Malta and Poland and by between two and three years in Denmark, Spain, Austria, and Slovakia. The expected postponement of retirement by women is similar, or even higher than for men in some cases. This reflects in several cases a progressive alignment of the retirement age of women to that of men.

Graph 21 shows the estimated impact of pension reforms on participation rates. According to the projection, pension reforms would have a sizeable impact on the labour market participation of older workers in most of the Member States which plan the implementation of enacted pension reforms. A stronger impact is expected from changes in the parameters affecting the statutory age of retirement. In Germany, Finland, Hungary and Slovenia, the impact on the participation rate is estimated to be more than 10 p.p. by 2020. In the Czech

[14] The findings of an international research project based on micro-estimation results are clear: changing pension plan provisions would have large effects on the labour participation of older workers, see Gruber and Wise (2005). The reforms taken into account are recently enacted in 20 EU Member States and include measures to be phased in gradually. Some countries have enacted legislation to increase the statutory retirement age for women or for both men and women. Others have changed provisions of social security programmes (and sometimes of other transfer programmes used as alternative early retirement paths) that provided strong incentives to leave the labour force at an early age. The information was provided by the Members of the EPC and AWG. For details on the pension reforms incorporated in the baseline scenario, see European Commission–EPC (2008).

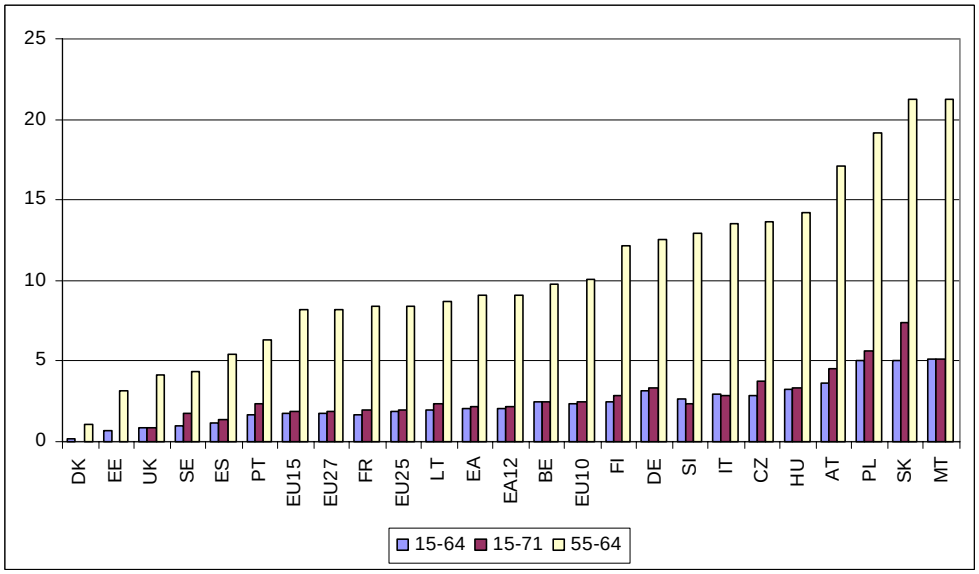
Republic and Slovakia, the impact is estimated to be larger than 15 p.p. by 2020. Overall, in the EU, the participation rate of older people (55-64) is estimated to be about 8 p.p. higher in 2020 and 13 p.p. higher in 2060 due to the impact of pension reforms. In the euro area, the impact is estimated to be slightly larger, at about 9 p.p. in 2020 and 13.5 p.p. 2060, respectively.

Graph 20 - Impact of pension reforms on the average exit age from the labour force



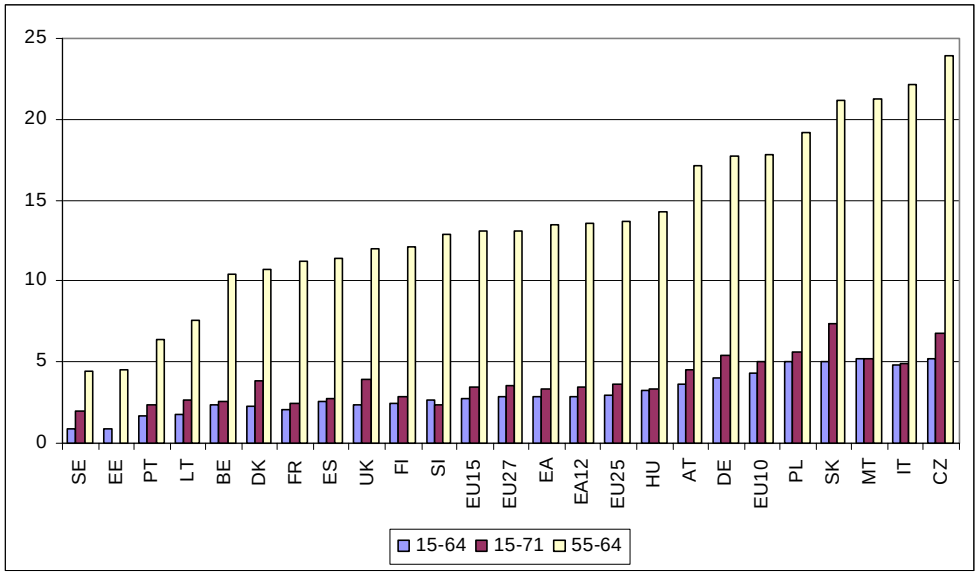
Source: Commission services, EPC

Graph 21 - Estimated impact of pension reform on participation rates (2020), in percentage points (comparison of projections with and without incorporating recent pension reforms)



Source: Commission services, EPC

Graph 22 - Estimated impact of pension reform on participation rates (2060), in percentage points (comparison of projections with and without incorporating recent pension reforms)



Source: Commission services, EPC

Changes in overall participation rates are mainly driven by changes in the labour force attachment of prime-age workers, as this group accounts for more than 70% of the total labour force. Therefore, the large increases in the participation rates of older workers projected will have a rather limited impact on the overall participation rate. For example, the 17 percentage point increase in the participation rate of older workers projected in Germany leads to an increase in the overall participation rate (workers aged 15 to 64 years) of about 4 percentage points by 2060.

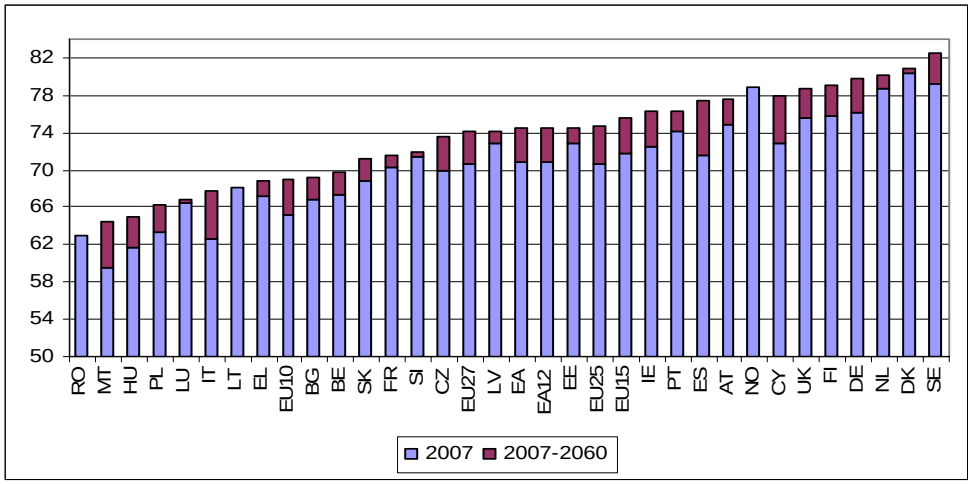
1.2.2. Main results of the projection of labour market participation rates

1.2.2.1. Projection of participation rates

The methodology used leads to a projected upward shift in the participation rates of older age groups (mainly from the age of 45) that is particularly strong for women while, by assumption, the participation rate profiles of the young are assumed to remain generally stable, or increase moderately over time.

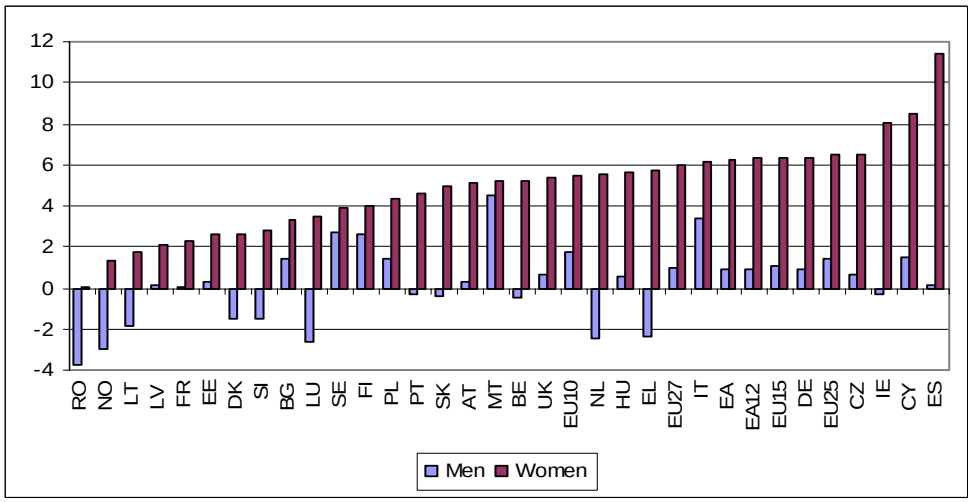
The overall participation rate (for the age group 15 to 64) in the EU27 is projected to increase by 3.6 percentage points over the period 2007-2060 (from 70.6% in 2007 to 74.1% in 2060). For the euro area, a similar increase is projected, from 70.8% in 2007 to 74.5% in 2060. For the age-group 15-71, the current and projected participation rates as well as the increase are smaller. Almost all of the increase is projected to materialize in the period up to 2020.

Graph 23- Participation rates (in percentage)



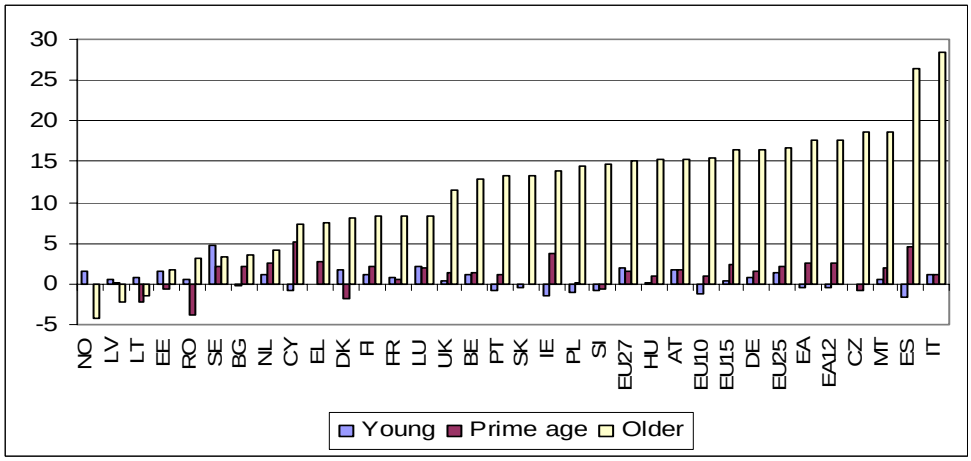
Source: Commission services, EPC.
Note: For Norway and Romania, which experience a small decline in participation rates over the period 2007 to 2060, the graph shows unchanged participation rates.

Graph 24 – Participation rates by gender, projected change over the period 2007-2060 (in percentage)



Source: Commission services, EPC.

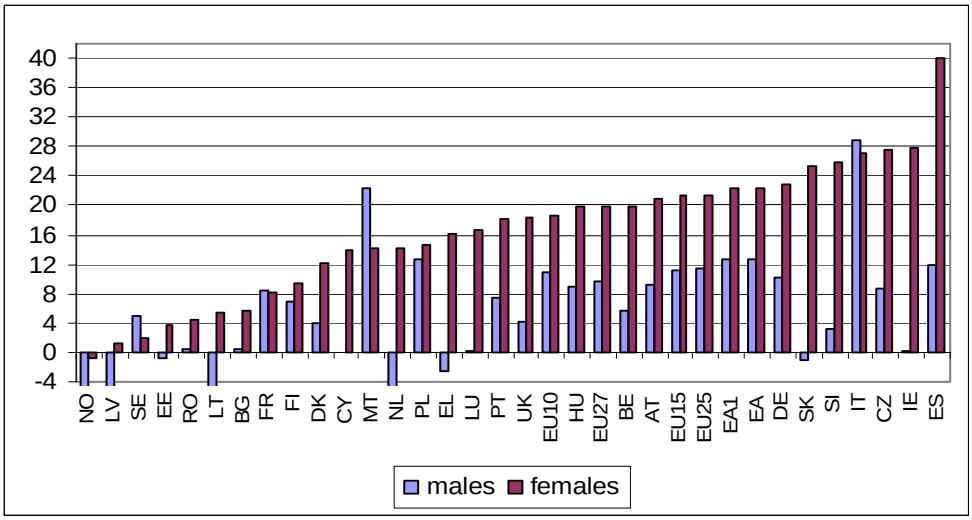
Graph 25 – Participation rates by main age groups, projected change over the period 2007-2060 (in %)



Source: Commission services, EPC.

The biggest increase in participation rates is projected for older workers (around 20 percentage points for women and 10 p.p. for men) in the EU27, and a slightly higher increase in the euro area (22 p.p. for men and 13 p.p. for women). As a result of these dynamics, the gap between male and female participation rates is projected to gradually narrow down, especially in countries with a large gap in 2007.

Graph 26– Participation rates of the older workers (55-64), projected change over the period 2007-2060 (in %)



Source: Commission services, EPC.

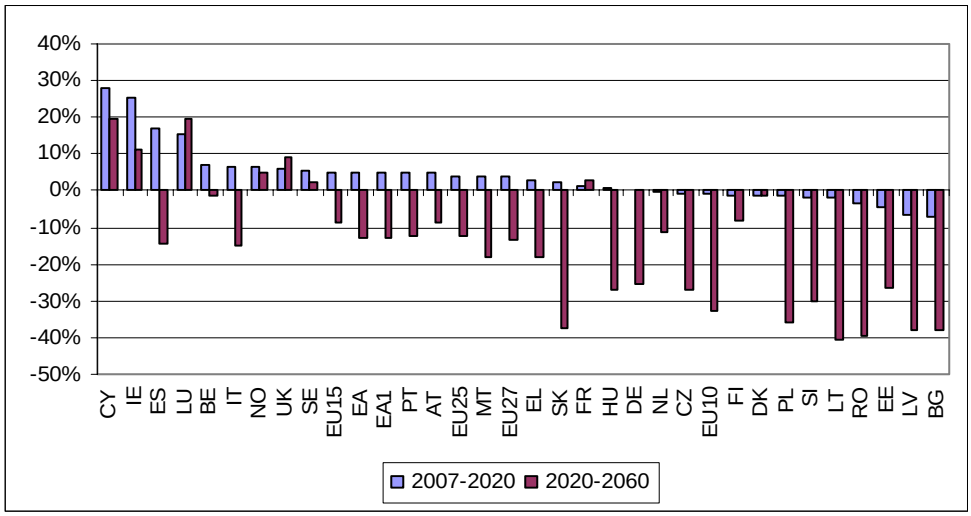
1.2.2.2. Projection of labour supply

The overall labour force in the EU27 is projected to increase by 3.7% from 2007 to 2020. This means an increase in labour force of roughly 8.6 million people. In the euro area, an increase of almost 5% is projected. According to the projection, the increase in labour supply over the period 2007 to 2020 is mainly due to the increase in female labour supply. The male labour force is projected to remain substantially unchanged.

However, between 2020 and 2060, the overall labour force is expected to decrease by as much as 13.6%, equivalent to around 33 million people (24.4 million if compared with the level in 2007) in the EU, as the positive trend in female labour supply reverses and the male labour supply also drops. In the euro area, the projected fall in labour supply between 2020 and 2060 is 12.6%, which translates into 20.4 million people (13 million if compared with the level in 2007).

Until 2020, a majority of EU countries (all except Denmark, the Netherlands, Finland, the Czech Republic, Estonia, Lithuania, Latvia, Poland, Slovenia, Bulgaria, and Romania) are projected to record an increase in labour supply. This trend is projected to reverse after 2020, when most countries are projected to record a decrease, except for Cyprus (+19.8%), Luxembourg (+19.5%), Ireland (+11%), France (+3.1%), Sweden (+2.2%) and the UK (+9.2%). As already mentioned, the projected negative labour force growth over the period 2020-2060 in the EU is to be ascribed almost exclusively to negative demographic developments, given that the participation rates over the period 2020-2060 are projected to continue their increase, albeit at a lower pace than during 2007-2020.

Graph 27 - Labour force projections, 2007-2060 (percentage change of people aged 15 to 64)



Source: Commission services, EPC.

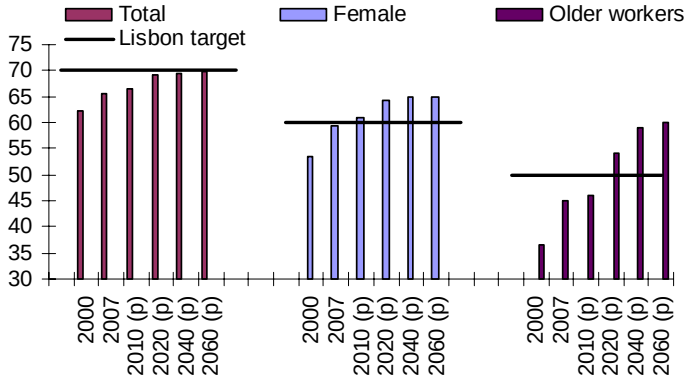
1.2.3. Assumptions on structural unemployment

A reduction in the unemployment rate of around 1 ½ percentage points is projected (from 7.2% in 2007 to 5.7% in 2020). A fall of a similar magnitude is projected for the euro area (from 7.5% in 2007 5.9% in 2020).[15]

1.2.4. Employment projection

The employment rates (of people age 15 to 64) in the EU are projected to increase from 65.5% in 2007 to 69% in 2020, to almost reach 70% in 2060. In the euro area, a similar development is projected and employment would reache 70% at the end of the projection period.

Graph 28 – Employment rates and Lisbon targets in the EU27 (in percentage)

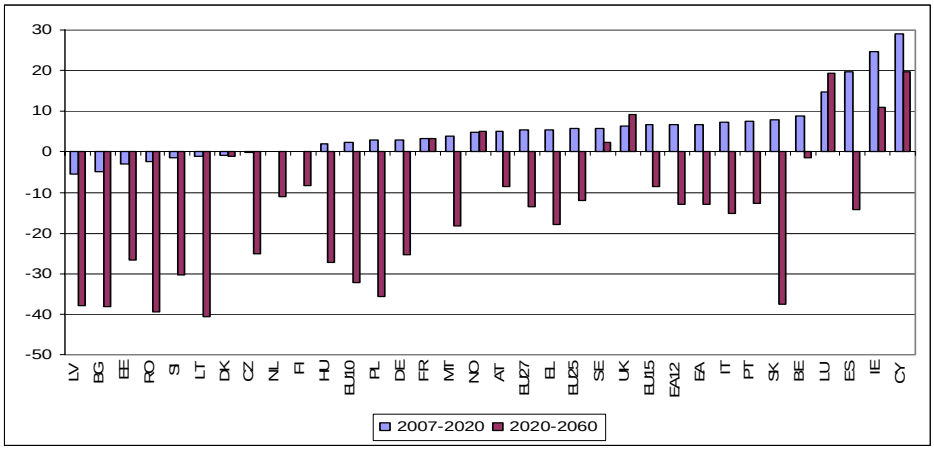


Source: Commission services, EPC.

[15] To avoid extrapolating forward high levels of NAIRU for countries still above the estimated medium-term EU15 average of the NAIRU (6.2%) (Belgium, Germany, Greece, Spain, France, Portugal, Hungary, Malta and Slovakia), the EPC agreed the assumption that these countries should converge to this unemployment rate by 2020.

The employment rate of women is projected to rise from 58.4% in 2007 to 63.4% in 2020 and to 65.1% in 2060. The employment rate for older workers will increase even more, from 44.9% in 2007 to 54.5% in 2020 and further to 59.8% in 2060. For the euro area, the increase in the employment rate of older workers (55-64) is higher than in the EU, rising by 17.7 p.p. compared with 14.9 p.p. in the EU. The older workers employment rate in 2060 is projected to be 59.8% in the EU and 60.3% in the euro area.

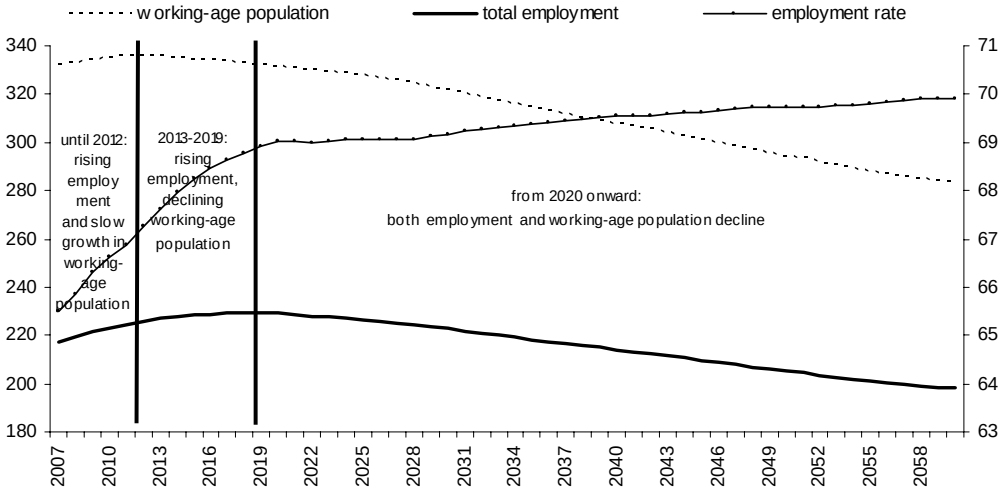
Graph 29– Employment projections, changes in percentage



Source: Commission services, EPC.

The future increases in the employment rates of women and older workers may temporarily cushion the impact of an ageing labour force; however after 2020 both the labour force and the number of persons employed enter a downward trajectory.

Graph 30 – Population of working-age and total employment, EU27



Source: Commission services, EPC.

Three distinct periods can be observed for the EU as a whole:

- *2007-2012 – demographic developments still support growth:* both the working-age population and the number of persons employed are projected to increase. However, the increase slows down as the effects of an ageing population take hold, even without incorporating the potential negative impact of the current financial and economic crisis. Policies need to be put in place to avoid that the crisis turns into a permanent shock to employment and labour productivity, and hence potential economic growth.

- *2013-2019– 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 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 continue to increase, albeit at a slower pace. This period could be characterised by tightening labour market conditions with potentially growing mismatches and the risk of heightened wage pressures. Conditions for pursuing structural reforms to prepare for the ageing of the population become less favourable;

- *the ageing effect dominates from 2020:* the trend increase in female employment rates will broadly have worked itself through. In the absence of further reforms, the employment rate of older workers is also projected to reach a steady state. Consequently, there is no counter-balancing factor to ageing, and both the working-age population and the number of persons employed enter a downward trajectory.

The number of people employed[16] is projected to record an annual growth rate of only 0.4% over the period 2007 to 2020 (compared to 1.3% over the period 1998-2007), before reversing to a negative annual growth rate of a similar magnitude in the subsequent period 2020 to 2060. As a result of these opposite trends, the overall employment in the EU is projected to shrink by about 19.4 million people over the period 2007 to 2060. Rises in immigration levels in some countries and increases in labour force participation rates moderate the fall in employment owed to the ageing of the population and the negative population growth projected for the period 2020 to 2060.

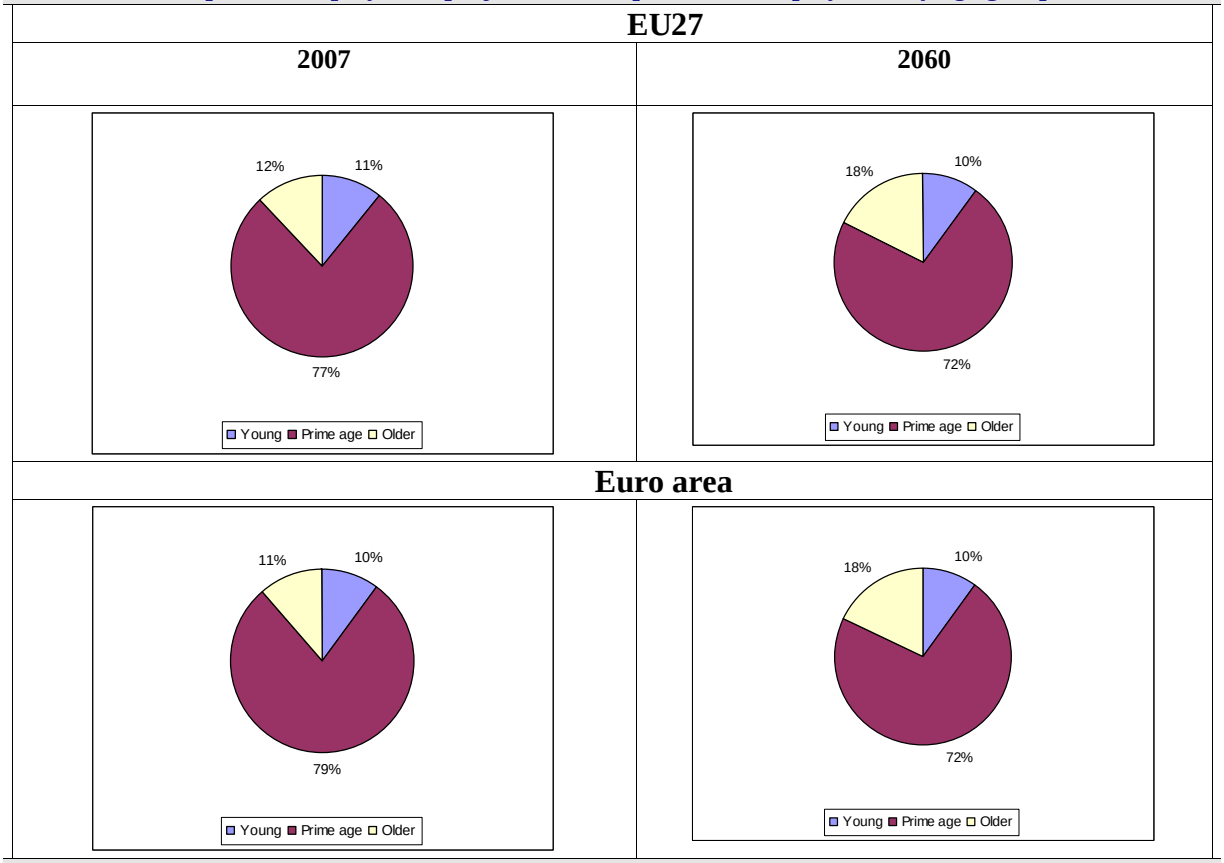
[16] According to the European Labour Force Survey definition.

Table 4 - Peaks and troughs for the size of the working-age population and the total number of persons employed

	Working-age population (in millions)							Total employment (in millions)						
		Peak		% change	Through		% change		Peak		% change	Through		% change
	2007 - value	value	year	2007 - peak	value	year	peak - through	2007 - value	value	year	2007 - peak	value	year	peak - through
BE	7,0	7,2	2022	3,5%	7,0	2007	-3,4%	4,3	4,7	2020	8,7%	4,3	2007	-8,0%
BG	5,3	5,3	2007	0,0%	3,0	2060	-44,5%	3,3	3,4	2009	2,2%	1,9	2060	-42,4%
CZ	7,3	7,4	2008	0,4%	5,2	2060	-29,7%	4,9	5,0	2013	2,9%	3,6	2060	-27,2%
DK	3,6	3,6	2009	0,4%	3,4	2041	-5,4%	2,8	2,8	2009	0,7%	2,7	2039	-4,6%
DE	54,6	54,6	2007	0,0%	38,9	2060	-28,7%	38,0	39,5	2015	3,9%	29,1	2060	-26,2%
EE	0,9	0,9	2007	0,0%	0,6	2060	-31,4%	0,6	0,7	2011	2,7%	0,5	2060	-30,8%
IE	3,0	3,9	2040	33,0%	3,0	2007	-24,8%	2,0	2,8	2040	38,9%	2,0	2007	-28,0%
EL	7,5	7,6	2010	0,7%	6,2	2060	-18,4%	4,6	4,9	2019	5,4%	4,0	2060	-18,1%
ES	30,6	34,2	2025	11,8%	28,4	2060	-17,0%	20,1	24,4	2028	21,3%	20,1	2007	-17,6%
FR	40,1	41,2	2060	2,7%	40,1	2007	-2,6%	26,0	27,7	2060	6,6%	26,0	2007	-6,2%
IT	39,0	39,5	2011	1,2%	32,7	2060	-17,1%	22,9	24,6	2024	7,4%	20,9	2060	-15,2%
CY	0,5	0,8	2060	43,0%	0,5	2007	-30,1%	0,4	0,6	2060	54,5%	0,4	2007	-35,3%
LV	1,6	1,6	2007	0,0%	0,9	2060	-42,9%	1,1	1,1	2009	1,8%	0,6	2060	-42,2%
LT	2,3	2,3	2007	0,0%	1,3	2060	-41,9%	1,5	1,5	2013	2,4%	0,9	2060	-42,7%
LU	0,3	0,4	2060	36,9%	0,3	2007	-27,0%	0,2	0,3	2060	37,1%	0,2	2007	-27,1%
HU	6,9	6,9	2007	0,0%	4,8	2060	-30,3%	4,0	4,1	2015	3,2%	2,9	2060	-28,0%
MT	0,3	0,3	2009	1,8%	0,2	2060	-23,0%	0,2	0,2	2022	4,2%	0,1	2060	-18,5%
NL	11,0	11,1	2011	0,6%	9,6	2060	-13,6%	8,4	8,5	2011	0,9%	7,5	2060	-12,0%
AT	5,6	5,8	2020	3,3%	5,2	2060	-10,6%	4,0	4,2	2020	5,0%	3,8	2060	-8,6%
PL	27,0	27,2	2011	1,0%	16,3	2060	-40,0%	15,4	16,5	2012	6,8%	10,2	2060	-38,1%
PT	7,1	7,3	2022	2,0%	6,3	2060	-12,8%	4,8	5,2	2023	7,5%	4,5	2060	-12,6%
RO	15,0	15,0	2007	0,0%	9,1	2060	-39,7%	8,8	9,0	2011	1,7%	5,2	2060	-41,9%
SI	1,4	1,4	2011	0,5%	1,0	2060	-32,5%	1,0	1,0	2009	1,3%	0,7	2060	-32,3%
SK	3,9	3,9	2011	1,1%	2,4	2060	-38,9%	2,4	2,6	2020	7,8%	1,6	2060	-37,5%
FI	3,5	3,5	2010	1,0%	3,0	2060	-13,9%	2,5	2,5	2009	1,7%	2,3	2060	-9,7%
SE	6,0	6,3	2050	5,2%	6,0	2007	-5,0%	4,4	4,9	2049	9,8%	4,4	2007	-8,9%
UK	40,4	45,0	2050	11,5%	40,4	2007	-10,3%	28,9	33,5	2060	16,0%	28,9	2007	-13,8%
NO	3,1	3,5	2060	13,1%	3,1	2007	-11,6%	2,4	2,6	2060	10,0%	2,4	2008	-9,5%
EA12	209,4	212,7	2013	1,6%	183,0	2060	-14,0%	137,9	147,2	2020	6,7%	128,1	2060	-12,9%
EA	211,6	215,0	2013	1,6%	185,0	2060	-14,0%	139,4	148,8	2020	6,7%	129,5	2060	-12,9%
EU27	331,9	335,9	2012	1,2%	283,3	2060	-15,6%	217,4	229,2	2019	5,4%	198,0	2060	-13,6%
EU15	259,4	263,9	2019	1,7%	237,7	2060	-9,9%	174,0	185,3	2020	6,5%	169,2	2060	-8,7%
EU10	52,2	52,4	2010	0,4%	33,6	2060	-35,9%	31,3	32,9	2013	5,0%	21,7	2060	-33,9%
EU25	311,5	315,9	2012	1,4%	271,3	2060	-14,1%	205,3	217,3	2020	5,9%	190,9	2060	-12,2%

Source: Commission services.

Graph 31 - Employment projections, composition of employment by age groups

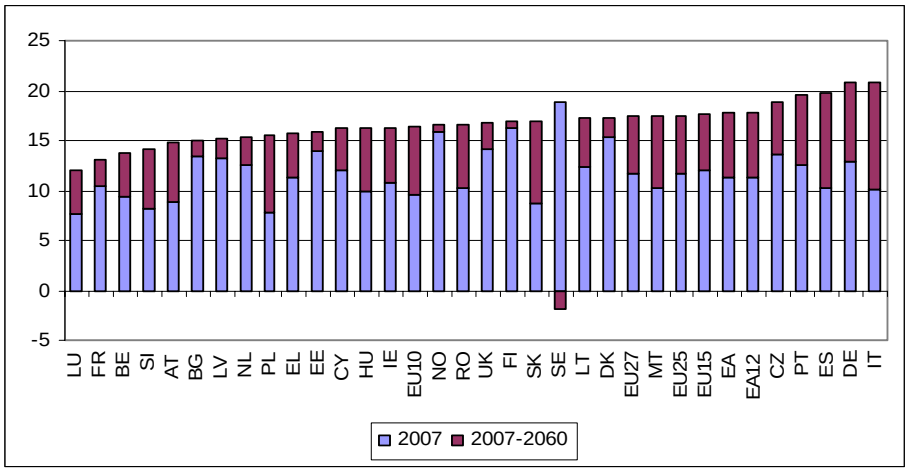


Source: Commission services, EPC.

As a result of different trends in the age composition of the population, the age structure of the labour force is projected to undergo a number of relevant changes. The share of older workers (aged 55 to 64) in the total labour force is projected to rise by 50%, rising from 11.6% in 2007 to about 17.4% in 2060 in the EU. In the euro area, it is projected to rise slightly more, reaching 17.8% in 2060. The increase projected is particularly high in Italy (from 10.1% to 20.8%), Spain (from 10.3% to 19.7%) and Slovakia (from 8.6% to 16.9%).

Most of the increase materializes in the period to 2020 in the EU and in the euro area. The share of older workers is projected to fall in the latter part of the projection period between 2020 and 2060 in some other Member States (Belgium, Germany, Finland, Sweden, Estonia, Latvia and Slovenia).

Graph 32- Share of older workers (labour force aged 55 to 64 as a percentage of the labour force aged 15 to 64)



Source: Commission services, EPC.
Note: For Sweden, there is a decline in the share of older workers over the period 2007 to 2060, shown by the bar below the axis.

1.2.5. The balance of non workers to workers: the economic dependency ratios emerging from the labour force projection

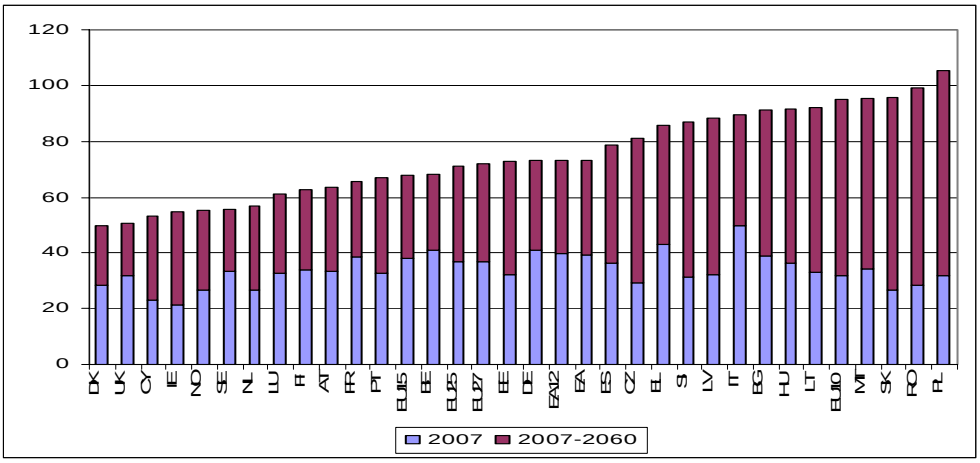
These trends are mirrored in the ratios of non workers to workers: the effective economic old-age dependency ratio, calculated as the number of inactive people aged 65 and above, as a percentage of population aged 15-64 employed, and the total economic dependency ratio, which includes the children in the calculation. It is important to consider the effective economic old-age dependency ratio when assessing the impact of ageing on budgetary expenditure, pension public schemes above all. This indicator shows the balance between non workers and workers: the inactive elderly and the economically active (employed) population.

The effective economic old-age dependency ratio is projected to rise sharply for the EU27 from 37% in 2007 to 42% in 2020 and 72% in 2060. This means that we would move from a ratio of nearly 4 elderly non workers out of 10 workers in 2007 to a ratio of more than 7 non workers to 10 workers. In the euro area, a similar evolution is projected, with the effective old-age dependency ratio rising from 39% in 2007 to 45% in 2020 and 73% in 2060. Extremely high values are projected in some EU countries. In Poland and Romania, the projections point to a situation in which there will be as many or more inactive old persons as employed in 2060 (106% and 99%, respectively). The effective economic old-age dependency ratio will be 90% or more in Bulgaria, Lithuania, Hungary, Malta and Slovakia. By contrast, it is projected to be smaller than two thirds in Denmark, Ireland, France, Cyprus, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden, the UK and Norway.

The total economic dependency ratio is the total inactive population relative to the people employed (aged 15-64). It gives an indication of the average number of people that each economically active person ‘supports', and thus is relevant when considering the prospects for potential GDP per capita growth. It is projected to decline in the first period of the projection (up to 2020) in the EU (from 125% in 2007 to 122% in 2020). Thereafter, it increases to 151% by 2060. A similar development is projected in the euro area. These results need to be interpreted carefully. They show that overall economic dependency is projected to decline up to 2020 mostly due to a better labour market performance (especially the projected increase in female employment rates), but also due to low fertility (i.e. smaller numbers of young people

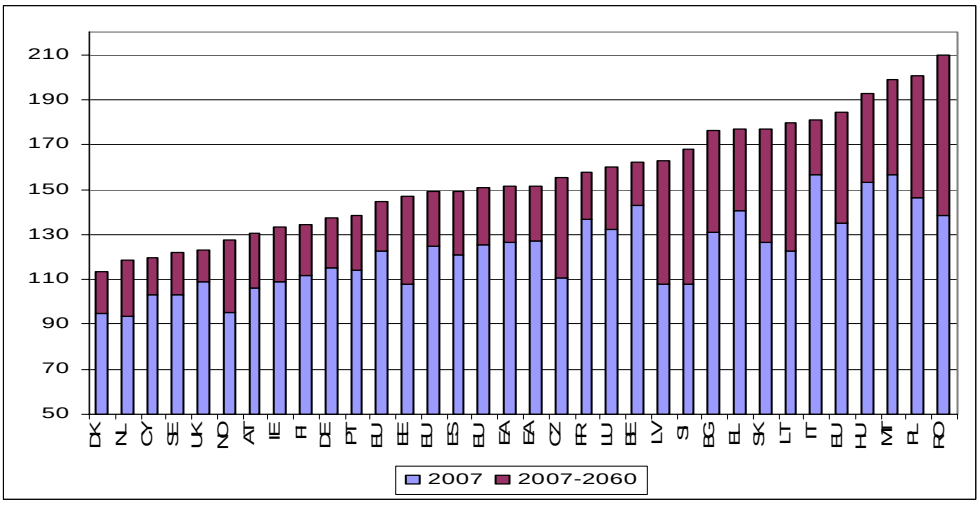
imply a decline in the youth dependency ratio). However, these effects taper-off after 2020 and the increase in the total economic dependency ratio between 2020 and 2060 is evident for all Member States. There are however large cross-country differences. For some Member States (Lithuania, Poland, Slovakia and Romania) it rises by 60 percentage points or more between 2020 and 2060, while for some others (Denmark, France, Finland, Sweden and the UK) it is projected to rise more modestly, by 20 percentage points or less.[17]

Graph 33- Effective economic old-age dependency ratio (inactive population aged 65 and above as a percentage of employed population aged 15 to 64)



Source: Commission services, EPC.

Graph 34– Total inactive population (both aged 14 and below and aged 65 and above) as a percentage of employed population aged 15 to 64)



Source: Commission services, EPC.

1.2.6. Projection of total hours worked

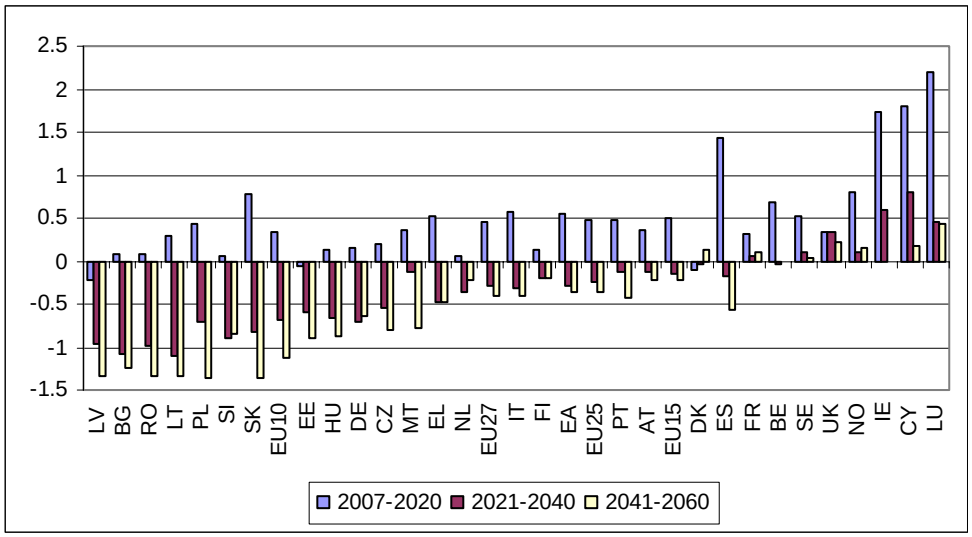
The projected evolution in employment will give rise to a 5.4% increase in the total hours of work in the period up to 2020 in the EU.[18] However, from 2020 onwards the situation is

[17] For more detailed information on the evolution of the economic dependency ratios per Member State, see the Statistical Annex.

[18] Compared with the projections in the 2006 Ageing Report, the labour input is defined as hours worked instead of number of employees. This definition was adopted to ensure consistency with the production function used to

projected to reverse and hours worked will fall by 12.9% between 2020 and 2060. Over the entire projection period, total hours worked are projected to fall by 8.2% in the EU. For the euro area, the projected fall is less marked (-5.7% between 2007 and 2060). In terms of annual average growth rates, hours worked are projected to fall by 0.2% over 2007-2060 in the EU and by 0.1% in the euro area.[19] These trends in hours worked reflect the employment trends discussed above and also a composition effect, that is the increasing share over time of employed persons working part-time. As a result of this composition effect, average hours worked per person will change over time.

Graph 35- Hours worked projections, annual growth rate



Source: Commission services, EPC.

There are major differences between the Member States, mainly reflecting different demographic trends. A reduction in hours worked of 20% or more between 2007 and 2060 is projected for Bulgaria, the Czech Republic, Germany, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia. In contrast, for some other Member States (Belgium, Ireland, Spain, France, Cyprus, Luxembourg, Sweden and the UK) an increase is projected over the same period.

1.2.7. Comparison with the 2006 round of projections

The participation rate in the EU25 (15-64) is projected to increase at virtually the same pace as in the 2006 projection, by 4 p.p. until 2050. By contrast, the older workers (55-64) participation rates are projected to increase more than in the 2006 projection. The structural unemployment rate in 2007 (7.3%) is lower than in the 2006 projection, but a smaller decrease in the unemployment rate is projected this time. Similarly, the employment rate is higher in 2007 in the current projection exercise, but a smaller increase is projected in the period to 2050. The reverse is the case for the employment rate of older workers (55-64), which is projected to increase more this time.

calculate output gaps for the purpose of, inter alia, estimating cyclically adjusted budget balances (CABs) in the context of the European Commission's multilateral budgetary surveillance.

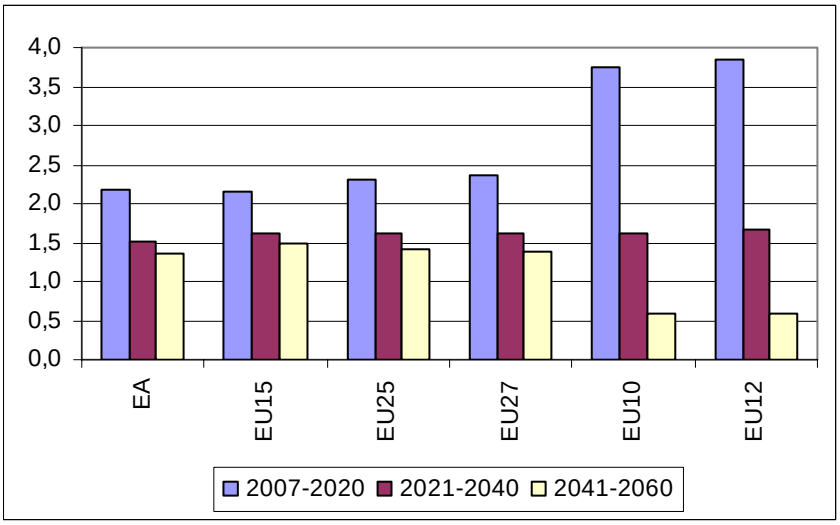
[19] The total hours worked for 2007-2009 are estimated using the production function framework. For the remainder of the projection period, the cohort simulation model was used.

1.3. Labour productivity and GDP

1.3.1. Main results of the projections

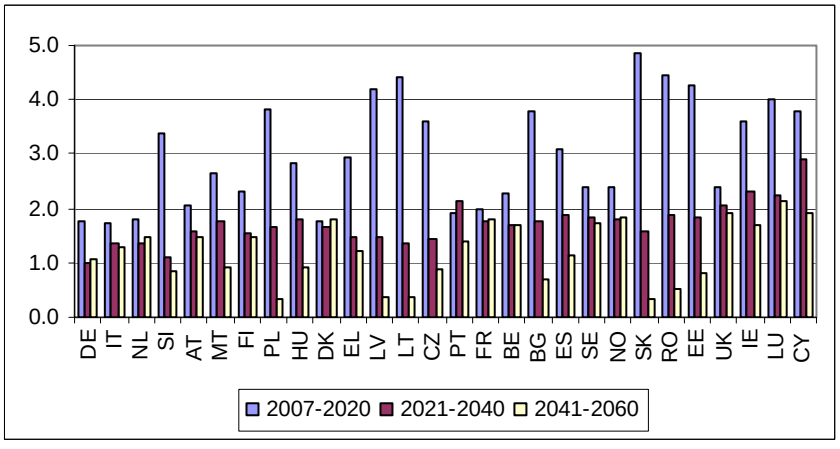
A sharp decline in the annual average potential GDP growth rate is projected in the EU, from 2.4% in the period 2007-2020, to 1.6% in the period 2021-30 and then 1.3% in the period 2041-2060. Over the whole period 2007-2060, output growth rates in the euro area are very close to those in the EU27, as the former represents more than 2/3 of the EU27 total output. Notwithstanding this, the potential growth rate in the euro area in the beginning of the projection period (up to 2020s) is lower than for the EU27 and the decline is therefore less sharp.

Graph 36 - Projected potential growth rates (annual average growth rates), EU aggregates



Source: Commission services.

Graph 37- Projected potential growth rates (annual average growth rates), all Member States

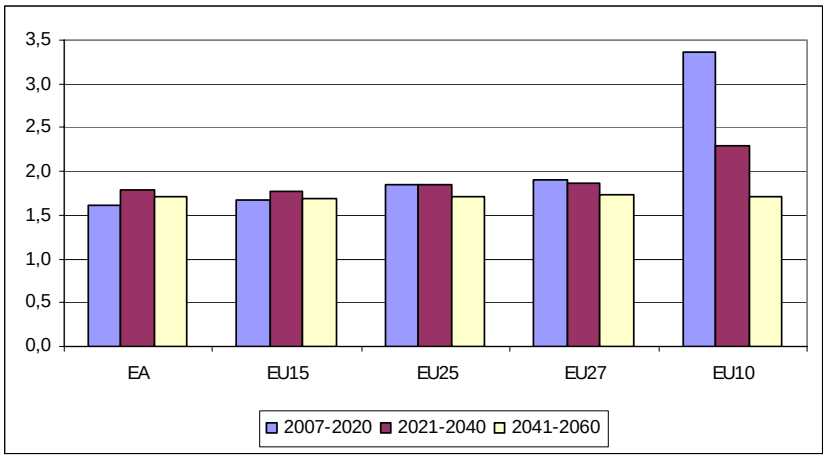


Source: Commission services, EPC.

For the EU27, productivity growth is projected to remain fairly stable throughout the projection period, close to 1.7%. The small increase up to the 2030s is due to the assumed higher productivity growth in the catching up Member States, which is assumed to converge to the 1.7% growth rate by 2050. Since the starting point of productivity growth in the euro

area is below the assumed long-term EU average of 1.7% annual growth, the increase in productivity growth assumed up to the 2030s is higher.

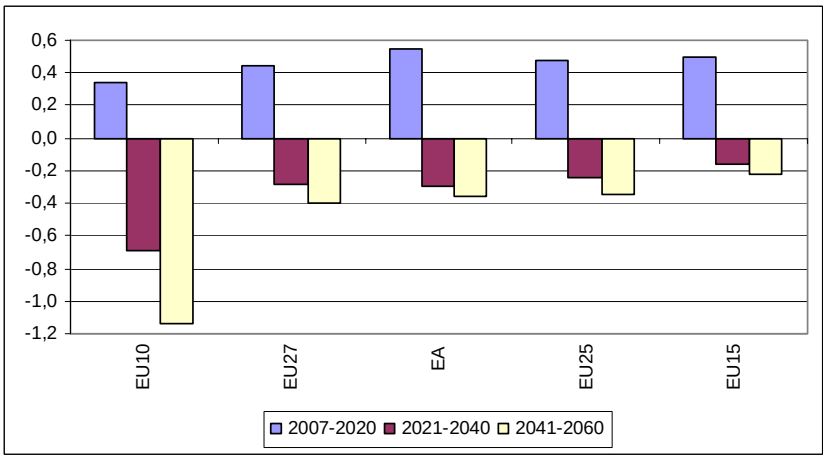
Graph 38– Labour productivity per hour, annual average growth rates, EU aggregates



Source: Commission services, EPC.

The labour input in the EU and in the euro area is projected to increase up to the 2020s. Thereafter, the demographic changes, with a reduction in the working-age population, are projected to act as a drag on growth.

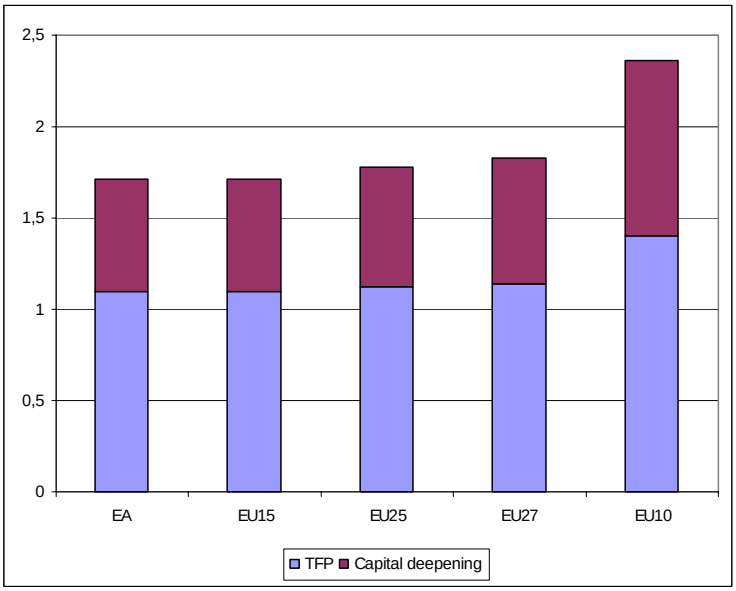
Graph 39– Labour input (total hours worked), annual average growth rates, EU aggregates



Source: Commission services, EPC.

Graph 40 shows the contribution of the main determinants of labour productivity (per hour worked): total factor productivity (TFP) growth and capital deepening. TFP growth explains most of productivity growth per hour worked. This follows from the fact that in the long-run, the capital deepening contribution follows TFP growth (times the labour share). By construction, TFP growth converges towards the rate of 1.1% by 2050 for all Member States, which, given the use of the "capital rule", implies a labour productivity growth rate of 1.7% for all countries in the steady state reached in 2050.

Graph 40– Determinants of labour productivity: Total factor productivity (annual average growth rates) and capital deepening (contribution in p.p.), EU aggregates, 2007-2060

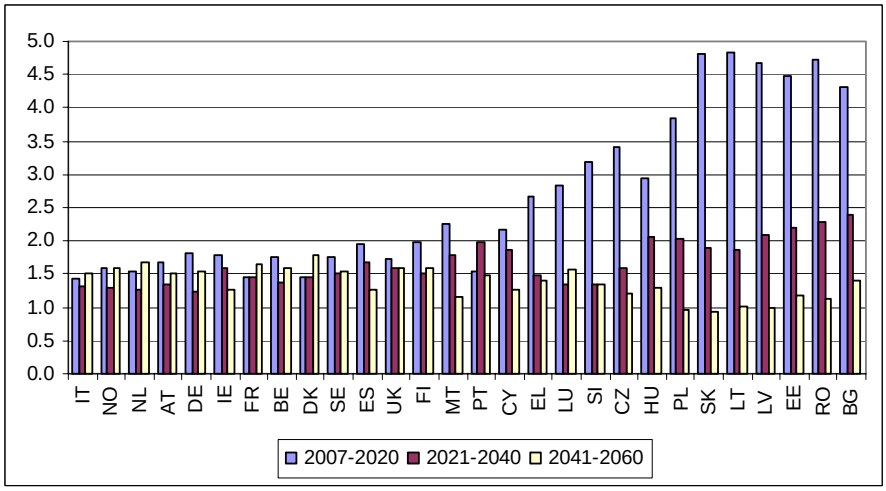


Source: Commission services, EPC.

For the countries with a relatively low GDP per capita, 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 0.6 p.p., as the growth in the capital stock slowly adjusts to growth in hours worked.

As expected, the projected decline in output per capita growth rates in both the EU27 and the euro area is a bit smaller than the projected fall in output growth rates, since total population growth rates are also projected go down over time.

Graph 41- Projected GDP per capita growth rates (period averages)



Source: Commission services, EPC.

While all EU Member States are projected to experience a more or less marked slowdown in their potential growth rates in the future owing to the adverse impact of demographic developments, growth rates differ substantially from country to country. In the first half of the projection period, productivity growth is the main source of discrepancy across countries, reflecting different productivity growth rates at the outset of the projection and the

differentiation of productivity growth rates according to the catching-up potential. In the latter part of the projection period, developments in the labour input have a dominant role, due to different demographic developments and the mechanical effect of productivity growth convergence.

In addition to falling potential GDP growth rates, the sources of growth will alter dramatically. The labour input will make a positive contribution to growth in both the EU and the euro area up to 2020, but turn significantly negative thereafter. Over time, productivity will become the dominant source of growth.

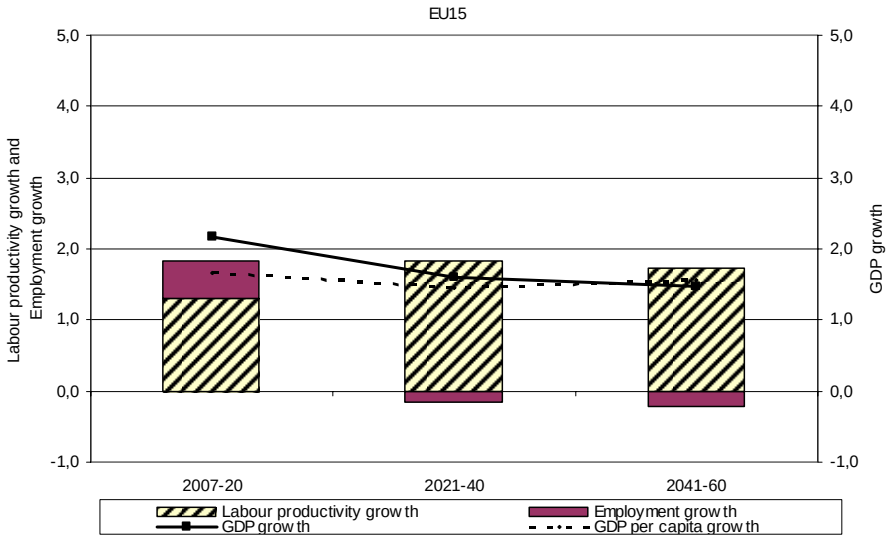
In order to assess the relative contribution of labour productivity and labour utilisation to GDP growth, the standard growth accounting framework can be used. For the EU and for the euro area, a slight increase in the size of the population and an increasing employment rate (which on average contribute 0.1 percentage points each to average GDP growth over the entire projection period) is more than offset by a decline in the share of the working-age population (which is a negative drag on growth by an average of -0.3 percentage points). As a result, the labour input contributes negatively to output growth on average over the projection period (by 0.1 p.p.).

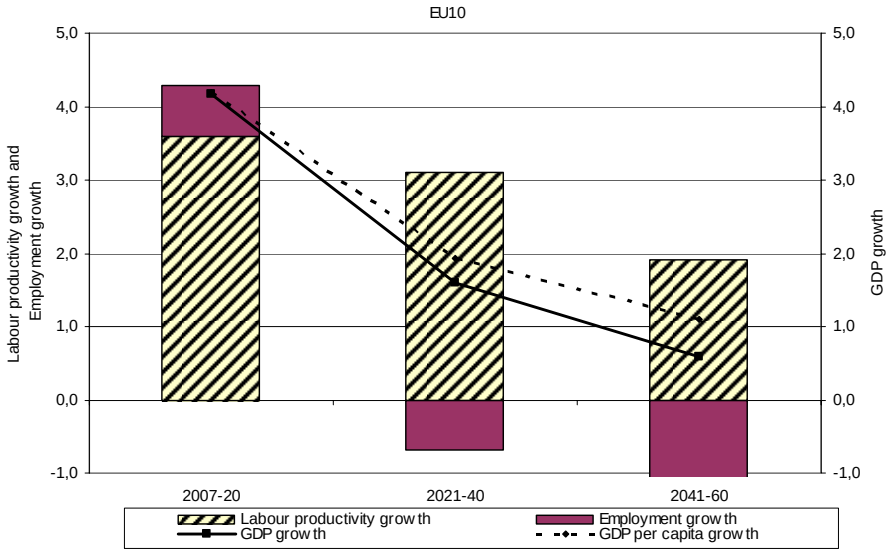
Table 5 - Decomposition of GDP growth, 2007-2060 (in percentage)

		EU27	EA	EA12	EU15	EU10	EU25
1	**GDP growth in 2007-2060**	1,7	1,6	1,6	1,7	1,8	1,7
	Due to % change in:						
2=3+4	**Productivity** (GDP per hour worked)	1,8	1,7	1,7	1,7	2,4	1,8
	of which:						
3	TFP	1,1	1,1	1,1	1,1	1,4	1,1
4	Capital deepening	0,7	0,6	0,6	0,6	1,0	0,7
5=6+7+8+9	**Labour input**	-0,1	-0,1	-0,1	0,0	-0,6	-0,1
	of which:						
6	Total population	0,1	0,1	0,1	0,2	-0,3	0,1
7	Employment rate	0,1	0,1	0,1	0,1	0,1	0,1
8	Share of working age population	-0,3	-0,3	-0,3	-0,2	-0,3	-0,3
9	change in average hours worked	0,0	0,0	0,0	0,0	0,0	0,0
10=1-6	**GDP per capita growth in 2007-2060**	1,6	1,5	1,5	1,6	2,1	1,6

Source: Commission services, EPC.

Graph 42 - Decomposition of GDP growth, EU15, EU10, 2007-20, 2021-40, 2041-60 (annual average growth rate)





Source: Commission services, EPC.

Given the decline in labour supply, the annual average potential GDP growth rate for the EU27 is projected to decline from 2.4% in the period 2007 to 2020 to 1.3% in the period 2041-2060. A smaller fall in potential growth rates is projected in the euro area, chiefly reflecting lower growth rates in the beginning of the projection period. The new Member States are projected to exhibit a larger decline in potential growth rates over the projection period. This stems from the assumption that productivity growth rates converge for all Member States by 2050 and that the demographic projections are less favourable in the new Member States compared with the old Member States. It should be borne in mind that these projections of GDP are based on projections of future growth in labour productivity and employment. In particular, projected labour productivity growth relies on assumptions about total factor productivity growth and capital stock developments. Although such patterns may or may not happen, they are based on the reasonable principle that cross-country discrepancies in labour productivity growth should be allowed at the start of the projection but should fade away towards the end of the projection horizon.

1.3.2. Comparison with the 2006 round of projections

In the current projection, the EU population is larger than in the projection carried out in 2006: about 4 million larger in 2008 and 43 million in 2050 for the EU25 (8%). The additional population in 2050 is concentrated in the working-age group (15-64), although all age brackets will increase in number.

As regards the demographic assumptions in EUROPOP2008, fertility rates in the initial year are slightly higher while the increase is marginally lower than in the 2006 exercise. A larger gain in life expectancy is assumed in this round and life expectancy in 2050 is now assumed to be 1.5 years higher for men at 83.3 and 1.2 years higher for women at 88.1. The net migration flows assumed in this projection round are significantly higher for the EU as a whole, although for some Member States (Germany, the Netherlands, Estonia, Lithuania, Latvia, Malta, Poland, and Slovenia) net migration flows are lower than assumed in 2006. Overall, EU net inward migration is projected to be 12.6 million higher and therefore explains about one third of the larger total population projected.

As a result, a smaller increase in the old-age dependency ratio is projected in EUROPOP2008 (by 24.6 percentage points between 2008 and 2050, compared to 25.8 percentage points in the previous projection). Due to the different demographic assumptions, the projected increase in the old-age dependency ratio is significantly lower in the UK, Spain, Portugal, Cyprus, Ireland, Austria, Greece, Belgium and Italy and significantly higher in Malta, Latvia, Lithuania, Slovakia, Poland, the Netherlands, Germany, Slovenia, Estonia (in descending order).

The participation rate (15-64) would increase at virtually the same pace in both projections, by 4 p.p. over the period up to 2050. The employment rate in 2007 is higher in the current projection exercise and would increase less over the projection period, but still surpass 70% in 2050.

The annual average potential GDP growth over the period 2007-2050 is projected to be 1.8%, compared with 1.7% in the 2006 projection. The higher average growth rate can be attributed to a more favourable demographic outlook (higher growth in the total population and a less adverse population composition effect), which is partly offset by a worse employment outlook. The projected average annual productivity growth is 1.8%, similar to the previous projection.

There are however marked differences at Member State level between the two projections. Greece, Spain and Portugal are projected to have higher average GDP growth (by 0.3-0.4 p.p.). In the case of Greece, this is due to higher labour productivity growth assumed. For Spain and Portugal, the more favourable growth outlook is due to a more benign demographic outlook. In GDP per capita growth terms, the difference in growth rates between the two projection exercises is smaller, especially for Spain and Portugal.

By contrast, some other countries (Latvia, Lithuania and Malta) are projected to have lower annual average GDP growth, by 0.4-0.6 p.p. For Latvia and Lithuania, this is due to a downward revision of productivity growth over the medium term, while in the case of Malta it is due to lower labour input growth following less favourable demographic prospects (which is true also for Lithuania and Latvia, albeit to a lesser degree).

2. PENSION EXPENDITURE

2.1. Main features of pension systems in the EU

Pension arrangements are very diverse in the EU, due to both different traditions on how to provide retirement income, and Member States being in different phases of the reform process of pension systems.

While a strong public sector involvement in the pension system through the public pension systems is a common feature, the importance of occupational and private pension provisions varies across countries. Statutory earnings-related old-age pension schemes, either a common scheme for all employees or several parallel schemes in different sectors or occupational groups are the core of the public pension system in most countries. The public pension system often provides also a minimum guaranteed pension to those who do not qualify for the earnings-related scheme or have accrued only a small earnings-related pension. Minimum guarantee pensions are usually means-tested and are provided either by a specific minimum pension scheme or through a general social assistance scheme. In a few Member States, notably in Denmark, the Netherlands, Ireland and the United Kingdom, the public pension system provides in the first instance a flat-rate pension, which can be supplemented by earnings-related private occupational pension schemes (in the UK, also by a public earnings-related pension scheme -State Second Pension- and in Ireland by an earnings-related pension scheme for public service employees). In these countries, the occupational pension provision is broadly equivalent to the earnings-related public pension schemes in most of the EU countries.

A number of Member States, including Sweden and some new Member States such as Bulgaria, Estonia, Latvia, Lithuania, Hungary, Poland and Slovakia, have switched part of their public pension schemes into private funded schemes. Typically, this provision is statutory but the insurance policy is made between the individual and the pension fund. Participation in a funded scheme is conditional on participation in the public pension scheme and is mandatory for new entrants to the labour market (in Sweden for all employees), while it is voluntary for older workers (in Lithuania it is voluntary for all).[20]

The type of benefits provided by the public pension systems diverge across countries. Most pension schemes provide not only old-age pensions but also early retirement, disability and survivors' pensions. Some countries, however, have specific schemes for some of these benefit types; in particular, some do not consider disability benefits as pensions (despite the fact that they are granted for long periods), and in some cases they are covered by the sickness insurance scheme.

The financing method of the pension systems also differ across countries. Most public pension schemes are financed on a pay-as-you-go (PAYG) basis, whereby contribution revenues are used for the payments of current pensions. In addition, there is a considerable

[20] According to the decision of EUROSTAT, these schemes are to be included in the private sector in national accounts because the transactions are between the individual and the pension fund. Thus, they are not recorded as government revenues or expenditure, and consequently, they do not have an impact on the government surplus or deficit. In addition, the insured persons have the ownership of the assets of the fund and, thus, they bear the risks and enjoy the rewards regarding the value of the assets. Furthermore, the EUROSTAT decision specifies that a possible government guarantee for such a fund is not an adequate condition to classify such schemes as social security (public) schemes, because such a guarantee is a contingent liability and these are not considered as economic transactions until they materialise.

variation between countries regarding the extent to which contribution revenues cover all pension expenditure. In most countries, minimum guarantee pensions are covered by general taxes. Earnings-related schemes are often subsidised to varying degrees from general government funds. Some specific schemes, notably public sector employees' pensions sometime do not constitute a well identified pension scheme but, instead, disbursements for pensions appear directly as expenditure in the government budget. On the other hand, some predominantly PAYG pension schemes have statutory requirements for partial pre-funding and, in view of the increasing pension expenditure, many governments have started to collect reserve funds for their public pension schemes.

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

2.2. The EU framework for pension projections

One of the most crucial parts of the joint budgetary projection exercise is the assessment of the impact of ageing population on pension expenditure. For this assessment, national pension models are used, in order to be able to reflect the institutional characteristics prevailing in each Member State. At the same time, there is a need to ensure that the projections are comparable in terms of assumptions used, so as to gauge the degree of the challenge posed by population ageing that the different Member States are facing. The commonly agreed underlying assumptions are described in Chapter 1 of this report.[21]

Using different, country-specific projection models may introduce an element of non-comparability of the projection results. Nevertheless, this approach was chosen by the EPC because pension systems and arrangements are very diverse in the EU Member States, making it extremely difficult to project pension expenditure on the basis of one common model, to be used for all the 27 EU Member States.

In order to ensure high quality and comparability of the pension projection results, an in-depth peer review was carried out when preparing the projections. The projection results were discussed and revised where deemed necessary by the AWG and the European Commission during the projection exercise. In addition, it was found that in many cases there was a need for providing additional information in the country fiches so as to better understand the different pensions systems and notably the projection results.[22]

The core of the projection exercise is the *government expenditure on pensions* for *both the private and public sectors*, as in the 2006 pension projection exercise. The EPC agreed to provide pension projections for the following items:

- Gross pension expenditure
- Number of pensions/pensioners
- Number of contributors

[21] For a more detailed description see also EC-EPC (2008), "The 2009 Ageing report: Underlying assumptions and projection methodologies", European Economy, No7, Brussels.
http://ec.europa.eu/economy_finance/publications/publication_summary13784_en.htm.
[22] It is envisaged to release the country fiches in a separate publication in the latter half of 2009.

- Contributions to public pension schemes
- Assets accumulated by public pension schemes

In addition, Member States covered, on a voluntary basis as in the 2006 exercise:

- Occupational and private (mandatory) pension expenditures

Moreover, the EPC decided that for the 2009 pension projection exercise, Member States would have provided, on a voluntary basis, projections on the following items:

- Replacement rates and benefit ratios
- Taxes on pensions and net pension expenditures
- Private (non-mandatory) pension expenditures

The 2006 pension projection exercise was the solid point of departure for the current projection. In order to further improve the pension reporting framework, a few additional changes were introduced.[23] The amendments to the 2009 reporting framework mainly stem from the following considerations:

- further information on privately managed pension schemes is necessary, as the reliance on private pension provision seems to increase in the future. The reporting framework is extended to cover private pension schemes to a greater degree, i.e. it is proposed Member States provide information on both mandatory and non-mandatory private schemes;

- there is a need to provide projections of taxes on both private and public pensions, since for some countries these can become an important source of revenue in the future;

- a large number of countries have implemented pension reforms that make the public pension systems less generous. In order to shed light on potential risks to future pension development, it is crucial to analyse the evolution of pension levels, so as to better understand the projection results. Thus, it was agreed that Member State, also on a voluntary basis, calculate the evolution of the gross average replacement rate at retirement (for both public pensions and private - second and third pillars);

- when the fiscal sustainability is assessed, it is necessary to distinguish between consolidated and non-consolidated figures. As regards assets in public pension schemes, a distinction needs to be made between national government bonds and other assets, since the former are netted out in the compilation of gross debt (Maastricht debt), while the latter are not; and,

- allowing for the fact that the same person may be a recipient of several types of pensions, the number of pensions and a number of pensioners could differ in some cases. Since each

[23] All of the introduced amendments were duly discussed by AWG and EPC delegates, and reflect recent developments and the expected advancement over the projection period as regards the features of the pension systems in the Member States. However, since many of the Member States found it difficult to provide figures concerning the recently introduced amendments, the EPC (AWG) agreed that they would be voluntary (see Annex 6.1 for the complete pension questionnaire).

figure provides different type of information, both the number of pensioners and the number of pensions are requested.

On this basis, the 2009 pension reporting framework was considerably expanded compared with the 2006 version; in particular, (i) private pension coverage; (ii) tax on pensions; (iii) the benefit ratio; and, (iv) the gross average replacement rate.[24]

2.3. Pension systems in the EU

The main focus of the projection exercise is on public pension expenditure. In order to understand better the development of this type of pension expenditure, further decomposition of the projections into its main components, (old-age, early retirement, disability and survivors' pensions) has been carried out. Several Member States have introduced occupational pension schemes and/or private mandatory and voluntary schemes. Table 6 provides an overview of the existing pension schemes in Member States, including the main characteristics of these schemes.[25] The table also indicates the type of a pension provision i.e. if it is a flat-rate, earning-related etc.

In addition, Table 6 provides information concerning the coverage in the current projection exercise. The coverage of public pensions is almost full, with the exception of some specific public pension schemes for some countries, highlighted with grey in Table 6. For instance, 9 countries (Germany, Spain, Cyprus, Luxembourg, Malta, the Netherlands, Austria, Poland, Slovenia) do not include projections of minimum pension and/or social allowance expenditure for a variety of different reasons. However, all the countries provided at least a rough estimate of the current and future expenditure of this part of the public pension scheme. In addition, only few countries (notably France and the UK) do not fully cover disability pensions as they are partly covered by the projections of health care expenditure.

Pension projections for the voluntary pension schemes (occupational and private pension schemes) have been provided only by few countries. As the participation in these schemes is voluntary and they have been set up quite recently, there is a lack of data that has not allowed a majority of the Member States to provide historical and/or expected values of pension expenditure for such schemes. However, the country coverage of the projection of the mandatory private and occupational pension schemes seems to be satisfactory.[26]

[24] A full version of the questionnaire is presented in Annex 6.1.
[25] See Annex 1 for detailed information on pension systems and its characteristics in Member States.
[26] See Annex 1 for a detailed account of each Member States' coverage in the projection.

Table 6 - Pension schemes in EU Member States

	COVERAGE									
	Public pensions						Occupational pension scheme		Private pension scheme	
	Minimum pension / social allowance	Old-age pensions	Early retirement pensions	Disability pensions	Survivors' pensions				Mandatory private scheme	Voluntary Pension scheme
BE	MT - SA	ER	ER	ER (wage earner); FR (self-employed)	ER		V*		X	V*
BG	MT-SA	ER / FR	ER (before end 2010 pensions)	ER / FR	ER / FR		V*		M young (1960) M* (prof)	V*
CZ	FR	ER	ER	ER	ER		X		X	V*
DK	FR & MT	FR & MT	V	FR	FR*		V		X	V
DE	MT - SA*	ER	ER	ER	ER		V*		X	V*
EE	FR	FR (before 1999); ER (after)	X	FR (before 1999); ER (after)	FR (before 1999); ER (after)		X		M - young (1983)	V - old*
EL	MT	ER	ER	ER	ER		X		X	V*
ES	MT - SA*	ER – priv ; FRw - pub.	ER – priv ; FRw - pub.	ER - priv; FRw - pub.	ER - priv; FRw - pub.		V - priv; M - pub.		-	V
FR	MT	ER	ER	ER - HC	ER		V		-	V*
IE	MT - FR & SA	FR	MT – FR & SA	SA: MT – FR; Contributory: FR	SA: MT – FR; Contributory: FR		M - pub; V* - priv		X	V*
IT	MT & SA	ER	ER	ER	ER		V*		X	V*
CY	SA*	ER	ER	ER	ER		M - pub; V* - priv		X	X
LV	SA	ER	ER	ER	ER		X		M - young (1971); V - old	V*
LT	SA	ER	ER	ER	FR or ER		X		V	V*
LU	FR - SA*	ER	ER	ER	ER		V*		X	V*
HU	MT - SA	ER	ER	ER	ER		X		M - new (1998)	V*
MT	MT - FR*	ER	-	FR	ER		Exists only to a minor extent*		X	V*
NL	SA*	FR	-	ER	FR		M		X	V*
AT	MT - SA*	ER	ER	ER	ER		M*		X	V*
PL	MT*	ER	ER	ER	ER		V*		M/V	V*
PT	MT - SA	ER	ER	ER	ER		M - prof; V - others		X	V*
RO	SA	ER	ER	ER	ER		-		M	-
SI	MT*	ER	ER	ER	ER		M * - prof; V* - others		X	V
SK	MT - SA	ER	ER	ER	ER		X		M/V	V*
FI	MT	ER	ER	ER	ER		V*		X	V*
SE	MT	ER	ER	ER	ER		V		M	V
UK	FR & MT - SA	ER	X	ER HC*	-		V*		X	V*
NO	FR	ER	X*	ER	ER		M*		X*	V*

Source: Commission services, EPC.

Note: Full information concerning different pension schemes in EU Member States is provided at the end of this chapter in the Annex: Overview of pension system in the Member States. Additional information on projection coverage can be found in the Annex: Coverage of the pension projection in the Member States. Cells highlighted in grey indicate the schemes not covered by the projection.

Key:		
MT	…	Means tested
FR	…	Flat rate
FRw	…	Flat rate by wage categories
ER	…	Earnings related
HC	…	Partly covered by health care expenditure
SA	…	Social allowance/assistance
X	…	Does not exist
V	…	Voluntary participation in the scheme
M	…	Mandatory participation in the scheme
*	…	Is not covered by the projection
public	…	Public sector employees
private	…	Private sector employees
new	…	New labour market entrants
prof	…	Only for selected professions
other	…	Other than selected professions
young(X)	…	Only for people born in year X and after
old	…	Only for people other than young

A key determinant of pension expenditure dynamics is the indexation rule. Table 7 provides an overview of the indexation rules in each Member State. A majority of countries (18) in the EU relies on indexation rules for pensions that do not fully reflect development in nominal wages; in some cases due to indexation to prices (Spain, France, Italy and Austria), in others due to a mix of wages and prices (Belgium, Bulgaria, the Czech Republic, Estonia, Cyprus, Latvia, Luxembourg, Hungary, Malta, Poland, Slovakia, Finland and Sweden) or due to a mix of GDP growth and prices (Portugal).

A few Member States that reformed their pension systems in the recent past have formally introduced a 'sustainability factor' and/or other 'reduction coefficients' into the specification that determines the amount of pension benefit at retirement (Germany, Slovenia, Finland, Italy, Portugal and Sweden). This approach introduces a component that changes the size of the pension benefit depending on expected demographic changes such as the life expectancy at the time of retirement.

Table 7 - Legal indexation rules in EU Member States

	LEGAL INDEXATION							
	Public pensions					Occupational pension scheme	Private pension scheme	
	Minimum pension / social allowance	Old-age pensions	Early retirement pensions	Disability pensions	Survivors' pensions		Mandatory private scheme	Voluntary Pension scheme
BE	CPI + LSA	CPI + LSA	CPI + LSA	CPI + LSA	CPI + LSA	-	-	-
BG	50%CPI + 50% NI	50%CPI + 50% NI	50%CPI + 50% NI (before end 2010 pensions). NR (after 2010 pensions)	50%CPI + 50% NI	50%CPI + 50% NI	NR	NR	NR
CZ	NR	CPI + min 1/3 RI	CPI + min 1/3 RI	CPI + min 1/3 RI	CPI + min 1/3 RI	-	-	-
DK	NI	NI	NI	NI	NI	-	-	-
DE	In line with pensions & re exam(5)	NI + sust	NI + sust	NI + sust	NI + sust	-	-	-
EE	80% CPI + 20% NI	80% CPI + 20% NI	80% CPI + 20% NI	80% CPI + 20% NI	80% CPI + 20% NI	-	-	-
EL	NR	NR	NR	NR	NR	-	-	-
ES	CPI	CPI	CPI	CPI	CPI	-	-	-
FR	CPI	CPI	CPI	CPI	CPI	-	-	-
IE	NR	NR	NR	NR	NR	NR - pub	-	-
IT	CPI or fixed in nominal terms	CPI - size	CPI - size	CPI - size	CPI - size	-	-	-
CY	NI	Basic: NI; Suppl.: CPI	Basic: NI; Suppl.: CPI	Basic: NI; Suppl.: CPI	Basic: NI; Suppl.: CPI	NI - pub	-	-
LV	CPI + 50% RI	CPI + 50% RI	CPI + 50% RI	CPI + 50% RI	CPI + 50% RI	-	-	-
LT	NR	NR	NR	NR	NR	-	-	NR
LU	CPI if CPI>2.5% & RI re-exam(2)	CPI if CPI>2.5% & RI re-exam(2)	CPI if CPI>2.5% & RI re-exam(2)	CPI if CPI>2.5% & RI re-exam(2)	CPI if CPI>2.5% & RI re-exam(2)	-	-	-
HU	-	50% CPI + 50% NI	50% CPI + 50% NI	50% CPI + 50% NI	50% CPI + 50% NI	-	At least 50% CPI + 50% NI	-
MT	2/3 COLA	COLA + NI (born before 1962); 70% NI + 30% CPI (born after 1962)	-	COLA	COLA + NI (born before 1962); 70% NI + 30% CPI (born after 1962)	-	-	-
NL	NI	NI	-	NI	NI	70% NI & 30% CPI	-	-
AT	CPI	CPI	CPI	CPI	CPI	-	-	-
PL	CPI + 20% RI	CPI + 20% RI	CPI + 20% RI	CPI + 20% RI	CPI + 20% RI	-	NR	NR
PT	CPI + GDP partially (GDP)	CPI + GDP partially (size and GDP)	CPI + GDP partially (size and GDP)	CPI + GDP partially (size and GDP)	CPI + GDP partially (size and GDP)	CPI for DB 1st pillar and re-exam(1) for the other plans	-	-
RO	RI	RI	RI	RI	RI	-	NR	-
SI	In line with pensions	NI and sust	NI and sust	NI and sust	NI and sust	NR	NR	NR
SK	NR	50% CPI + 50% NI	50% CPI + 50% NI	50% CPI + 50% NI	50% CPI + 50% NI	-	NR	-
FI	CPI	80% CPI + 20%NI + sust	80% CPI + 20%NI + sust	80% CPI + 20%NI + sust	80% CPI + 20%NI + sust	-	-	-
SE	CPI	NI + sust	NI + sust	NI + CPI	NI + CPI	-	-	-
UK	NI	CPI; NI as of 2012	-	-	CPI	-	-	-
NO	NI	NI	-	NI	NI	-	-	-

Source: Commission services, EPC.
Note: Details concerning indexation rules in Member States can be found in Annex 8.3.

Key:		
NR	…	No rule exists
RI	…	Real income growth
NI	…	Nominal income growth
GDP	…	GDP growth
CPI	…	CPI inflation
LE	…	Adjustment to life expectancy.
LSA	…	Living standard adjustment
COLA	…	Adjustmentd to cost of living
size	…	Adjusted by a pension size
sust	…	Additional adjustment due to other mechanisms such as a sustainability factor, balancing mechanism, life expectancy, value of a pension point, maintenance of relativity between means-tested and contributory pension, etc.
re-exam(X)	…	Reexamination of pension value every X years
min	…	At least

In some cases, Member States decided to use in the projection an indexation rule which is more in line with the current and past practices, when these have not strictly followed the legislated indexation rules. For instance, Italy, Finland and Sweden, have assumed an indexation of public minimum pension/old age allowance benefits to wages in the projection, while the legal indexation rule provides for indexation to prices. In the case of few countries, there is no explicit rule guiding the indexation of (minimum) pension benefits, thus an operational interpretation of the indexation has been made for the purpose of the long-term projection so as to reflect effective constant policy. For example, in the Czech Republic, Greece, Ireland and Slovakia indexation to wages and a mix of wages and prices has been assumed in the projection of public minimum pension benefits, while there is no legal indexation rule. Table 8 mentions these and other cases when the legal indexation rule either does not exist or differs from the rules applied in the projection.

Table 8 - Indexation rules applied in the projection exercise (when different from the legal rules)

	Public pensions					Occupational	Private pension	
	Minimum pension / social allowance	Old-age pensions	Early retirement pensions	Disability pensions	Survivors' pensions		Mandatory private scheme	Voluntary Pension scheme
BE	CPI + LSA	CPI + LSA	CPI + LSA	CPI + LSA	CPI + LSA	-	-	-
CZ	NI	CPI + 1/3 RI	CPI + 1/3 RI	CPI + 1/3 RI	CPI + 1/3 RI	-	-	-
EL	CPI + 0.5%	CPI + 0.5%	CPI + 0.5%	CPI + 0.5%	CPI + 0.5%	-	-	-
ES	6% short term, up to 2035 convergence to CPI. After 2035 CPI.					-	-	-
IE	NI + sust	NI	NI + sust	NI + sust for MT schemes	NI + sust for MT schemes	NI	-	-
IT	GDP per capita					-	-	-
LT	RI	RI	RI	RI	RI	-	-	-
NL			-			70% NI & 30% CPI	-	-
PL						-	CPI + 20% NI	-
PT						CPI for DB 1st pillar	-	-
SI						NR	-	-
SK	NI					-	CPI	-
FI	50 % CPI + 50 % to NI as of 2011					-	-	-
SE	NI	NI	NI	NI	NI	-	-	-

Source: Commission services, EPC.
Note: Details concerning indexation rules in Member States can be found in Annex 8.3.

Key:

NR	...	No rule exists
RI	...	Real income growth
NI	...	Nominal income growth
GDP	...	GDP growth
CPI	...	CPI inflation
LE	...	Adjustment to life expectancy.
LSA	...	Living standard adjustment
COLA	...	Adjustmentd to cost of living
size	...	Adjusted by a pension size
sust	...	Additional adjustment due to other mechanisms such as a sustainability factor, balancing mechanism, life expectancy, value of a pension point, maintenance of relativity between means-tested and contributory pension, etc.
re-exam(X)	...	Reexamination of pension value every X years
min	...	At least

Pension arrangements are very diverse in the EU Member States, due to both different traditions on how to provide retirement income, and by Member States being in different phases of the reform process of pension systems. Table 9 shows the statutory retirement age in 2008 and the effective exit age from the labour market in 2001 and in 2007. In the large majority of countries, the average exit age is lower than the statutory retirement age. In many

cases, this is due to the existence of early retirement schemes and/or other government programmes that provide income support to older people before they reach the official retirement age. Also, in a number of countries (like Finland, Sweden) the retirement age is flexible, with built-in incentives to remain active in the labour market. For instance, retiring at say age 62 would lead to a reduction of a certain amount compared with a typical case of 65, while continuing working until say 68 would lead to an increase of a certain amount.

Table 9 - Statutory retirement age and average exit age

	Exit age						Statutory retirement age	
	TOTAL		MALE		FEMALE		MALE	FEMALE
	2001	2007	2001	2007	2001	2007	2008	2008
BE	56.8	61.6	57.8	61.2	55.9	61.9	65	64
BG	58.4	61.2	62.5	64.1	56.8	59.7	63	59y 6 m
CZ	58.9	60.7	60.7	62	57.3	59.4	61y 10m	56 - 60
DK	61.6	60.6	62.1	61.4	61	59.7	65	65
DE	60.6	62	60.9	62.6	60.4	61.5	65	65
EE	61.1	62.5					63	60y 6m
IE	63.2	64.1*	63.4	63.5*	63	64.7*	66	66
EL		61		61.6		60.5	65	60
ES	60.3	62.1	60.6	61.8	60	62.4	65	65
FR	58.1	59.4	58.2	59.5	58	59.4	60	60
IT	59.8	60.4	59.9	61	59.8	59.8	65	60
CY	62.3	63.5					65	65
LV	62.4	63.3					62	62
LT	58.9	59.9*					62.5	60
LU	56.8						65	65
HU	57.6	59.8**	58.4	61.2**	57	58.7**	62	62
MT	57.6	58.5*					61	60
NL	60.9	63.9	61.1	64.2	60.8	63.6	65	65
AT	59.2	60.9	59.9	62.6	58.5	59.4	65	60
PL	56.6	59.3	57.8	61.4	55.5	57.5	65	60
PT	61.9	62.6	62.3	62.9	61.6	62.3	65	65
RO	59.8	64.3*	60.5	65.5*	59.2	63.2*	63	58
SI		59.8*					63	61
SK	57.5	58.7	59.3	59.7	56	57.8	62	55 - 59
FI	61.4	61.6	61.5	62	61.3	61.3	62 -68	62 - 68
SE	62.1	63.9	62.3	64.2	61.9	63.6	61-67	61- 67
UK	62	62.6	63	63.6	61	61.7	65	60
NO	63.3	64.4	63	64.1	63.6	64.7	62	62
EU27	59.9	61.2	60.4	61.9	59.4	60.5	:	:
EA	59.9	61.3	60.2	61.6	59.6	60.9	:	:
EA12	59.9	61.3	60.2	61.6	59.6	60.9	:	:
EU15	60.3	61.5	60.7	62	59.9	61.1	:	:
EU10	57.6	59.6	58.8	61.3	56.6	58.3	:	:
EU25	59.9	61.2	60.4	61.9	59.4	60.6	:	:

Source: Average Exit age (Eurostat), information provided by AWG delegates
Joint Commission-Council report on SPSI (2009)
Note: * represents 2006 and ** represents 2005

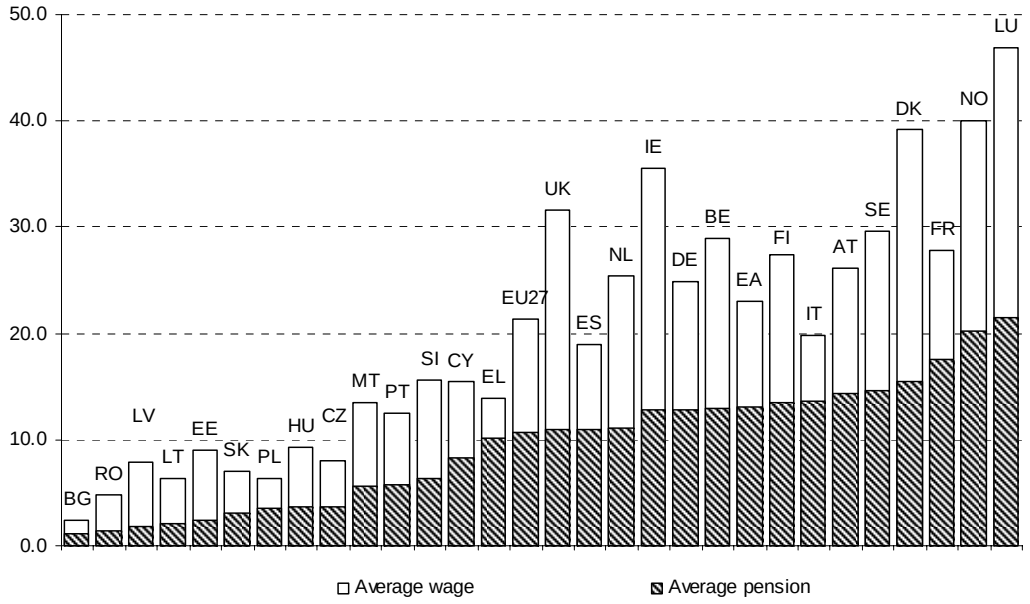
Source: Commission services, EPC.

In 2007, there was a wide difference in the average public pension benefit ranging from less than 3000 euro or less per year (Bulgaria, Romania, Latvia, Lithuania and Estonia) to 14000 euro or more per year (Austria, Sweden, Denmark, France, Norway and Luxembourg). These wide differences reflect that average wage income levels are very different (ranging from less than 5000 euro per year to more than 25000 euro per year) and the diversity of pension systems and arrangements (see Graph 43).[27]

[27] In some coutries (e.g. Slovenia) pension benefits are not subject to taxation so gross pensions equal net pensions.

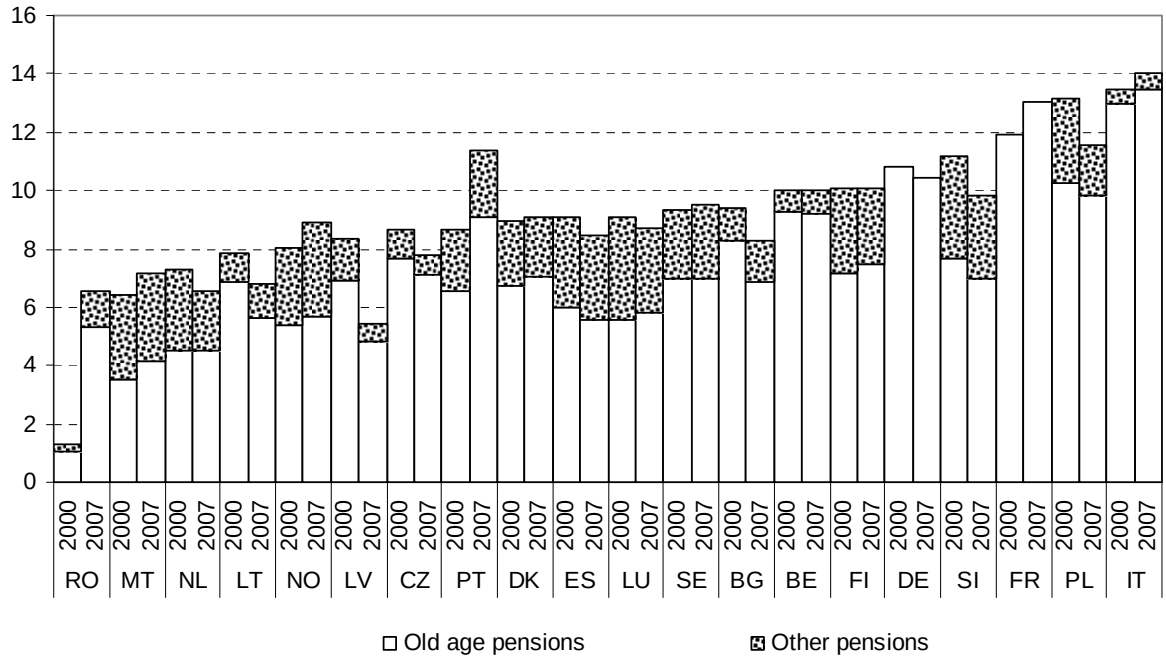
Graph 44 shows the public pension expenditure in 2000 and 2007. In the EU27, public pension expenditure was about 10.1% of GDP in 2007, see Table 50. Compared with 2000, the pension/GDP ratio has increased in eight countries (Romania, Norway, Malta, Portugal, Denmark, Sweden, France and Italy) over this period.

Graph 43 - Average gross wage and average gross public pension benefit in 2007 (1000 euros)



Source: Commission services, EPC.

Graph 44- Average Gross public pension expenditure in 2000 and 2007 (% of GDP)



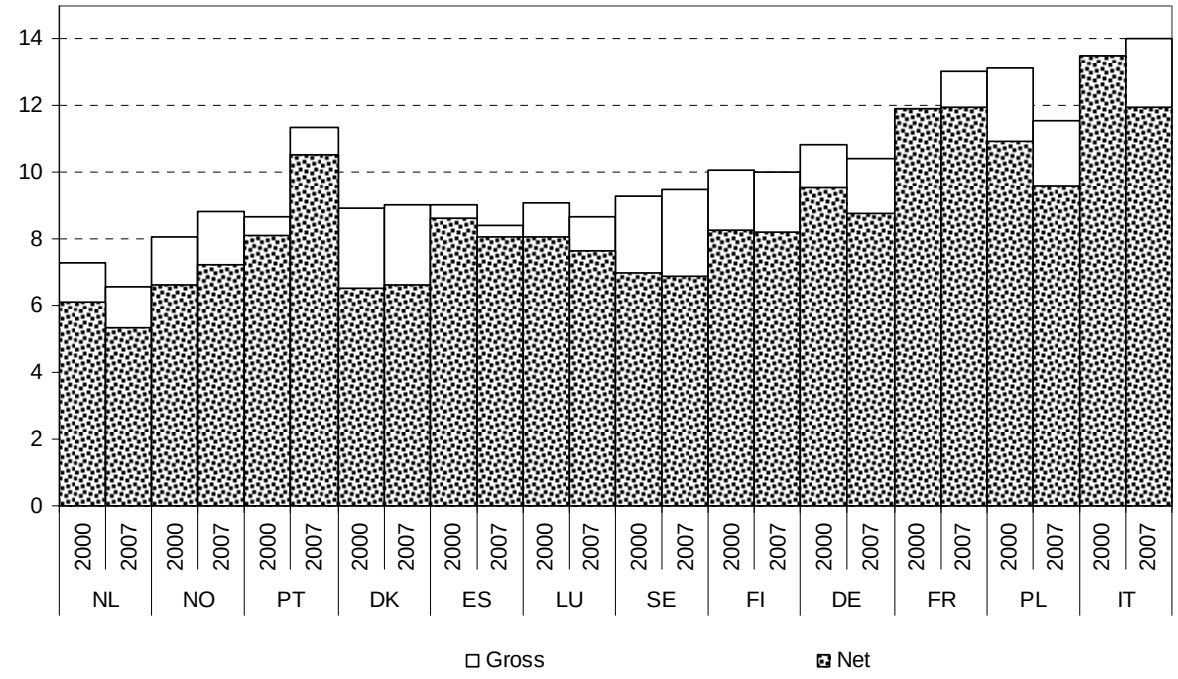
Source: Commission services, EPC.

Note: The graph presents only the countries which provided information in both years.

A very large difference in the level of public pension spending can be observed in 2007 among Member States. It ranges from 6% of GDP or below in Latvia, Lithuania and Ireland to 14% in Italy. In many Member States (Denmark, France, Hungary, Italy, Malta, Norway, Portugal, Romania and Sweden), pension expenditure has increased faster than GDP, but in some others (Belgium, Bulgaria, the Czech Republic, Germany, Spain, Finland, Lithuania, Luxembourg, Latvia, the Netherlands, Poland, Slovenia) it has increased at a slower pace.

Half of Member States (the Netherlands, Spain, Luxembourg, Norway, Denmark, Sweden, Finland, Germany, Portugal, Poland, Austria, France and Italy), has also provided information on government tax revenues from public and private pensions. However, the incomplete coverage hampers a comparable examination across the EU. The presence of tax revenues from public pensions means that the net public pension expenditure is lower. However, in most countries the size of these taxes is rather small, on average of the order of 1 ½ p.p. of GDP in 2000 and 2007 (see Graph 45).

Graph 45- Gross and net public pension expenditure in 2000 and 2007 (% of GDP)



Source: Commission services, EPC.

Note: The graph presents only the countries which provided data for both years and a tax on pension is non zero. France and Italy did not provide data for 2000.

In some countries, tax revenues from private pensions are large (e.g. in the Netherlands, Denmark). This is mainly due to the accumulation of pension funds.

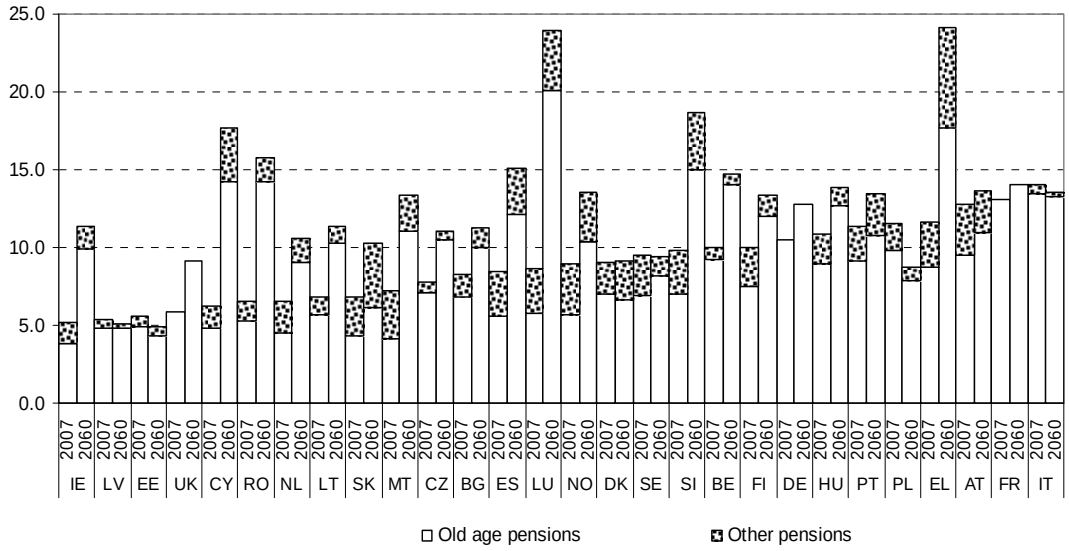
A number of countries have implemented systemic pension reforms, shifting part of the previously public pillar to a mandatory funded private pillar (Bulgaria, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Sweden). At present, these private pillars are making very small disbursements, but their importance will increase in the future. Private pensions are generally small today; see Graph 48 in the following section.

2.4. Pension expenditure projections

2.4.1. Public pensions

For the EU, the projections show an increase in the public pension expenditures of 2.4 p.p. of GDP over the period 2007-2060. For the euro area, the increase is projected to be slightly higher, at 2.8 p.p. of GDP. There is a very large diversity across Member States as regards the projected change in public pension expenditure, ranging from a decline of -2.8 p.p. of GDP (Poland) to an increase of 15.2 p.p. of GDP (Luxembourg).

Graph 46 – Gross old-age and other public pension expenditure in 2007 and 2060 (% of GDP)



Source: Commission services, EPC.

Note: The definitions of Old-age and Other pensions are provided in *Annex 8.5.*

Definitions used in the projections:

France: Disability pensions for individuals below a retirement age are included in health-care expenditure. After the minimum retirement age (60) disability pensions are covered by the public pension scheme. Survivors' pensions for all age are covered by the public pension expenditures.

UK: Benefits paid to disabled persons below state pension age are not included in the projection, but disability benefits for persons above state pension age are included in public pension expenditure. The UK does not have survivor pensions.

Ireland: "Old-age and other public pension expenditure" includes in addition the pension expenditure of public service occupational pension schemes.

Hungary: the projection of old-age and early pensions include an estimation of the old-age allowance (a minimum pension in Hungary), which is not a part of Hungarian authorities pension model at this stage. This projection contributes with 0.4 p.p. of GDP to the increase in old-age and early pensions ratio over the period 2007-2060. In addition, a part of the increase in gross pension expenditures from 2007 to 2060 in Hungary is explained by the introduction of pension taxation as of 2013 and so does not reflect an increase in expenditures effectively burdening the budget. Taxes on public pensions in 2060 are calculated to be 0.7% of GDP.

The lion's share of the projected increase in public pension expenditure is due to the increase in old-age and early pensions. Old-age and early pensions are projected to increase by 2.4% of GDP between 2007 and 2060 in the EU. In the euro area, the increase is projected to be slightly higher at 2.6% of GDP. A smaller increase is projected for other pension expenditure, mainly disability and survivor pensions, increasing only slightly by 0.1. of GDP in the euro area.

In three Member States (Greece, Cyprus, Luxembourg) the public pension expenditures are projected to increase by more than 10 p.p. of GDP. In other five Member States (Malta, Spain, Romania, Ireland and Slovenia) spending to GDP will grow between 5 to 10 p.p. On

the contrary in case of Denmark, Sweden, Latvia, Italy, and Estonia the ratio either stays at or drops down below the initial (2007) level. For the majority of the Member States the change of the ratio is below 5%. Some countries are prospecting a decrease over the entire period of projections (Poland, Estonia, Denmark, Italy and Latvia), although this masks an increasing pattern over part of the projections period (such as in the case of Italy). As regards spending on disability and survivor pensions, they are projected to decrease in the majority of countries. Only in 8 Member States (Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, the UK and Norway) is it projected to increase, although only slightly.

In sum, EU Member States are: (i) reducing the generosity of public pension schemes so as to make these programmes financially more sustainable in view of the demographic trends; (ii) pushing up the statutory retirement age in a gradually phased way over the long-term for old-age pensions; (iii) restricting access to early retirement schemes and strengthening the incentives to prolong working lives, which leads to a containment of the increase in old-age and early pensions spending. Also, the projections show no increase in disability and survivor pensions, embodying an assumption of lower take-up rates of these transfers over the projection period.

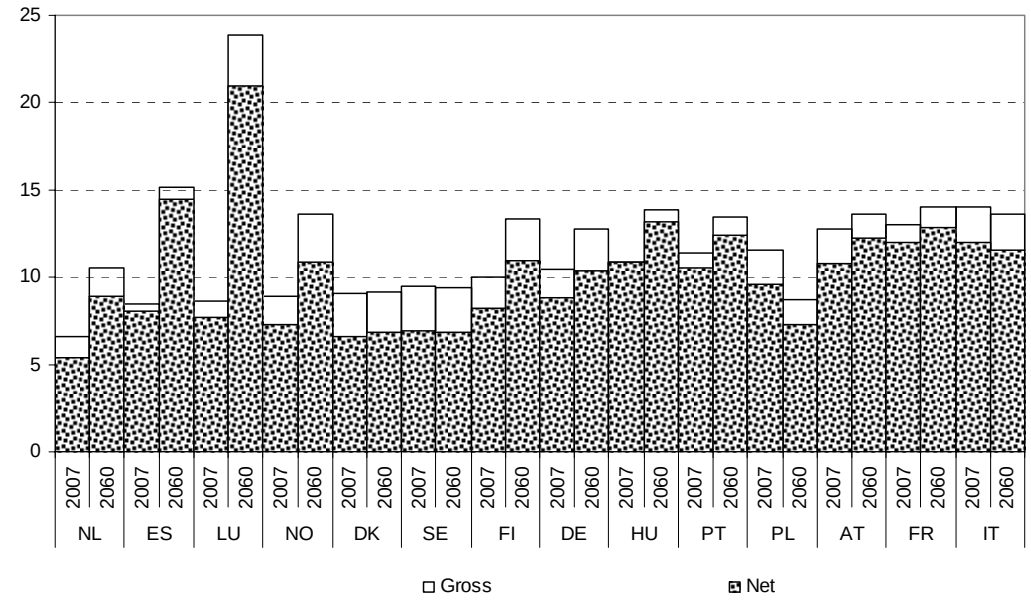
Gross versus net public pension expenditure

For a few Member States (the Netherlands, Spain, Luxembourg, Norway, Denmark, Sweden, Finland, Germany, Portugal, Poland, Austria, France and Italy), projections on government tax revenues from public and private pensions were also provided. However, the lack of a complete coverage of these items hampers a comparable examination across the EU. The presence of taxation revenue of public pensions means that the net public pension expenditure is lower. In most countries, the projected increase over the period 2007-2060 of these taxes is rather small (see Graph 47).

In some countries, the projected increase in taxes on private pensions is considerably larger, (e.g. in the Netherlands, Denmark). This is mainly due to contribution to private pensions being tax-exempt, while the disbursement of the pension being subject to tax. Also, private funded pension schemes are in a build-up phase in that contributions still outweigh disbursements, and disbursements will therefore increase in the future.[28] The size of these private funds and the taxation regime for those pensions (savings) will determine the size of the potential increase in the related tax receipts and hence the contribution to the future fiscal position of the government.

[28] Annex: 'Assets in public pension schemes as a share of GDP' presents a projected value of assets in public pension funds.

Graph 47 - Gross and net public pension expenditure in 2007 and 2060 (% of GDP)



Source: Commission services, EPC.

Note: The graph presents only the countries which provided data for both years and a tax on pension is non zero.

Hungary: A part of the increase in gross pension expenditures from 2007 to 2060 in Hungary is explained by the introduction of pension taxation as of 2013 and so does not reflect an increase in expenditures effectively burdening the budget. Taxes on public pensions in 2060 are calculated to be 0.7% of GDP.

2.4.2. Private pensions

In light of fiscal pressures arising from the demographic trends, many countries have taken steps to encourage the creation of occupational and private pension schemes.[29] As a result, the role of these schemes has recently increased. Still, the role of privately managed pension schemes is currently rather limited, as the major part of pension income is provided by public pension schemes. But, as shown in Graph 48, the provision of pension income by private pension funds is expected to increase in the near future.[30]

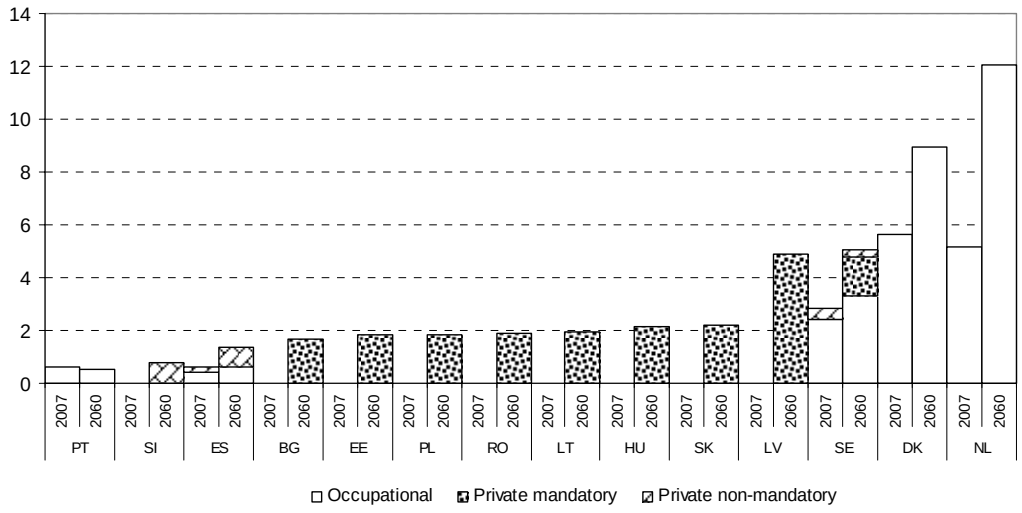
In general, net contributions to occupational and private pension funds are increasing over time and the most of occupational and private funds are still "a long way" from being mature funds. In other words, at this moment there are only a few countries with large numbers of pensioners or people who will retire soon and will rely to a substantial part on funded pensions. Thus, in most cases, contributions to the private funds continue to exceed drawings from now-retired members, meaning there should be no need for the funds to liquidate under current difficult conditions any of their investments and sell assets at reduced prices, (see

[29] Due to a lack of information concerning development of occupational and private schemes, only a few countries provided a projection of relevant variables. Consequently, this section combines the results provided by Member States in the pension questionnaire, in the country fiche and additional information provided by DG EMPL, in particular the 2009 SPC report. On top of that, the Netherlands provided additional information concerning the development of the privately managed funds' financial position with respect to the latest development and the impact of the financial crisis.

[30] Graph 48 shows the private pension projections by pillar (provided only by very few Member States). It should be pointed out that the graph is not comprehensive; private pensions may exist in a country, but it was not possible to provide a projection (see the note to the graph for detailed information). See also Table A61 in statistical annex: "Assets in all pension schemes as a share of GDP', which presents the current and projected value of assets in all public, occupational, private mandatory and voluntary pension schemes.

Graph 48 and Graph 49). In 2007 private pension scheme covered more than half of the retired people in Denmark (56%) and the Netherlands (59%). In Sweden the coverage by private pension schemes is 20%.

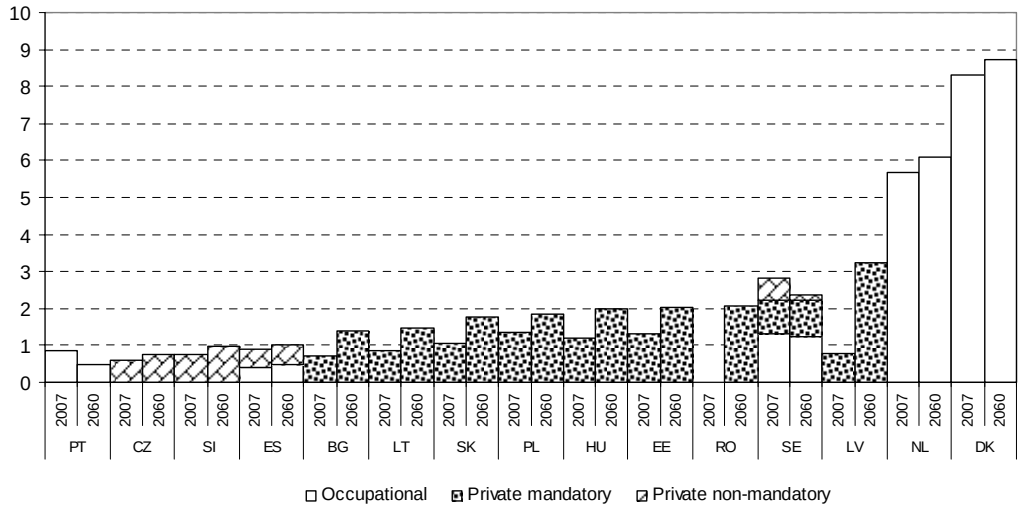
Graph 48 - Expenditure of non-public occupational, private mandatory and non-mandatory pension (% of GDP)



Source: Commission services, EPC.

Note: The graph presents only the countries which provided data for other pension schemes and its value is non zero. In Slovakia, the private pension pillar changed from mandatory to voluntary in 2008.

Graph 49 - Contributions to occupational, private mandatory and non-mandatory pension (% of GDP)



Source: Commission services, EPC.

Note: The graph presents only the countries which provided data for other pension schemes and its value is non zero.

Concerning pension expenditure of occupational pension funds, only 5 Member States (Denmark, Spain, the Netherlands, Portugal and Sweden) provided projections, while 9 Member States (Greece, the Czech Republic, Estonia, Hungary, Lithuania, Latvia, Malta, Poland and Slovakia) have indicated that they do not have occupational pension schemes. The presence of a high coverage of 2nd pillar pensions since a long time in e.g. Sweden, Denmark, the Netherlands provides for a sizable topping-up of the public pillar. In Denmark, pension

expenditures paid by occupational pension schemes were 5.6% of GDP in 2007 and are expected to increase to 8.9% of GDP in 2060. An even higher increase is projected for the Netherlands where occupational pensions are envisaged to rise from 5.2% of GDP in 2007 to 12.1% GDP in 2060. For Sweden and Portugal the current level of occupational pension expenditure to GDP is relatively low (below 2.5% of GDP) and is projected to increase at most by 1.5 p.p. of GDP.

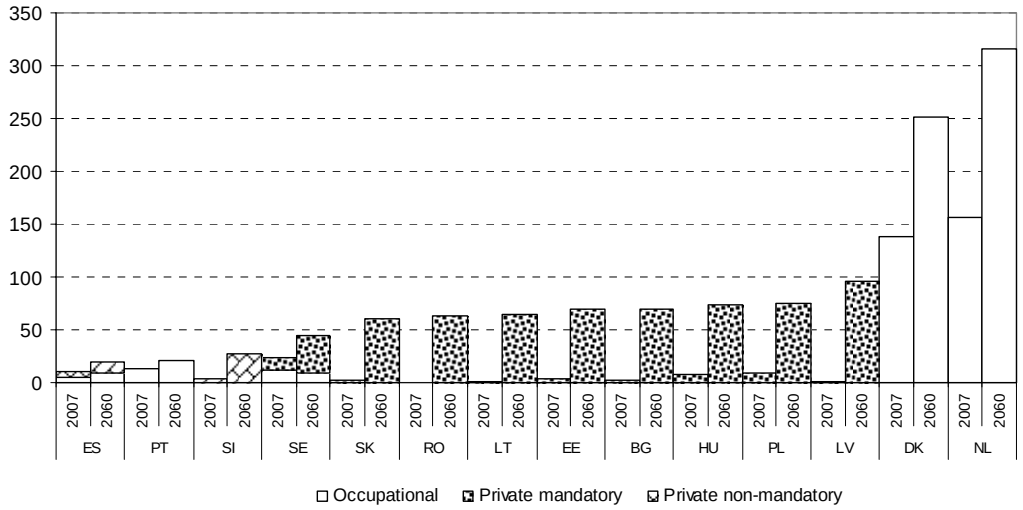
Several countries have made private pension mandatory

A number of countries have implemented systemic pension reforms, shifting part of the previously public pillar to a mandatory funded private pillar (Bulgaria, Germany, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Sweden). For private mandatory pension expenditure, 8 Member States (Bulgaria, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia and Sweden) have provided projections and 8 Member States (Belgium, Denmark, Greece, Spain, the Netherlands, Portugal, the Czech Republic and Malta) report that such pensions do not exist. At present, these private pillars are making very small disbursements, but their importance will increase in the future (see Graph 48). As these funds have not started to pay out pensions, only Hungary and Sweden provided a level of pension expenditures by mandatory private funds for 2007, although in comparison to GDP the value is close to zero. On the contrary, in 2060, the mandatory private pensions are projected to provide a considerable top-up of the public pensions in these countries. The level of pension to GDP ratio in case of private mandatory schemes in 2060 is projected to vary from 1.4% GDP in Sweden to 4.8% in Latvia.

As regards private non mandatory pension funds, while the legislative framework for has been set-up in all EU countries, the projections have been provided only by Spain, Sweden and Slovenia. Based on the projection, under prudent assumptions and no policy change as for the rest of the exercise it seems that voluntary pension savings contribute and are projected to contribute only marginally to total pensioners' income. Concretely, in the case of Spain and Sweden the current voluntary pension expenditure to GDP in 2007 reach only 0.2% and 0.4% respectively. In 2060, the projected level is expected to reach 0.7%, 0.3% and 0.8% of GDP in case of Spain, Sweden and Slovenia.

Both occupational and private schemes are to a very large part funded, i.e. individuals accumulate their savings in the funds for a later stage of their life cycle. When reaching the retirement age, the value of the accumulated assets is paid to the individuals either in the form of an annuity, or at once, or in some other type of payment. Graph 50 shows the value of accumulated assets in both occupational and private pension schemes in 2007 and 2060 as projected by some of the Member States.

Graph 50 - Occupational, private mandatory and non-mandatory pension assets (% of GDP)



Source: Commission services, EPC.

Note: The graph presents only the countries that provided data for other pension schemes.

The value of pension income coming from the pension funds is affected not only by the contributions made, but also by developments in the financial markets. As a consequence, the value of the pension income may diminish in case of an adverse shock to asset prices. Still, the design of the pension scheme can limit the final effect of the shocks on the value of the fund's assets. The value of pension wealth at retirement is affected by many factors, nonetheless the distinction between defined benefit and defined contribution schemes seems to be of high relevance. The value of future pension income in a defined benefit scheme may also be affected by negative economic shocks. Still, within this type of scheme, the risks can be spread between more individuals over the longer period. On the other hand, the value of pension income is affected much more in a defined contribution scheme. In particular, part of the risk related to volatility of the value of financial assets is transferred to individuals covered by the defined contribution scheme.[31]

Currently, occupational pension schemes are mostly defined benefit schemes. However, many of these have recently switched towards defined contribution schemes. Private pension funds were constructed as defined contribution schemes from the beginning. An increasing role of defined contribution schemes has and will have important implications for the pensioners' asset value depending on the rate of return.

The financial crisis has reduced the value of private pension funds

Since private pensions are to a very large part funded, their contribution to future retirement income will depend on the rate of return on those funds in addition to the contributions made. The assumption made on the rate of return, being uncertain, crucially determines the future pension benefit. Moreover, in periods with large changes in equity prices, the starting point in terms of asset position can have strong lasting effects. The following box discusses recent developments in private pension funds in a few countries with relatively developed schemes.

[31] See also the 2009 Joint Report on Social Protection and Social Inclusion (COM (2009) 58 final) and its accompanying document (SEC (2009) 141) for a discussion of the role of parameters affecting stability and adequacy of pension income in occupational and private pension schemes.

Box: The financial crisis and funded pension schemes in selected countries

Ireland: Ireland is one of the few countries with a strong reliance on private funded pensions for those retiring today. Most of the defined benefit funds are currently in a deficit and most of the defined contribution funds realise a negative return on assets. The average fund return in the 12 months to the end of January was substantially reduced.

The Netherlands: Dutch defined benefit pension funds guarantee security to members by a funding buffer with funds normally targeting assets to be 130% of liabilities. If the funding ratio between assets and nominal, that is non indexed, liabilities ratio fall below 130%, measures are to be taken to restore the funding position within 15 years and for funds below 105%, they must have a plan to reach 105% within 3 years, before reaching 130%. The 3 year time span has recently been temporarily extended to 5 years. The ratio (or capitalization rate) of pension funds has declined from 140% of nominal pension rights at the end of 2007 to a February 2009 value of around 90%.

Denmark: In Denmark, value of assets in the private funds has decreased from around 138 percent of GDP in 2007 to an estimated 119 percent of GDP in 2008.

Sweden: The most important element of the Swedish pension system is pensions from the Notional Defined Contribution (NDC) scheme, backed by a reserve fund (the AP funds). If the NDC pension system is in deficit, a so-called automatic balancing mechanism is triggered, leading to a lowering of the indexation of the pensions until a positive financial balance is restored. The value of the assets in the PPM system, the mandatory funded part of the Swedish pension system, has dropped by 34.5% between end-2007 to end-2008. As the system is introduced newly the effects on paid out pensions is very limited.

United Kingdom: The UK has a long history of private pension provision. Over the past year weaker equities reduced asset values by 14.5%, whilst lower bond yields resulted in a 6.5% increase in aggregate liabilities. Consequently, approximately 90% of existing Funds are in deficit.

Source: Contributions from AWG members, Commission services.

2.5. Drivers of pension expenditure

2.5.1. Peaks and troughs in public pension expenditure

In addition to the projected changes in public pension expenditure over the entire projection period up to 2060, it is interesting to analyse the dynamics of the projections. Even if the number of older people generally increases throughout the projection period up to 2060, it is not the case for every country, and it is does not necessarily lead to a monotonic increase in the public pension/GDP ratio throughout the projection period. Despite the differences between Member States, the common trend is clear. As Europe's population rises it will lead to considerable increases in pension expenditure across the continent with only a few exceptions. Table 10 shows the projected peaks and troughs in the public pension expenditure ratio.[32]

In 10 countries (the Czech Republic, Germany, Greece, Latvia, Lithuania, Luxembourg, Hungary, the Netherlands, Austria and Slovakia) the public pension ratio is decreasing over the coming two decades, reaching the lowest level in the period before 2030, but then it increases to reach a peak at the end of the projection period in 7 of them (the Czech Republic, Germany, Lithuania, Hungary, the Netherlands, Slovakia, Luxembourg) or before in 3 of them (Greece, Austria and Latvia). In 12 countries (Belgium, Denmark, Estonia, Spain, France, Italy, Latvia, Poland, Portugal, Slovenia, Finland, Sweden) the public pension ratio

[32] Please note that for the rest of this chapter public service occupational expenditure is not included for Ireland. This is due to the integration of the schemes which means the decomposition can only be carried out accurately on the social security element.

peaks before the end of the projection period. In another 7 countries (Bulgaria, Ireland, Cyprus, Malta, Norway, Romania, and the UK) the public pension ratio increases over the entire projection period.

Table 10 - Projected trough and peak years for pension expenditure (% of GDP)

	Start year 2007	Trough year (before peak)	Trough value	Decreas from 2007 to trough	Peak year	Peak value	Increase from trough to peak	End year 2060	Change 2007 - 2060
BE	10.0				2056	14.8		14.7	4.8
BG	8.3							11.3	3.0
CZ	7.8	2016	6.8	-1.0				11.0	3.3
DK	9.1				2020	10.6		9.2	0.1
DE	10.4	2013	10.0	-0.5				12.8	2.3
EE	5.6				2009	6.5		4.9	-0.7
IE	4.0							8.6	4.6
EL	11.7	2009	11.6	-0.1	2055	24.3	12.7	24.1	12.4
ES	8.4				2053	15.6		15.1	6.7
FR	13.0				2036	14.5		14.0	1.0
IT	14.0				2041	15.6		13.6	-0.4
CY	6.3							17.7	11.4
LV	5.4	2013	4.7	-0.7	2038	6.1	1.4	5.1	-0.4
LT	6.8	2012	6.5	-0.3				11.4	4.6
LU	8.7	2010	8.6	-0.1	2059	24.2	15.6	23.9	15.2
HU	10.9							13.8	3.0
MT	7.2							13.4	6.2
NL	6.6	2008	6.3	-0.2				10.5	4.0
AT	12.8	2010	12.7	-0.1	2046	14.0	1.3	13.6	0.9
PL	11.6				2008	11.8		8.8	-2.8
PT	11.4				2053	13.6		13.4	2.1
RO	6.6							15.8	9.2
SI	9.9				2058	18.6		18.6	8.8
SK	6.8	2020	6.3	-0.5				10.2	3.4
FI	10.0				2033	14.0		13.4	3.3
SE	9.5				2009	9.7		9.4	-0.1
UK	6.6							9.3	2.7
NO	8.9	2008	8.8	-0.1				13.6	4.7
EU27	10.1							12.5	2.4
EA	11.0				2053	13.9		13.8	2.8

Source: Commission services, EPC.

Box: Decomposition of pension expenditure

In order to analyse the dynamics and the factors of the pension spending to GDP ratio, the following decomposition is used:

$$\frac{Pension\ \ Exp.}{GDP} = \overbrace{\frac{Population\ \ 65+}{Population\ \ 15-64}}^{Dependency\ \ Ratio\ \ Effect} \times \overbrace{\frac{Number\ \ of\ \ Pensioners}{Population\ \ 65+}}^{Coverage\ \ Ratio\ \ effect}$$
$$\times \overbrace{\frac{Population\ \ 15-64}{Working\ \ People\ \ 15-64}}^{Employment\ \ Rate\ \ Effect} \times \overbrace{\frac{\frac{Average\ \ Pension}{GDP}}{Hours\ \ Worked\ \ 15-71}}^{Benefit\ \ Ratio\ \ Effect}$$
$$\times \underbrace{\frac{Working\ \ People\ \ 15-64}{Hours\ \ Worked\ \ 15-71}}_{residual}$$

In particular, we analyse the percentage change in the public pension expenditure to GDP ratio. The overall percentage change can be expressed as a sum of the contribution of the four main factors, i.e. the dependency ratio contribution, the coverage ratio contribution, the employment rate contribution and the benefit ratio contribution.

The dependency ratio effect/contribution quantifies the impact of the change in the old age dependency ratio on the pension to GDP ratio. The dependency ratio is defined as a ratio of the population aged over 65 to the population aged from 15 to 64. An increase in this ratio indicates a higher proportion of older individuals with respect to working age population, i.e. an ageing population. As the dependency ratio increases, the pension to GDP ratio moves in the same direction.

The coverage ratio effect is defined as the number of pensioners of all ages to population over 65 years. Development in the coverage ratio provides information about developments of the effective exit age and the percentage of population covered. As the coverage ratio increases, the pension expenditure to GDP ratio increases as well.

The employment rate effect is defined as a ratio of population aged 15-64 to the number of working people aged 15-64 (i.e. 1/employment rate). As the employment rate increases, the ratio of pension expenditure to GDP falls down.

The benefit ratio effect indicates the development of the relative value of the average pension (public pension spending / number of pensioners) with respect to the average wage (proxied by the change in the GDP per hours worked).

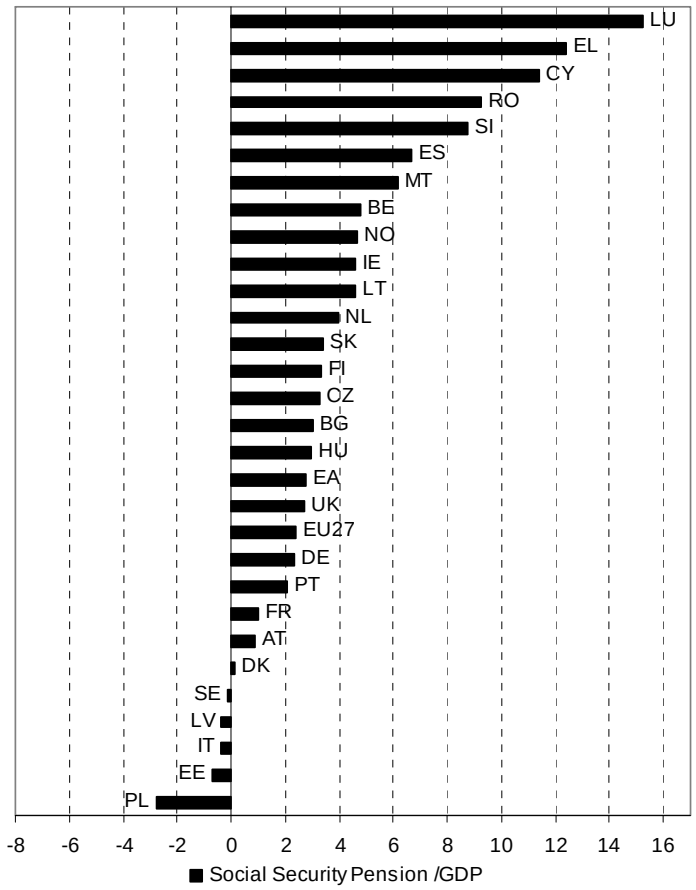
2.5.2. Decomposition of the projected pension expenditure

In order to shed light on the main drivers behind these dynamics, the decomposition of pension expenditure to GDP into its main components as outlined in the Box above is made.

Graph 51 shows the pension to GDP increases over the whole projection horizon (2007 – 2060). It should be recalled that the ratio can be pushed downwards due to a shift from public schemes towards private mandatory schemes as in Bulgaria, Estonia, Latvia, Hungary, Poland, Slovakia and Sweden.[33]

[33] In case of Luxembourg, the pension projection is affected by the considerable number of cross border workers who will in the future years receive a pension from the Luxembourg social security scheme, but at the same time will not be registered as Luxembourg inhabitants. Due to this peculiar circumstance, Luxembourg can not be, in same cases, strictly compared with other Member States. Thus, in some of our analysis Luxembourg is treated as

Graph 51 - Change in the Public Pension/GDP over 2007-60 (in percentage points)



Source: Commission services, EPC.

In the case of many countries, as already shown in Table 10, the evolution of the pension to GDP ratio is not increasing monotonically from 2007 to 2060. Indeed, about half of the countries, reaches the peak before 2060. Thus, the analysis of the development in the sub periods of the projection horizon can provide additional information on the main drivers of changing trends over time. Table 11 shows changes in the public pension spending to GDP ratio in five sub periods of the whole projection horizon for all Member States.

an outlier. Whenever the conclusions seem to be affected by country specific situation, this is highlighted in the text.

Table 11 - Development of the ratio of public pension expenditure to GDP (in percentage points)

	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
BE	1.8	2.0	0.8	0.1	0.0	4.8
BG	0.1	0.2	0.9	1.3	0.5	3.0
CZ	-0.9	0.3	1.3	1.7	0.9	3.3
DK	1.6	-0.1	-0.2	-0.8	-0.4	0.1
DE	0.0	1.1	0.5	0.2	0.5	2.3
EE	0.3	-0.3	-0.2	-0.1	-0.4	-0.7
IE	0.6	0.8	1.0	1.6	0.6	4.6
EL	1.5	3.9	4.4	2.6	0.1	12.4
ES	1.1	1.3	2.4	2.2	-0.3	6.7
FR	0.6	0.6	0.2	-0.2	-0.2	1.0
IT	0.1	0.7	0.8	-0.8	-1.1	-0.4
CY	2.6	1.9	2.1	2.7	2.2	11.4
LV	-0.3	0.7	0.3	-0.3	-0.7	-0.4
LT	0.1	1.3	0.9	1.3	1.0	4.6
LU	1.2	4.3	4.3	3.7	1.8	15.2
HU	0.2	0.0	1.2	1.0	0.6	3.0
MT	2.1	0.1	1.2	1.4	1.4	6.2
NL	1.2	1.5	1.1	-0.1	0.3	4.0
AT	0.3	0.8	0.2	0.0	-0.4	0.9
PL	-1.8	-0.3	-0.2	-0.1	-0.3	-2.8
PT	1.0	0.2	-0.1	0.8	0.1	2.1
RO	2.3	1.6	2.1	2.3	1.0	9.2
SI	1.2	2.2	2.9	2.1	0.4	8.8
SK	-0.5	1.0	1.0	1.1	0.8	3.4
FI	2.6	1.3	-0.3	-0.4	0.1	3.3
SE	-0.1	0.1	-0.1	-0.3	0.3	-0.1
UK	0.3	0.7	0.4	0.0	1.2	2.7
NO	2.6	1.2	0.7	-0.1	0.3	4.7
EU27	0.4	0.9	0.7	0.2	0.2	2.4
EA	0.5	1.1	0.9	0.4	-0.1	2.8
EA12	0.5	1.1	0.9	0.3	-0.1	2.7
EU15	0.4	0.9	0.7	0.2	0.1	2.4
EU10	-0.9	0.2	0.6	0.8	0.3	1.0
EU25	0.3	0.9	0.7	0.2	0.2	2.3

Source: Commission services, EPC.

Over the period 2007-2020 the increase in the public pension spending as percentage of GDP in the EU27 is rather low (+0.4 p.p). The minimum and the maximum change over 2007-2020 is registered by Poland (-1.8 p.p) and Cyprus, Finland, Norway (+2.6 p.p) respectively. Over the period 2020-2030, the results deteriorate considerably, i.e. the EU27 average increases by +0.9 p.p, with a maximum increase (of +4.3 p.p.) in Luxembourg.[34] In the following decade (2030-2040), the dynamic of the spending is comparable to the previous decade (2020-2030). The EU27 average does not grow as much as during the previous decade (+0.7 p.p) with a minimum increase in Finland (-0.3 p.p.) and a maximum in Greece (+4.4 p.p). The situation improves noticeably during the last two decades of the projection horizon. During 2040-2050 the EU27 average change is just + 0.2 p.p with a maximum increase in Luxembourg (+ 3.7 p.p) and a minimum in Italy (-0.8 p.p.). This tendency is even more pronounced during 2050-2060 when the increase in the EU27 is only +0.17 p.p, with a maximum value in Cyprus (+2.2 p.p) and a substantial drop in Italy (–1.1 p.p.).

To sum up, over the next fifty years, public pension spending (as percentage of GDP) is not projected to grow completely evenly in the EU Member States. Furthermore, it seems that the development of the ratio will change more or less every twenty years. In particular, the time span up to 2020 can be characterised by a more modest increase in the public pension to GDP ratio than over the following twenty years. Finally, the last twenty years of the projection

[34] For Luxembourg, the projected change in the social security pension expenditure to GDP may be biased upwards due to country specific situation, i.e. the cross border workers effect.

period (and especially 2050-60) is charaterised by a less dynamic increase in the public pensionratio. The factors behind these different trends will be discussed below by using the decomposition described in the box "Decomposition of pension expenditure".

The decomposition of the overall change in the public pension spending to GDP ratio over the period 2007-2060 is provided in Table 12. In particular, the table demonstrates the contribution of each of the four main factors to the change in the pension/GDP ratio. As already stressed, the main contributor to the increase in the ratio of pension to GDP is represented by demographic factors (captured by the old age dependency ratio), ranging from +4.2 p.p. to +13.7 p.p. in the case of the UK and Slovenia respectively. It needs to be stressed that for many Member States, the increase in the old age dependency ratio is the only factor pushing upward the pension to GDP ratio, while the remaining evolution of the other three factors contribute to keep down the evolution in the pension/GDP ratio. However, compared to the remaining three factors, in absolute terms the upwards contribution of the ageing population is the largest one. As a result, the significant worsening effect of demographic factors is only partly offset by projected higher employment, lower coverage rate and lower benefit rate.

In general, the projected increase in the employment rate contributes only to a very limited extent to to keep down the pension/GDP ratio in the majority of Member States,[35] being less that 1 p.p. in absolute terms over the projection period (0.7 for the EU27).

On the contrary, the contributions of the fall in both the coverage rate and the benefit rate are more pronounced, although generally not large enough to stabilise the pension to GDP ratio in the long run at the initial level. The overall EU27 effect of these two factors seems to be comparable, about -2.5 p.p. But variation among countries tends to be noticeable. An increase in the coverage ratio will contribute to increase the pension/GDP ratio in Luxembourg (+5.2 p.p.) and Cyprus (+1.6 p.p.). On the contrary, large falls are projected to contribute to put downward pressure on pension in Poland (-6.3 p.p.) and Romania (-4.9 p.p.).

Concerning the contribution of changes in the benefit ratio, one can observe both negative as well as positive values. An increase in the benefit ratio over the projection period will push up the pension/GDP ratio in Luxembourg (+1.2 p.p.) and Romania (+1.7 p.p.) while countries like Poland (-7.1 p.p.) and Italy (-5.5 p.p.) are expected to face a reverse trend. The mentioned differences among countries are mainly due to different degree of reforms affecting both access to pensions and generosity of future pension benefits.

[35] This is mainly due to the assumptions behind the macroeconomic projection and the development of aggregate employment, in particular in the long run.

Table 12 - Decomposition of the public pension spending to GDP ratio over 2007 – 2060 (% of GDP)

	2007 level	Dependency ratio contribution	Coverage ratio contribution	Employment effect contribution	Benefit ratio contribution	Interaction effect	2060 level
BE	10.0	7.4	-0.9	-0.5	-1.0	-0.3	14.7
BG	8.3	9.1	-3.0	-0.5	-1.8	-0.8	11.3
CZ	7.8	9.5	-3.5	-0.5	-1.2	-1.1	11.0
DK	9.1	6.5	-4.9	-0.1	-0.5	-0.7	9.2
DE	10.4	7.9	-1.9	-0.8	-2.2	-0.8	12.8
EE	5.6	4.6	-1.6	-0.2	-3.1	-0.4	4.9
IE	4.0	5.9	-1.5	-0.2	0.7	-0.3	8.6
EL	11.7	12.7	-0.4	-0.6	0.8	-0.1	24.1
ES	8.4	10.7	-0.9	-0.9	-1.7	-0.5	15.1
FR	13.0	8.4	-2.2	-0.5	-4.0	-0.7	14.0
IT	14.0	10.4	-3.2	-1.1	-5.5	-1.0	13.6
CY	6.3	10.8	1.6	-0.5	-0.3	-0.2	17.7
LV	5.4	5.7	-1.6	-0.2	-3.9	-0.4	5.1
LT	6.8	9.6	-2.4	0.0	-1.8	-0.8	11.4
LU	8.7	8.4	5.2	0.0	1.2	0.3	23.9
HU	10.9	11.3	-5.4	-0.7	-1.1	-1.0	13.8
MT	7.2	11.3	-3.1	-0.7	-0.5	-0.8	13.4
NL	6.6	6.6	-1.5	-0.2	-0.6	-0.4	10.5
AT	12.8	9.9	-2.6	-0.5	-5.0	-1.0	13.6
PL	11.6	13.4	-6.3	-1.0	-7.1	-1.8	8.8
PT	11.4	9.8	-1.7	-0.6	-4.5	-0.9	13.4
RO	6.6	13.6	-4.9	0.3	1.7	-1.5	15.8
SI	9.9	13.7	-3.5	-0.1	-0.7	-0.7	18.6
SK	6.8	11.7	-3.9	-0.6	-2.4	-1.4	10.2
FI	10.0	8.7	-3.1	-0.6	-0.9	-0.7	13.4
SE	9.5	5.6	-0.4	-0.4	-4.3	-0.6	9.4
UK	6.6	4.2	-1.4	-0.3	0.5	-0.3	9.3
NO	8.9	8.2	-1.2	0.3	-2.4	-0.2	13.6
EU27	10.1	8.7	-2.6	-0.7	-2.5	-0.6	12.5
EA	11.0	9.0	-2.0	-0.7	-2.9	-0.7	13.8
EA12	11.1	8.8	-1.9	-0.7	-2.9	-0.7	13.8
EU15	10.2	7.7	-1.8	-0.6	-2.3	-0.6	12.6
EU10	9.7	11.8	-4.9	-0.7	-3.9	-1.3	10.7
EU25	10.2	8.5	-2.4	-0.7	-2.5	-0.6	12.5

Source: Commission services, EPC.

As seen before, over the projection horizon 2007-2060 important differences in the evolution of the pension to GDP ratio are projected and it is important to get a better understanding of the factors behind such different trends. Graph 52 shows the decomposition of the percentage change of the public pension expenditure to GDP ratio into the four main factors during five sub periods. By construction, the sum of the contributions of each particular effect over the 5 sub periods gives the total contribution over the entire projection period 2007-2060.

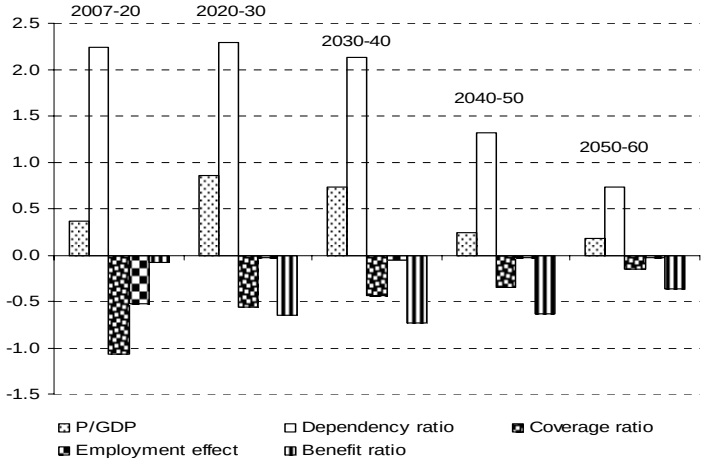
In general, at the EU27 level, the effect of demographic factors is decreasing over time. The largest contribution is envisaged for the periods 2007-2020 and 2020-2030, reaching (+2.2 p.p) and (+2.3 p.p) respectively. At the end of the projection (2050-2060), the contribution of demographic factors levels down to +0.7 p.p. of GDP. Significant differences can be found among Member States; in particular, alternative demographic development is expected for EU10 and EU15 countries.

The contribution of the coverage ratio at EU27 level is expected to fade out over the projection horizon. The initial downward contribution (-1.1 p.p.) of the 2007-2020 period is estimated to fall down over the next 50 years towards zero (- 0.2 p.p.).

The employment contribution is even more short-lasting, from the initial level of -0.5 p.p during the period 2007 to 2020 to zero in the period 2020 to 2030.

Finally, the contribution of the benefit ratio development at the EU27 level is envisaged to increase in absolute terms from the initial level (-0.1 p.p.) in 2007-2020 to its maximum value in 2030-2040 (-0.7 p.p.). The expected rising contribution of the benefit ratio development seems to be affected mainly by a typical feature of most pension system reforms, which even though enacted nowadays, will affect mainly individuals retiring in thirty to forty years.

Graph 52 - Decomposition of the public pension spending to GDP ratio over sub periods for EU27 (in percentage points)

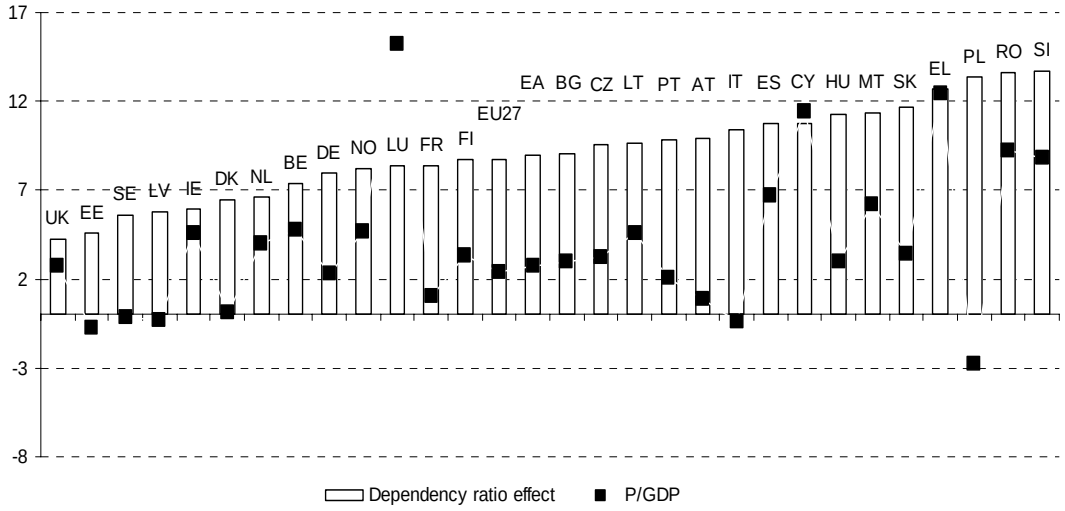


Source: Commission services, EPC.

2.5.2.1. Old age dependency effect

As serious demographic changes are expected in the upcoming decades, demographic factors are projected to be the main driver of the future pension expenditure. The overall picture is provided by Graph 53 which shows the contribution of a change in the old-age dependency ratio to the public pension to GDP ratio. For all countries, except Cyprus and Luxembourg, the contribution of the old-age dependency ratio is bigger that the total change in the public pension to GDP. It is evident that envisaged demographic transition will affect future pensions to a remarkable extent. Hopefully, recent pension reforms have strengthened the counterbalancing impact of other factors (increase in employment rate, especially of older workers, decline in the coverage ratio, through postponement of retirement age, less generous public pension transfers). However the increase in the dependency ratio is still expected to have a considerable impact on public spending.

Graph 53 - Contribution of the dependency ratio to the change in the ratio of the public pension expenditure to GDP over 2007 – 2060 (in percentage points)



Source: Commission services, EPC.

Table 13 provides information on the contribution of the demographic factors to the change in the public pension spending to GDP ratio over different periods of time. The effect of the demographic factors is projected to be the strongest over 2007-2040. The minimum impact over the 2007-2020 period is in Latvia (+0.7 p.p.) while the maximum value is recorded by Finland (+4.7 p.p.). The impact for the EU27 is +2.2 p.p. over the same period. In addition, the impact remains almost unchanged (+2.3 p.p.) during the next decade 2020-2030, when the minimum value is in Ireland (+1.0p.p.) and the maximum impact is in Austria (+3.8 p.p.). The situation starts to improve from 2030 onwards, i.e. the upward contribution of the demographic drivers become lower. As documented in Table 13, the EU27 average contribution drops from +2.1 p.p. over the period 2020 to 2030 to 0.7 p.p. between 2050 and 2060. In addition, over the period 2040 to 2050 the contribution of the demographic transition will become less than 0.5 p.p. in case of 8 Member States (Denmark, the Netherlands, the UK, France, Sweden, Germany, Norway and Finland). Over 2050-2060 again in case of 8 countries (Italy, Greece, Spain, France, Denmark, the Netherlands and Portugal) the contribution of the dependency ratio is expected to be of very limited extent. One should note that the countries with a low level of the old-age dependency contribution to the increase in the pension/GDP ratio are euro-area countries and EU15. On the other hand, the impact of increasing old-age dependency ratio will still be above 2.0 p.p. between 2050-2060 in 5 new Member States (Slovakia, Malta, Romania, Cyprus and Lithuania).

Table 13 - Contribution of the dependency ratio to the change in the ratio of public pension expenditure to GDP (in percentage points)

	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
BE	1.8	2.7	1.7	0.6	0.7	7.4
BG	2.0	1.3	1.7	2.5	1.6	9.1
CZ	3.6	1.0	1.4	2.3	1.2	9.5
DK	3.3	1.9	1.3	-0.3	0.3	6.5
DE	1.8	3.1	2.1	0.4	0.6	7.9
EE	0.9	1.0	0.7	1.1	0.9	4.6
IE	1.0	1.0	1.3	2.0	0.6	5.9
EL	2.1	2.4	4.4	3.8	0.1	12.7
ES	1.1	2.3	3.7	3.4	0.1	10.7
FR	3.7	2.5	1.8	0.2	0.2	8.4
IT	2.4	2.7	3.9	1.5	0.0	10.4
CY	1.7	2.0	1.3	2.9	2.8	10.8
LV	0.7	1.2	1.0	1.5	1.4	5.7
LT	0.9	2.3	1.9	1.7	2.8	9.6
LU	1.4	2.8	2.6	0.8	0.8	8.4
HU	3.1	1.3	1.9	3.1	1.7	11.3
MT	4.3	2.2	0.6	2.0	2.2	11.3
NL	2.7	2.3	1.6	-0.3	0.4	6.6
AT	2.0	3.8	2.8	0.7	0.7	9.9
PL	4.1	2.9	1.3	3.0	2.0	13.4
PT	2.2	2.3	2.6	2.3	0.4	9.8
RO	1.6	1.6	3.5	4.0	3.0	13.6
SI	3.6	3.3	2.8	3.2	0.9	13.7
SK	2.7	2.2	1.7	3.0	2.1	11.7
FI	4.7	2.4	0.4	0.5	0.8	8.7
SE	2.5	1.0	0.8	0.3	1.0	5.6
UK	1.2	1.1	0.8	0.2	0.9	4.2
NO	2.5	2.4	2.1	0.4	0.8	8.2
EU27	2.2	2.3	2.1	1.3	0.7	8.7
EA	2.2	2.7	2.6	1.2	0.3	9.0
EA12	2.2	2.7	2.6	1.1	0.3	8.8
EU15	2.0	2.3	2.1	0.9	0.4	7.7
EU10	3.3	2.2	1.5	2.8	2.0	11.8
EU25	2.3	2.3	2.1	1.2	0.7	8.5

Source: Commission services, EPC.

2.5.2.2. Coverage effect

As population is expected to become older and government is expected to spend an increasing part of public expenditures on pension benefits, several measures have been already implemented in order to stabilise future development of public pension schemes. Among others, for example, in many Member States the legal retirement age has been postponed, early retirement schemes have been abolished or reduced substantially and other conditions to receive a pension have been made more restrictive. In addition, as people expect to live longer they can decide voluntarily to postpone the retirement age, i.e. they exit labour market after reaching the legal retirement age. The final impact of these measures translates into a lower level of the coverage ratio (the number of benefit recipients as % of the population of the same age, here measured as persons aged 65 or more).

Table 14 shows the coverage ratio for all Member States at age 65, i.e. the ratio of the number of pensioners under the public scheme (all ages) divided by the number of people aged over 65 (the potential beneficiaries in an hypothetical "universal" scheme). The coverage ratio at age 65 is projected to be reduced over the projection period in all but one country (Luxembourg).[36] This reflects the expected general increase in the average exit age from the

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

labour force, and also in many cases a lower number of pensioners below the retirement age (e.g. getting disability pensions). In most of the countries, the coverage will remain above 100%, with the notably exception of Denmark (as the retirement age will increase to 72 years by 2060). In the case of Malta and Spain the current low coverage can be explained by women not entitled to their own contributory old-age benefits but that are considered covered by their spouses' pensions. In any case, coverage of pensioners over 65 years will increase over the projection in both countries.

Table 14 - Coverage ratio (% of population at the age of 65 or more)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060 in p.p.
BE	140.8	142.5	141.5	136.1	132.5	133.4	132.0	-8.8
BG	168.6	167.1	147.8	140.3	138.8	130.3	121.0	-47.6
CZ	184.1	172.1	141.4	130.4	126.2	118.2	114.5	-69.6
DK	159.9	155.1	141.1	119.6	108.5	103.9	96.3	-63.5
DE	121.6	119.8	115.8	107.8	103.1	102.7	102.1	-19.5
EE	160.2	162.7	147.1	137.8	133.3	127.7	118.8	-41.5
IE	159.0	155.5	142.5	134.7	127.9	120.2	118.3	-40.7
EL	127.0	124.7	117.6	116.6	115.8	115.2	119.1	-7.9
ES	109.0	108.3	105.2	103.6	101.9	99.5	100.1	-8.9
FR	138.9	142.1	128.9	122.9	118.0	118.6	118.0	-21.0
IT	134.3	129.3	120.7	119.3	111.7	106.6	107.1	-27.2
CY	123.3	132.9	140.1	145.1	149.0	150.9	150.5	27.2
LV	147.7	141.1	130.0	127.1	123.8	120.8	110.6	-37.1
LT	173.0	171.0	172.1	156.1	144.5	143.5	130.8	-42.3
LU	218.5	226.8	253.2	269.5	286.0	314.4	319.5	101.1
HU	190.0	180.0	155.6	145.7	138.9	123.5	116.8	-73.1
MT	124.3	130.3	112.2	100.3	98.4	91.6	88.8	-35.5
NL	139.4	136.3	125.5	118.2	114.4	114.5	114.0	-25.4
AT*	172.9	170.3	165.8	144.2	131.8	135.9	140.5	-32.4
PL	194.8	180.7	136.1	117.0	116.2	107.6	100.1	-94.7
PT*	174.8	173.0	168.4	163.5	155.7	149.5	152.3	-22.5
RO	178.3	171.7	145.2	139.2	129.0	120.0	108.9	-69.3
SI	162.3	159.8	145.1	134.6	132.5	126.0	122.7	-39.6
SK	185.8	178.2	144.1	130.0	126.1	113.9	106.8	-79.0
FI	153.2	153.2	130.5	122.5	119.9	118.1	116.3	-36.9
SE	137.0	135.1	132.5	134.8	133.8	134.6	131.6	-5.5
UK*	124.7	125.7	113.0	109.9	107.2	100.9	101.6	-23.1
NO	137.0	140.4	137.2	130.0	123.5	123.9	124.5	-12.5
EU27	140.1	137.4	125.8	119.3	114.7	111.4	110.0	-30.1
EA	131.9	130.5	123.3	117.9	113.0	111.4	111.6	-20.3
EA12	131.2	129.8	122.9	117.6	112.7	111.1	111.5	-19.6
EU15	130.7	129.6	122.0	116.9	112.3	110.1	110.3	-20.4
EU10	186.4	175.5	141.9	126.6	123.9	114.9	108.0	-78.4
EU25	138.1	135.6	124.8	118.3	113.9	110.8	109.9	-28.1

Source: Commission services, EPC.

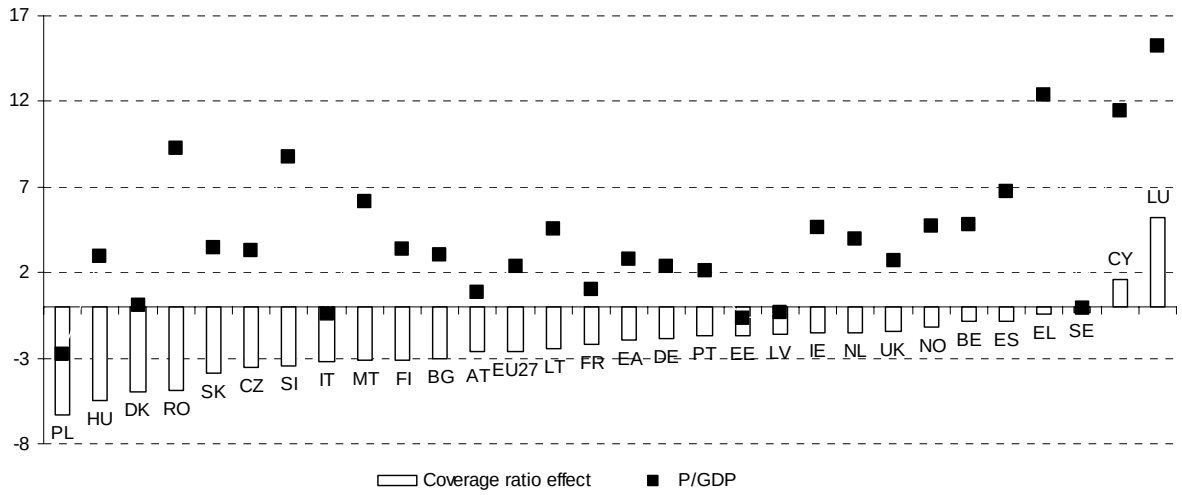
Note: 'Coverage Ratio 65' is calculated as the total number of pensioners as a share of the population aged 65 and over. . * = Austria, Portugal and the UK did not provide the number of pensioners. In order to quantify the coverage ratio, the number of pensioners was proxied by the number of pensions, as the dynamic of the two variables should be comparable at least in the long-run. In the case of Ireland, only the number of pensioners in the social security scheme is covered.

Over the projection horizon, this generalised decrease in the level of the coverage ratio translates into a downward impact on the public pension to GDP ratio, i.e. the contribution of the coverage ratio is negative for all Member States except for Luxembourg and Cyprus, see Figure 12. In 10 Member States the projected decreasing in the coverage rates is contributing to reduce the pension spending (as % of GDP) by at least 3 p.p. (Poland, Romania, Hungary, Denmark, Slovakia, the Czech Republic, Slovenia, Italy, Malta and Finland). For the remaining 18 Member States (Bulgaria, Austria, Lithuania, France, Germany, Portugal,

Estonia, Latvia, Ireland, the Netherlands, the UK, Norway, Belgium, Spain, Greece, Sweden, Cyprus, Luxembourg) the declining coverage rate will contribute to limit the impact or demographic factors on pension spending, although to a lower extent. The overall EU27 contribution is -2.6 p.p. over the period 2007 to 2060.

As already suggested, the projected falling coverage rate can be at least partly attributed to the introduction of labour market and pension system reforms. Table 15 presents developments of the coverage contribution over five sub periods. In general, the effect of the coverage rate tends to decrease over time. To be specific, the EU27 coverage contribution drops down in absolute terms from -1.1 p.p. in 2007-2020 to -0.2 p.p. in 2050 -2060. It also has to be mentioned that relating the number of pensioners of all ages to the (growing) population aged 65 and more tend to overstate the decrease in the coverage ratio. Consequently the increase in the coverage ratio both in the population aged 55-64 and in the population aged 65 and more observed in some countries (e.g. Belgium), despite labour market reforms, does not show in the presented coverage ratio.

Graph 54 - Contribution of the coverage ratio to a change in the ratio of the public pension expenditure to GDP over 2007 – 2060 (in percentage points)



Source: Commission services, EPC.

Over the period between 2007 and 2020, the coverage ratio contributes to increasing pension spending by 1.3% of GDP in Luxembourg and by almost 1 p.p. in Cyprus. On the contrary the strongest downward contribution in recorded in Poland (-3.5 p.p.). In the subsequent decade (2020- 2030), the dampening effect of decreasing coverage ratios in the EU27 falls to a value -0.6 p.p., with the biggest contribution recorded in Austria (-1.8 p.p.). For Luxembourg (+0.7 p.p.) and Cyprus (+0.3 p.p.) the coverage continues to increase.[37] Over the last three decades of the projection period (2030-2060), the contribution of the coverage ratio development is falling further down to reach a value -0.2 p.p. in 2050-2060 in the EU27, with the highest contribution in Romania (-1.7 p.p.) and a slightly upward impact on pension spending in Greece (+0.8 p.p.), Italy, Spain, Cyprus, Austria, Portugal, the UK and Norway.

[37] A steadily high value of the coverage contribution in case of Luxembourg is affected by a country specific situation concerning cross-border workers and foreign pensioners.

Table 15 - Contribution of the coverage ratio to the change in the ratio of public pension expenditure to GDP (in percentage points)

	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
BE	0.1	-0.5	-0.4	0.1	-0.2	-0.9
BG	-1.1	-0.4	-0.1	-0.6	-0.8	-3.0
CZ	-1.8	-0.5	-0.2	-0.6	-0.3	-3.5
DK	-1.1	-1.7	-1.0	-0.4	-0.7	-4.9
DE	-0.5	-0.8	-0.5	-0.1	-0.1	-1.9
EE	-0.5	-0.4	-0.2	-0.2	-0.4	-1.6
IE	-0.4	-0.3	-0.3	-0.4	-0.1	-1.5
EL	-0.9	-0.1	-0.1	-0.1	0.8	-0.4
ES	-0.3	-0.1	-0.2	-0.3	0.1	-0.9
FR	-1.0	-0.6	-0.6	0.1	-0.1	-2.2
IT	-1.4	-0.2	-1.0	-0.7	0.1	-3.2
CY	0.9	0.3	0.3	0.2	0.0	1.6
LV	-0.7	-0.1	-0.2	-0.1	-0.5	-1.6
LT	0.0	-0.7	-0.6	-0.1	-1.0	-2.4
LU	1.3	0.7	1.0	1.9	0.4	5.2
HU	-2.1	-0.7	-0.5	-1.4	-0.7	-5.4
MT	-0.8	-1.0	-0.2	-0.8	-0.4	-3.1
NL	-0.7	-0.5	-0.3	0.0	0.0	-1.5
AT	-0.5	-1.8	-1.2	0.4	0.5	-2.6
PL	-3.5	-1.4	-0.1	-0.7	-0.6	-6.3
PT	-0.4	-0.4	-0.6	-0.5	0.2	-1.7
RO	-1.5	-0.3	-0.8	-0.9	-1.4	-4.9
SI	-1.1	-0.8	-0.2	-0.8	-0.5	-3.5
SK	-1.6	-0.7	-0.2	-0.8	-0.6	-3.9
FI	-1.6	-0.8	-0.3	-0.2	-0.2	-3.1
SE	-0.3	0.2	-0.1	0.1	-0.2	-0.4
UK	-0.6	-0.2	-0.2	-0.5	0.1	-1.4
NO	0.0	-0.6	-0.7	0.0	0.1	-1.2
EU27	-1.1	-0.6	-0.4	-0.4	-0.2	-2.6
EA	-0.7	-0.5	-0.5	-0.2	0.0	-2.0
EA12	-0.7	-0.5	-0.5	-0.2	0.1	-1.9
EU15	-0.7	-0.5	-0.5	-0.2	0.0	-1.8
EU10	-2.4	-1.0	-0.2	-0.7	-0.6	-4.9
EU25	-1.0	-0.6	-0.4	-0.3	-0.1	-2.4

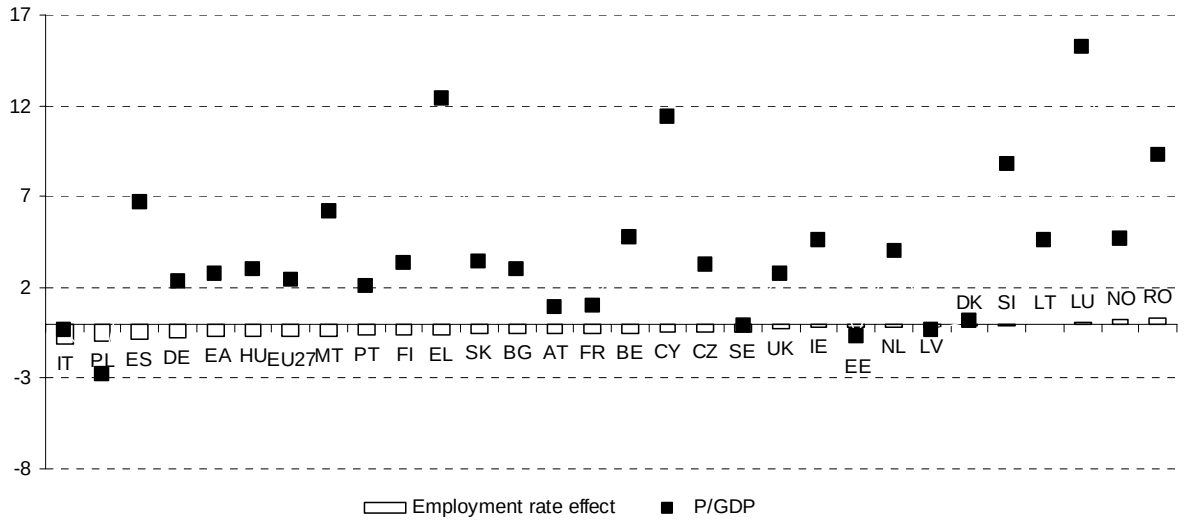
Source: Commission services, EPC.

2.5.2.3. Employment effect

In order to stabilise financial sustainability of the pension system, one of the best policy measure is to stimulate people to stay longer in the labour market, i.e. to postpone exiting the labour market.[38] As shown in Graph 55, the projected increase in the employment rate – as sketched in the baseline scenario - will contribute limiting the increase in the social pension spending to GDP over 2007-2060.

[38] The Annex 'Number of contributors to public pension schemes' provides information on the development of the number of contributors, as in few Member States the number of employed and contributors can be different.

Graph 55 - Contribution of the employment rate to the change in the ratio of the public pension expenditure to GDP over 2007–2060 (in percentage points)



Source: Commission services, EPC.

When analysing different sub-periods, it follows that the only significant employment contribution takes place during the period between 2007 and 2020. Still, during that period the contribution of higher employment rate is below 1 p.p. in absolute terms. The overall EU27 employment contribution between 2007 and 2020 is only -0.5 p.p. Only in Norway, the pension to GDP ratio is expected to rise due to a projected decrease in the employment rate. On the contrary, the largest negative contribution within 2007–2020 is envisaged in Hungary where the pension to GDP ratio will be reduced almost by one percentage point over 2007-2020 due to the increase in the employment rate. Starting from 2020 onwards, the average contribution is almost zero for the EU27. This reflects mostly the assumption of a constant structural unemployment rate in the Member States from that point onwards and only moderate increases in the participation rates.

Table 16 - Contribution of the employment effect to the change in the ratio of public pension expenditure to GDP (in percentage points)

	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
BE	-0.5	0.1	-0.1	0.0	0.0	-0.5
BG	-0.6	0.2	0.1	0.0	-0.2	-0.5
CZ	-0.5	0.1	0.0	-0.1	0.0	-0.5
DK	0.0	0.0	-0.1	0.0	0.0	-0.1
DE	-0.7	0.0	-0.1	0.1	0.0	-0.8
EE	-0.3	0.1	0.0	0.0	-0.1	-0.2
IE	-0.2	0.0	0.0	0.0	0.0	-0.2
EL	-0.7	0.2	0.0	-0.2	0.1	-0.6
ES	-0.7	-0.1	-0.1	-0.1	0.1	-0.9
FR	-0.3	0.0	-0.2	0.0	0.0	-0.5
IT	-0.9	-0.2	-0.1	0.0	0.1	-1.1
CY	-0.5	0.0	0.1	0.0	0.0	-0.5
LV	-0.2	0.1	0.0	0.1	-0.2	-0.2
LT	-0.3	0.2	0.1	0.1	-0.1	0.0
LU	0.0	0.0	-0.1	0.1	0.1	0.0
HU	-0.9	0.1	0.3	-0.1	0.0	-0.7
MT	-0.5	-0.3	0.1	0.0	0.0	-0.7
NL	-0.1	0.0	-0.2	0.1	0.0	-0.2
AT	-0.2	-0.1	-0.3	0.1	0.0	-0.5
PL	-0.9	-0.2	0.3	0.0	-0.1	-1.0
PT	-0.6	0.0	0.0	0.0	0.0	-0.6
RO	-0.2	0.4	0.3	0.1	-0.2	0.3
SI	-0.3	0.3	0.2	-0.2	-0.1	-0.1
SK	-0.7	0.0	0.2	0.0	-0.1	-0.6
FI	-0.5	0.0	0.0	-0.1	0.0	-0.6
SE	-0.4	0.0	0.0	0.0	0.0	-0.4
UK	-0.1	0.0	-0.1	0.0	0.0	-0.3
NO	0.2	0.1	0.0	0.0	0.0	0.3
EU27	-0.5	0.0	-0.1	0.0	0.0	-0.7
EA	-0.6	0.0	-0.1	0.0	0.0	-0.7
EA12	-0.6	0.0	-0.1	0.0	0.0	-0.7
EU15	-0.5	0.0	-0.1	0.0	0.0	-0.6
EU10	-0.7	0.0	0.2	0.0	-0.1	-0.7
EU25	-0.5	0.0	-0.1	0.0	0.0	-0.7

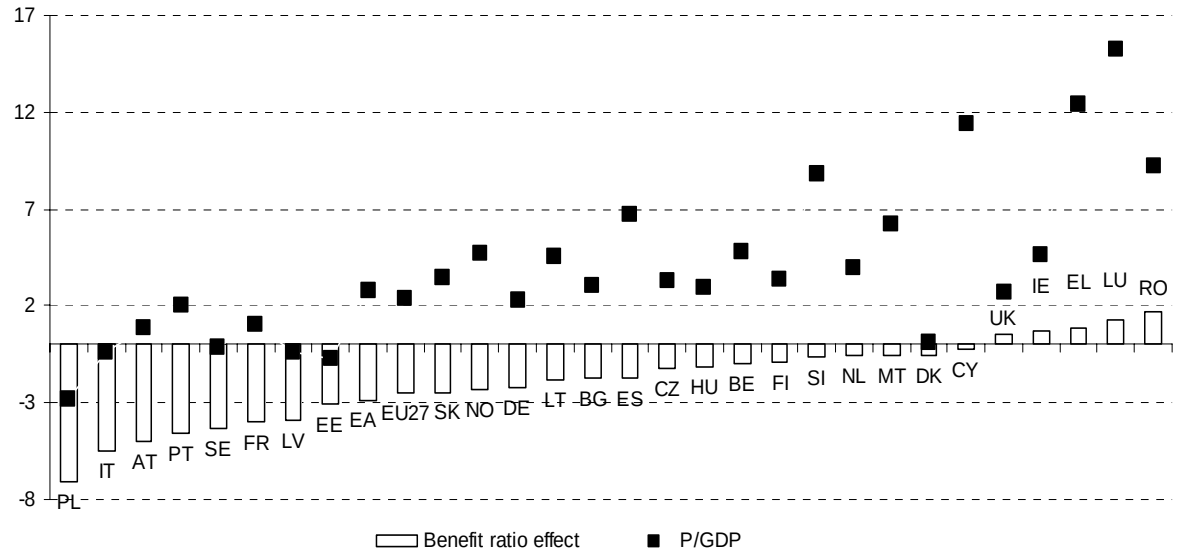
Source: Commission services, EPC.

2.5.2.4. Benefit effect

The stabilisation of the public pension spending can be attained also by means of reducing future generosity of pension benefits.[39] In general, as documented by Graph 56, a reduction in the relative value of the public pension benefit is projected to contribute to a limitation of the pension to GDP ratio over the period 2007 to 2060 in the EU. Only in 5 Member States (the UK, Ireland, Greece, Luxembourg and Romania), the contribution of the change in the benefit ratio is envisaged to be positive. In the rest of the countries, a reduction in the relative value of social security benefits (compared to the gross average wage) is projected. In the following 8 Member States (Poland, Italy, Austria, Portugal, Sweden, France, Latvia and Estonia) the contribution of a decreasing benefit ratio is in absolute terms quite significant (above 3 p.p.).

[39] Theoretical replacement rates (TRR) calculated by the Indicator Sub-Group of the Social Protection Committee are the agreed measure of adequacy of pensions. Analysis of future development of TRR are presented in the 2009 Joint Report on Social Protection and Social Inclusion (COM (2009) 58 final) and its accompanying document (SEC (2009) 141).

Graph 56 - Contribution of the benefit ratio to the change in the ratio of the public pension expenditure to GDP over 2007–2060 (in percentage points)



Source: Commission services, EPC.

Contrary to the labour market reforms, changes of the pension schemes tend to have an impact on economic variables rather in the long run. Usually, the impact of the reforms affecting the value of pension benefits will become visible only in future years, as currently working individuals will retire under different conditions in the future. This circumstance is clearly visible in Table 17 where the contribution of falling benefit ratios at the EU27 level is the strongest from 2020 to 2050.

Focusing on development at the EU27 level, the first period 2007-2020 is characterised by a relatively low contribution of a change in the benefit ratio (-0.1 p.p.). Still, a great divergence is observed across countries, ranging from the largest positive contribution in Romania (+2.8 p.p.) and the largest negative contribution registered in Sweden (-1.5 p.p.), Luxembourg and the Czech Republic (-1.4 p.p. for both). As already noted, the effect of the pension system reforms is expected to materialise over longer horizon. Thus, not surprisingly, the EU27 contribution of the average benefit to keep pension spending under control increases over time, starting from 2020-2030. The largest positive contribution falls down reaching 1.3 p.p. in case of Greece. The largest negative benefit contribution remains unchanged at -1.4 p.p. this time registered by Portugal. As the current pension reforms adjusting adequacy of individual pension benefits will affect primarily individuals retiring in thirty to forty years, the largest contribution of the fall in benefit ratios is projected to show up over the period 2030-2040 (-0.7 p.p. in the EU27).

In some cases, a declining benefit ratio can also reflect an increase in the coverage ratio, when the number of beneficiaries of supplements provided for dependent spouses tend to decrease due to the increase in the aged population benefiting from its own pension (Belgium); in these cases, the decrease in the benefit ratio will not automatically translate into a decrease in the living standard of the household.

Table 17 - Contribution of the benefit ratio to the change in the ratio of public pension expenditure to GDP (in percentage points)

	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
BE	0.5	-0.1	-0.5	-0.5	-0.5	-1.0
BG	0.1	-0.8	-0.7	-0.4	0.0	-1.8
CZ	-1.4	-0.3	0.2	0.3	0.0	-1.2
DK	-0.4	0.0	-0.2	-0.1	0.1	-0.5
DE	-0.5	-0.9	-0.8	-0.1	0.0	-2.2
EE	0.1	-0.9	-0.7	-0.9	-0.8	-3.1
IE	0.3	0.1	0.1	0.1	0.0	0.7
EL	1.0	1.3	0.2	-0.8	-0.9	0.8
ES	1.0	-0.7	-0.7	-0.7	-0.7	-1.7
FR	-1.4	-1.1	-0.7	-0.5	-0.2	-4.0
IT	0.3	-1.3	-1.6	-1.5	-1.3	-5.5
CY	0.5	-0.4	0.3	-0.2	-0.5	-0.3
LV	-0.1	-0.4	-0.6	-1.6	-1.3	-3.9
LT	-0.3	-0.3	-0.4	-0.4	-0.5	-1.8
LU	-1.4	0.6	0.7	0.8	0.6	1.2
HU	0.5	-0.7	-0.3	-0.3	-0.3	-1.1
MT	-0.6	-0.6	0.6	0.3	-0.3	-0.5
NL	-0.5	-0.1	0.0	0.1	0.0	-0.6
AT	-0.9	-0.6	-0.9	-1.1	-1.4	-5.0
PL	-0.8	-1.3	-1.6	-1.9	-1.5	-7.1
PT	0.0	-1.4	-1.7	-0.7	-0.7	-4.5
RO	2.8	0.1	-0.3	-0.5	-0.3	1.7
SI	-0.6	-0.3	0.1	0.1	0.1	-0.7
SK	-0.3	-0.4	-0.6	-0.7	-0.5	-2.4
FI	0.6	-0.1	-0.4	-0.5	-0.4	-0.9
SE	-1.5	-1.1	-0.8	-0.6	-0.4	-4.3
UK	0.0	-0.1	0.0	0.4	0.3	0.5
NO	-0.1	-0.5	-0.7	-0.5	-0.5	-2.4
EU27	-0.1	-0.6	-0.7	-0.6	-0.4	-2.5
EA	-0.2	-0.8	-0.8	-0.6	-0.5	-2.9
EA12	-0.2	-0.8	-0.8	-0.6	-0.5	-2.9
EU15	-0.2	-0.7	-0.7	-0.4	-0.3	-2.3
EU10	-0.6	-0.8	-0.8	-1.0	-0.8	-3.9
EU25	-0.2	-0.7	-0.7	-0.6	-0.4	-2.5

Source: Commission services, EPC.

2.5.3. Is there a risk of pensions becoming 'too small'?

We have seen that sizable decreases in benefit ratios are projected over coming decades. It is very difficult to assess to what extent future pension benefits will be 'adequate' in the future.[40] Comprehensive pension reforms have aimed at strengthening fiscal sustainability by generally including measures aimed at both tightening of eligibility for pension benefits and reducing the growth of the pension benefits in relation to income growth in the economy.

Table 18 shows the benefit ratio (the ratio between the average pension benefit and the economy-wide average wage) and the replacement rate (the average first pension as a share of the economy-wide average wage).[41]

[40] See for related work, e.g. Social Protection Committee (2008) on privately funded pension provision and their contribution to adequate and sustainable pensions.
http://ec.europa.eu/employment_social/spsi/docs/social_protection_commitee/final_050608_en.pdf

[41] The average wage (the denominator of the benefit ratio) is calculated as a ratio of gross wages and employed persons (both employees and self-employed) of age 15 to 71 years.

Table 18 - Benefit ratios and replacement rates (in %)

	Benefit Ratio (%)						Gross Average Replacement Rate (%)					
	Public pensions			Public and private pensions			Public pensions			Public and private pensions		
	2007	2060	% change	2007	2060	% change	2007	2060	% change	2007	2060	% change
BE	45	43	-4				45	42	-7			
BG	44	36	-20	44	41	-8		36			49	
CZ	45	38	-17				33	27	-17	33	27	-17
DK	39	38	-4	64	75	17	33	33	0	71	84	18
DE	51	42	-17	51	42	-17						
EE	26	16	-40	26	22	-18	28	16	-41	28	31	9
IE	27	32	16									
EL	73	80	10				61	67	10			
ES	58	52	-10	62	57	-8						
FR	63	48	-25									
IT	68	47	-31				67	49	-26			
CY	54	57	5									
LV	24	13	-47	24	25	4	33	22	-33	33	33	2
LT	33	28	-16	33	32	-2	32	29	-10	32	37	15
LU	46	44	-4	46	44	-4	53	62	17			
HU	39	36	-8	39	38	-3	49	38	-23	49	43	-13
MT	42	40	-6									
NL	44	41	-7	74	81	10						
AT	55	39	-30				49	38	-22			
PL	56	26	-54	56	31	-44						
PT	46	33	-29	47	33	-31	58	56	-3			
RO	29	37	26	29	41	41	36	44	20	36	49	34
SI	41	39	-6	41	40	-2						
SK	45	33	-27	45	40	-11						
FI	49	47	-5									
SE	49	30	-39	64	46	-27	49	31	-36			
UK	35	37	7									
NO	51	47	-8									

Source: Commission services, EPC.

Note: The 'Benefit ratio' is the average benefit of public pension and public and private pensions, respectively, as a share of the economy-wide average wage (gross wages and salaries in relation to employees), as calculated by the Commission. The 'Gross Average Replacement Rate' is calculated as the average first pension as a share of the economy-wide average wage, as reported by the Member States in the pension questionnaire. Public pensions used to calculate the Benefit Ratio includes old-age and early pensions and other pensions, while public pensions used to calculate the Gross Average Replacement Rate only includes old-age and early pensions. In general, the old-age and early pensions are the major part of pension expenditure, so this difference is unlikely to affect the results substantially. The benefit ratio and the gross average replacement rate convey different information. In particular, due to differences in wage concepts used when calculating the benefit ratio and the replacement rate, the two indicators (and in specially their level) are not strictly comparable and should be interpreted with caution.

The decline in the public pension benefit ratio over the period 2008 to 2060 is substantial, 20% or more in 11 Member States (France, Italy, Austria, Portugal, Sweden, Estonia, Latvia, Lithuania, Poland, Slovakia and Bulgaria).[42] However, taking into consideration also the projected support from pension benefits from the 2nd and 3rd pillars, the decline in the total pension benefit ratio is smaller in several of these countries (Sweden, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Bulgaria), see also Table 18**.**[43] Notwithstanding this, it still declines by 20% or more in Portugal, Sweden, Estonia and Poland. The risk of a 'too small' pension must not be overstated by focusing on the drop in the benefit ratio: in spite of the decline, benefit ratios in France and Italy, for instance, are among the highest in 2007 and remain among the highest in 2060.[44]

[42] The growing mobility of labour within the EU leads to a growing part of the retired having pension benefit from more than one country. If only pensions to inhabitants in the actual country are concerned, the benefit ratio will increase in countries with many pensioners abroad, e.g. Sweden.

[43] It should be noted that not all Member States were in a position to provide projection for 2nd and 3rd pillars even if they exist, indicating that the total benefit ratio is not fully comparable.

[44] Note that the decline of the benefit ratio in some cases is more due to the increase of the GDP than to the decrease of the average pension.

Table 19 - Decomposition of the public and other pension spending to GDP ratio over 2007 – 2060 (in percentage points)

	2007 level	Dependency ratio contribution	Coverage ratio contribution	Employment effect contribution	Benefit ratio contribution	Interaction effect	2060 level
BG	8.3	9.1	-3.2	-0.5	-1.8	1.2	13.0
DK	14.7	6.5	-8.0	-0.2	-0.8	6.0	18.1
EE	5.6	4.6	-1.8	-0.2	-3.6	2.1	6.7
IE	5.2	5.9	-2.1	-0.3	0.9	1.6	11.3
ES	9.0	10.7	-0.9	-1.0	-1.9	0.5	16.4
LV	5.4	5.7	-2.0	-0.2	-5.2	6.3	10.0
LT	6.8	9.6	-2.7	0.0	-2.0	1.7	13.3
HU	10.9	11.3	-4.5	-0.7	-2.4	1.5	16.0
NL	11.7	6.6	-2.7	-0.3	-1.2	8.4	22.6
PL	11.6	13.4	-6.5	-1.0	-7.6	0.7	10.6
PT	12.0	9.8	-1.6	-0.6	-4.9	-0.7	14.0
RO	6.6	13.6	-5.1	0.3	1.7	0.7	17.7
SI	9.9	13.7	-3.5	-0.1	-0.7	0.0	19.3
SK	6.8	11.7	-4.2	-0.6	-2.7	1.4	12.4
SE	12.2	5.6	-0.5	-0.5	-6.2	3.7	14.4

Source: Commission services, EPC.

Note: Other pensions cover occupational and private pensions. This table only includes Member States that have provided private pillar pension expenditure projections in addition to public pension projections, and does consequently not include all Member States.

In the case of a declining benefit ratio over time, the replacement rates at retirement provides information on whether the reduction in average pension benefit over time is due to a decline over time in newly awarded pensions (as reflected in the replacement rate at retirement), or due to a decline in previously awarded 'old' pensions, the latter being influenced by the pension indexation rule employed; also volumes of new entrants and drop-outs have an influence.

Only about half of the Member States have reported replacement rates, which hampers a mapping of the situation across the EU. Nonetheless, in a number of countries, the decline in the public pension replacement rate between 2007 and 2060 is substantial, being 15% or more in Italy, Austria, Sweden, Estonia, Hungary and Latvia. This suggests that the valorisation of the average first pension is lagging behind the average wage growth quite significantly (in some cases partly reflecting the impact of increases in life expectancy in the calculation of the pension benefit –through some kind of "adjustment coefficient" or "sustainability factor"). In a number of countries the decline in the gross average replacement rate including the contribution from 2nd and 3rd pillar pensions is smaller than concerning public pensions.

A decline in the replacement rate over time may be an explicit policy target in some cases, where the initial replacement is very high. Hence, it is informative to look not only at the change in the replacement rate over time, but also at the level, see Table 19. If the replacement rate at a future point in time is 'low', there is a case for putting in place other sources of income in order to avoid potential future issues as regards adequacy of pensions. In countries where the social security replacement rate is low in the future, the potential inadequacy of pensions from public schemes may therefore be relatively larger and call for proper intervention by governments.

However, as pointed out above, it must be borne in mind that other sources of income for older people can make up for the lower initial pension from public schemes. First, retirement income from other pillars can support purchasing power of pensioners (for instance, this is the case in Sweden, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia, Bulgaria, who have

provided projection of these private funded pillars, see Graph 48).[45] Second, other income sources can contribute to retirement income, like drawing down on accumulated assets and savings. Third, behavioural change among the population, beyond what is already assumed in the baseline projections, to further extend working lives and/or to increase their savings to enhance the future pension benefit and/or retirement incomes may occur on the assumption that individuals are well-informed of their future prospects and take a (long) forward-looking perspective. Clearly, structural reforms that fosters (or forces) the expansion of life spent working can affect this change.

In addition to issues regarding the level of the first pension awarded, as captured by the average replacement rate, indexation rules governing the evolution of the pension after retirement is an important determinant of the pension income after retirement. As noted above, pinpointing a level below which a pension may be 'too low', is a difficult task. Nonetheless, the lower the first pension benefit, the higher the reliance of price indexation (as opposed to wage indexation) after retirement is, the higher is the probability that the pension benefit for an individual risks becoming inadequate over time. This applies in particular to individuals with the lowest, or minimum, pension benefits and moreover in flat-rate systems.

The table in Section 8.3 in the Annex on Pensions shows the rules governing pensions and the indexation assumption used in the projection. In a large number of countries (Belgium, Bulgaria, the Czech Republic, Denmark, Germany, Estonia, Greece, Spain, Ireland, Italy, Latvia, the Netherlands, Portugal, Finland, Sweden, the UK),[46] the projection for minimum pensions/old age allowances assumes indexation above prices, and in some of them (Bulgaria, the Czech Republic, Greece, Spain, Ireland, Italy, Finland, Sweden, Lithuania), the pension projection for minimum pensions/old age allowances assumes a higher indexation than legislated (e.g. to wages despite the fact that the legislated indexation postulates indexation to prices). Under the assumption that the minimum pension/old age allowances are set at a level considered to ensure a minimum income for subsistence (a 'basic social safety net'), this modelling choice may be considered as fairly neutral.

Therefore, assuming indexation to prices for the projection of minimum pensions[47], may underestimate the future actual spending on minimum pensions. Indeed, potentially increasing risk for inadequate pension income for older people at the bottom of the income scale during the course of the retirement are likely to trigger ad-hoc interventions by governments in order to re-align the minimum income to the increased living standards, and thus pose a risk of underestimation of public pension expenditure. Still, since in almost all Member States the proportion of public minimum pensions in relation to total public pension expenditure is small, the size of this possible underestimation may not be very important. In addition, information on other sources of income for older people is needed in order to assess income adequacy in a meaningful way.

[45] However, also income from this pension pillar may be volatile and raise potential risks to long-term fiscal sustainability. See for discussions e.g. IMF (2008) Fiscal Policy for the crisis, SPN/08/01, Washington and OECD (2009) Private Pensions Outlook 2008, Paris.

[46] Belgium assumes CPI plus an adjustment to living standards, DE assumes nominal income plus a sustainability factor, Spain assumes 6% indexation in the medium term followed by a convergence path to CPI indexation till 2035 and thereafter CPI indexation, IE assumes nominal income plus a sustainability factor.

[47] It should be noted that some countries have not provided a projection for minimum pensions or social allowance and therefore underestimate pension expenditure.

2.6. Sensitivity of the projection results

In order to verify the robustness of the pension projection with respect to changes in key variables, a series of sensitivity tests were carried out. Specifically, changes to the demographic (assumptions on life expectancy and migration flows) and macro-economic (productivity growth, employment rates and the interest rate) variables were applied.

The pension projections are sensitive to a number of underlying assumptions, which are necessary to project developments in government expenditure over a long period of time. Given the uncertainties surrounding the assumptions, it is important to test the robustness of the results.

As presented in Chapter 1, there is some uncertainty about assumptions regarding demographic and economic outlook over the long-term. For example, there is no consensus among experts regarding the size of the future increase in life expectancy, future labour productivity growth or the impact of enacted pension reforms on employment rates. In order to take such uncertainties into account, a set of projections under alternative assumptions is carried out in addition to the baseline scenario (labour productivity growth, employment rate, interest rate and life expectancy).

Table 20 - Description of the sensitivity scenarios

Population		Labour force		Productivity	Interest rate
High life expectancy	**Zero migration**	**Higher employment rate**	**Higher employment rate older workers**	**Higher labour productivity**	**Higher interest rate**
A scenario with an increase of life expectancy at birth of one year by 2060 compared to the baseline projection.	A scenario with zero migration compared to the baseline projection.	A scenario with the employment rate being 1 p.p. higher compared to the baseline projection. The increase is introduced linearly over the period 2010-2020 and remains 1 p.p. higher thereafter. The higher employment rate is assumed to be achieved by lowering the rate of structural unemployment (the NAIRU).	A scenario with the employment rate of older workers (55-64) being 5 p.p. higher compared to the baseline projection. The increase is introduced linearly over the period 2010-2020 and remains 5 p.p. higher thereafter. The higher employment rate of this group of workers is assumed to be achieved through a reduction of the inactive population.	A scenario with labour productivity growth being assumed to converge, to a productivity growth rate which is 0.25 percentage points higher than in the baseline scenario. The increase is introduced linearly during the period 2010-2020, and remains 0.25 p.p. above the baseline thereafter.	A scenario with the real interest being 1 percentage point above that in the baseline scenario, i.e. 4%.

Source: Commission services, EPC.

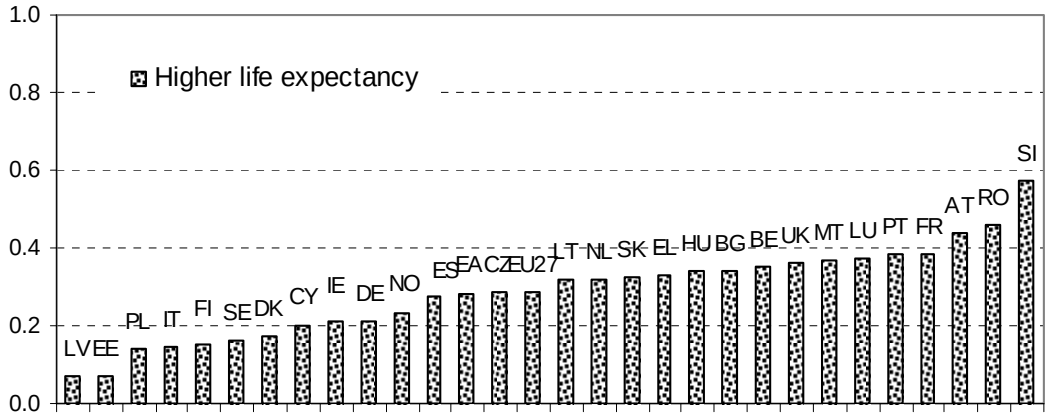
Life expectancy

A higher life expectancy (of 1 year at birth by 2060) would lead to higher public expenditure on pensions. Eventually, this drop in mortality at all ages laeds to a larger labour force, and therefore higher contributions. The increase of the pension to GDP ratio in the EU27 on

average would be above +0.3 p.p. The impact is however not uniform across countries, ranging from +0.1 p.p. by Latvia to +0.6 p.p. by Slovenia.

The extent to which the pension schemes react to a change in life expectancy depends on scheme design. The impact of longer life expectancy appears to be smaller in countries where the annuity explicitly depends on life expectancy at retirement or in countries where automatic stabilizers of spending are built into the system to compensate for some fiscal imbalances (e.g. the sustainability factors in Germany, Finland and Sweden). This type of features increases the resilience of pension schemes to longevity risk. By contrast, the impact is larger in countries with a large level of pension expenditure in 2050 and where no such automatic stabilizers have been put in place (e.g. Belgium).

Graph 57 - Difference between the higher life expectancy and the baseline scenarios (in percentage points)



Source: Commission services, EPC.

Higher labour productivity growth

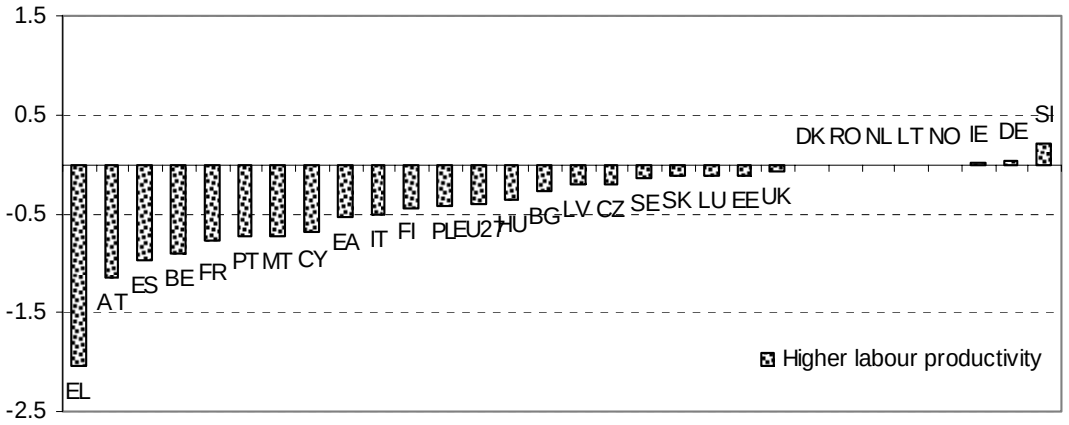
A permanent increase of 0.25 p.p. in the productivity growth rate would reduce the increase in the pension to GDP ratio in the EU27 by -0.4 p.p. up to 2060. A larger reduction would be the case in Greece (-2.0 p.p.), Austria (-1.1 p.p.) and Spain (-1.0 p.p.), while an increase is projected in Slovenia (+0.2 p.p.) thanks to indexation of pensions to wages or larger accumulation of pension rights.

Higher productivity growth increases income, also in per capita terms, and leads to improved living standards at the aggregate level. However, the main mechanism behind the lower increase in pension expenditure as a share of GDP is that higher productivity growth leads to a faster growth of GDP and hence a faster increase in income than in pensions (a fall in benefit ratio). As discussed in Section 3 above, this change in relative income position between the working-age population and the retired may put pressure on governments to adjust retirement income policies to avoid potential risks related to inadequate pensions.

Higher labour productivity growth has a different impact on pension expenditure across countries. It will have virtually no impact in countries where the public pension scheme provides a flat rate pension whose level is indexed to wage growth (e.g. Denmark and Ireland). By contrast, it will lead to lower increases where pension expenditure trail GDP growth. This will be the case if pensions are not fully indexed to wages after retirement. The higher the productivity growth, the higher the gap between the average pension and the

average wage. It will also be the case if pensions are earnings-related and are calculated over a long period of the career. A more dynamic productivity growth will lead immediately to higher GDP growth. Workers will have higher wages and therefore accumulate more pension rights but this will result in higher pension spending only when those workers retire, which can occur after the projection period.

Graph 58 - Difference between the higher labour productivity and the baseline scenarios (in percentage points)



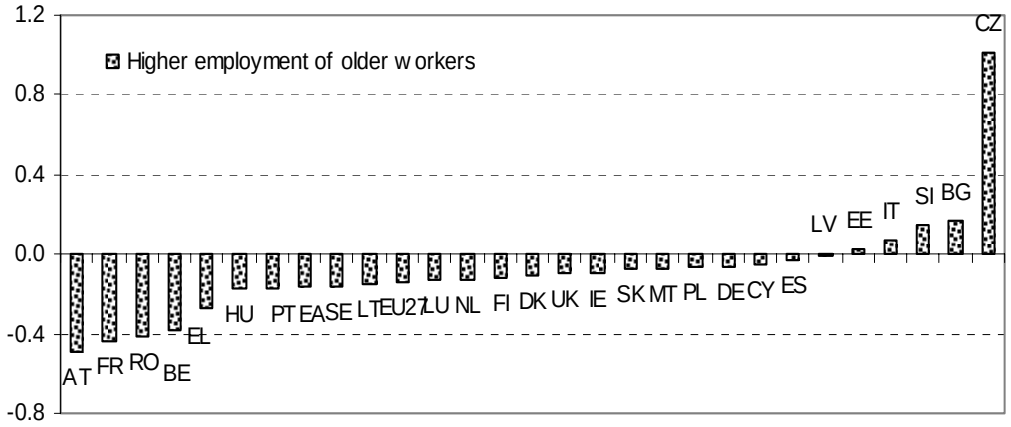
Source: Commission services, EPC.

Higher employment of older workers

An increase of the employment rates of older workers by 5 percentage points compared to the baseline would reduce the decrease in pension expenditure as a share of GDP by -0.1 p.p. over 2007-2060. This would materialize through higher employment growth raising GDP growth in a first phase. However, in a second phase it would enable workers to accumulate further pension rights, having a moderating upward impact on the pension-to-GDP ratio in the longer term. The older workers employment effect also reduces the increase in the pension ratio as it will mechanically reduce the number of retirees.

The impact of a higher employment of older workers will depend on the extent to which extending working lives will translate into higher pension entitlements. A larger reduction would occur in Austria (-0.5 p.p.), France, Romania and Belgium (all -0.4 p.p.). On the other hand, an increase is projected for the Czech Republic (+1.0). In earnings-related systems, there are counteracting effects: a decrease in the number of pensioners (due to the postponement of the retirement age) in the short term and a resulting increase in the average pension in the long term (due to larger accumulated rights) and a reduction in the average number of pension drawing years.

Graph 59 - Difference between the higher employment of older workers and the baseline scenarios (in percentage points)

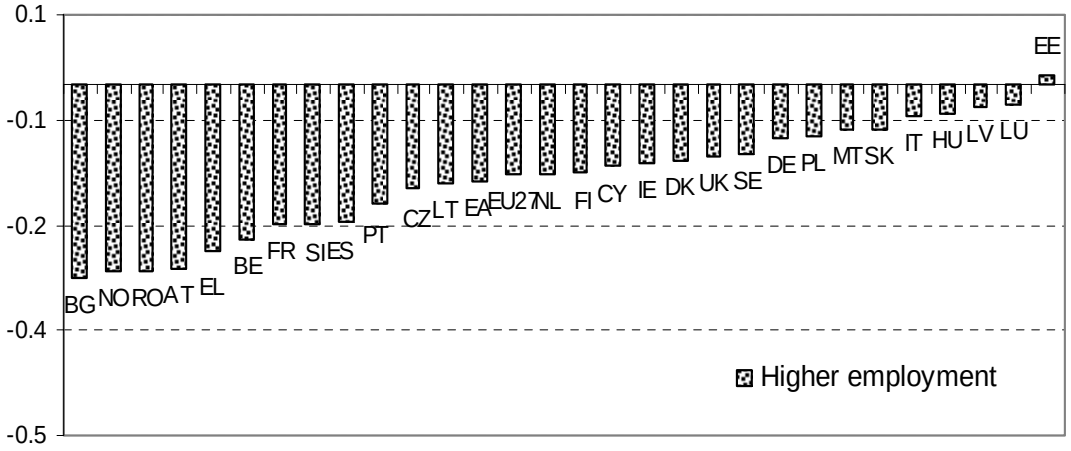


Source: Commission services, EPC.

Higher total employment

The impact of a higher employment for the entire workforce (assuming a reduction of the unemployment rate; activity rates are kept constant) leads to a reduction of -0.1 p.p. in the EU. A stronger impact would occur in Bulgaria, Norway, Romania and Austria all reaching (-0.3 p.p.). On the other hand, in Hungary, Latvia, Luxembourg, Estonia with almost zero impact on pension to GDP ratio, the effect is very small. In some cases this reflects the flat-rate character of the public pension scheme.

Graph 60 - Difference between the higher total employment and the baseline scenarios (in percentage points)



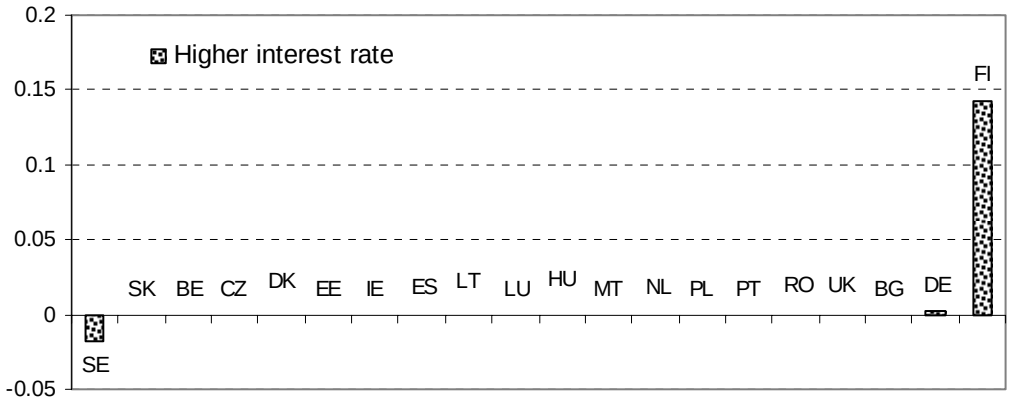
Source: Commission services, EPC.

Higher interest rates

Raising the assumption on the interest rate by 1 p.p. has an impact on public expenditure only in a few countries with funded components in the public pension schemes such as Sweden (-

0.02 p.p.) and Finland (+0.14 p.p.). The effect comes through a higher rate of return and its impact will depend on the extent to which assets have been accumulated. The effect of this test is generally stronger for private pension and in particular for countries that have large pensions scheme funds, such as the Netherlands, Denmark, Finland and Sweden.[48]

Graph 61 - Difference between the higher interest rate and the baseline scenarios (in percentage points)



Source: Commission services, EPC.

Zero migration

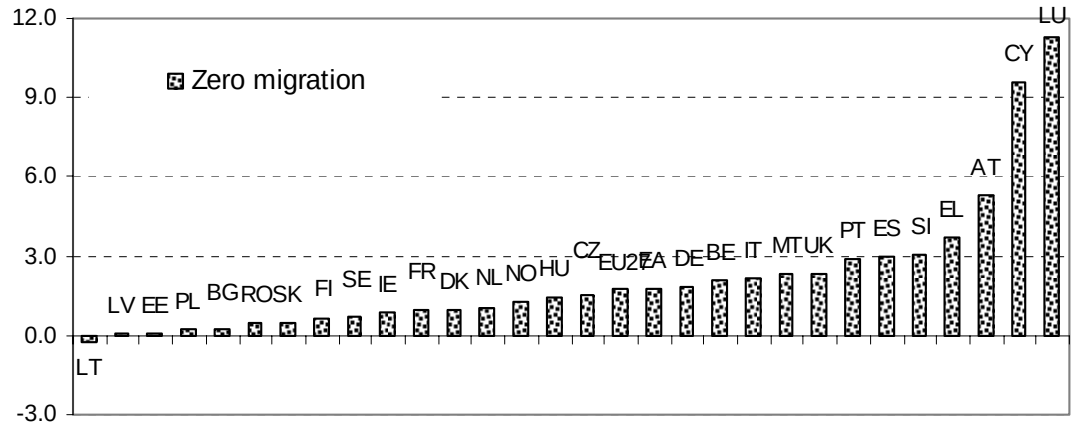
The zero migration scenario assumes the absence of both immigration and emigration between each Member State and the rest of the world. The assumptions of this scenario seem to be very strong and even unrealistic for some of the countries. As a result, the outcomes of this scenario have to be interpreted with caution. Indeed the difference between the baseline and the zero migration scenarios is the largest one among all of the sensitivity tests for majority of the Member States.

In general, due to the zero net migration assumption, the pension to GDP ratio increases. This is the case in all Member States except a very limited negative change in case of Lithuania. The EU27 average increase in pension to GDP ratio is projected to be +1.8 p.p. above the baseline change over the projection horizon. An increase in the pension to GDP ratio mainly results from an impact of the smaller labour force and lower GDP over the projection period, as migrants generally are active in the labour market. At the same time, the number of pensioners is generally less affected by the zero net migration assumption over the projection horizon, i.e. 2007 – 2060.[49]

[48] The Annex 'Assets in all pension schemes as a share of GDP' provides an overview of the value of assets in all pension funds, i.e. public, occupational and both private mandatory and voluntary (when data have been provided).

[49] Beyond 2060, the number of pensioners will be affected by the assumptions of the net zero migration scenario. As the current and future (up to 2060) level of employment is lower due to lower inflow of immigrants, the number of pensioner is expected to fall in the long-horizon (beyond 2060) as well.

Graph 62 - Difference between the zero migration and the baseline scenarios (in percentage points)



Source: Commission services, EPC.

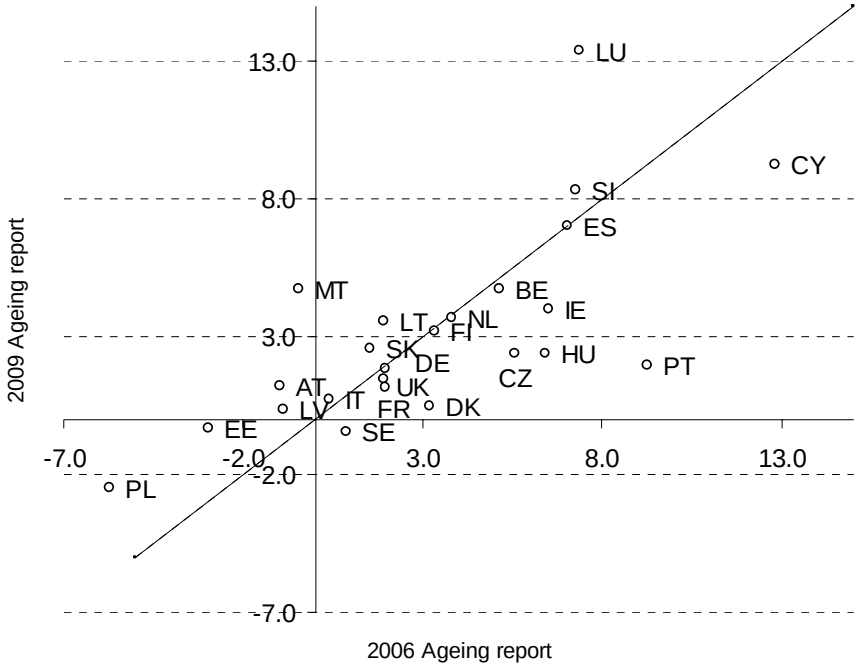
2.7. Comparison with the 2006 round of projections

Graph 63 presents the change in public pension expenditure as a share of GDP between 2007 and 2050 in the current projection exercises and as projected in 2006.[50] It reveals that, for most countries, the change in pension expenditure as a share of GDP has been revised over time, sometimes significantly (as reflected by the distance from the 45 degree line in Graph 63).[51] Compared with the 2006 pension projection exercise, pension expenditure is now projected to be fairly similar for the EU25 (rising by 2.1% of GDP, compared with 2.2% of GDP in the 2006 Ageing Report).[52]

Pension expenditure is now projected to increase more (or decrease less) in Estonia, Italy, Latvia, Lithuania, Luxembourg, Malta, Austria, Poland, Slovenia, Slovakia, with large upward revisions of 1.5 p.p. of GDP or more in Estonia, Lithuania, Luxembourg, Malta, Austria, Poland.[53] By contrast, a lower increase (or higher decrease) is now projected in Belgium, the Czech Republic, Denmark, Ireland, France, Cyprus, Hungary, Latvia, the Netherlands, Portugal, Finland, Sweden, the UK, with significant downward revisions of 1.5 p.p. of GDP or more in the Czech Republic, Denmark, Ireland, Cyprus, Hungary and Portugal.

[50] See the annex: 'Comparison of the public pension expenditure to GDP between 2006 and 2009 ageing reports'.
[51] A small discrepancy between the changes in the consecutive projection exercises may be due to different starting year used; for the 2006 projection, the change is calculated over the period 2004-2050 and in the current projection it is calculated over the period 2007-2050.
[52] It should be noted that the projection for Greece is included in the current projection exercise, which was not the case in the 2006 Ageing Report. Excluding Greece from the EU25 aggregate would lead to a lower increase in the current projection, of 1.9 p.p. of GDP.
[53] For Luxembourg, substantial differences between 2006 and 2009 projections results are due to the fact that a new projection methodology for cross border workers is introduced in the 2009 exercise, leading to a sensible reduction in labour input and potential growth.

Graph 63 - Change in the public pension to GDP (2007-50) compared: 2006 Ageing Report and current projection (in percentage points)



Source: Commission services, EPC.

The revisions of projected changes in pension expenditure over the long-term are due to several factors, notably but not exclusively due to reforms of pension systems. Also other factors can have an effect, such as changes in the demographic and macro-economic assumptions, changes in modelling pension expenditure over the long-term and changes in the coverage of the projection (data on pension schemes covered in the projection).

In order to shed light on the reasons behind these revisions, a comparison of a decomposition of the change in public pension expenditure between the 2006 Ageing Report and the current projection exercise into four factors is conducted, like in section 3 above.

Each effect is illustrated in Graph 64. In addition, the overview Table 21 presents a decomposition of the public pension to GDP ratio in 2006 and 2009 projections. An analysis of the reasons behind the revisions for each country is provided in the country fiches on the pension projection and results envisaged for release in the latter half of 2009. The main points may be summarized as follows:

- As shown in section 3 above, the main factor behind the projected increase in pension expenditure is the demographic transition to an older population. The dependency effect has decreased in a majority of countries Portugal, Ireland, Cyprus, the Czech Republic, Austria, Spain, the UK, Italy, Hungary, Denmark, Belgium, Finland, France, Slovenia, Germany and Sweden, and it has increased only in few the Netherlands, Luxembourg, Slovakia, Estonia, Poland, Latvia, Lithuania and Malta.

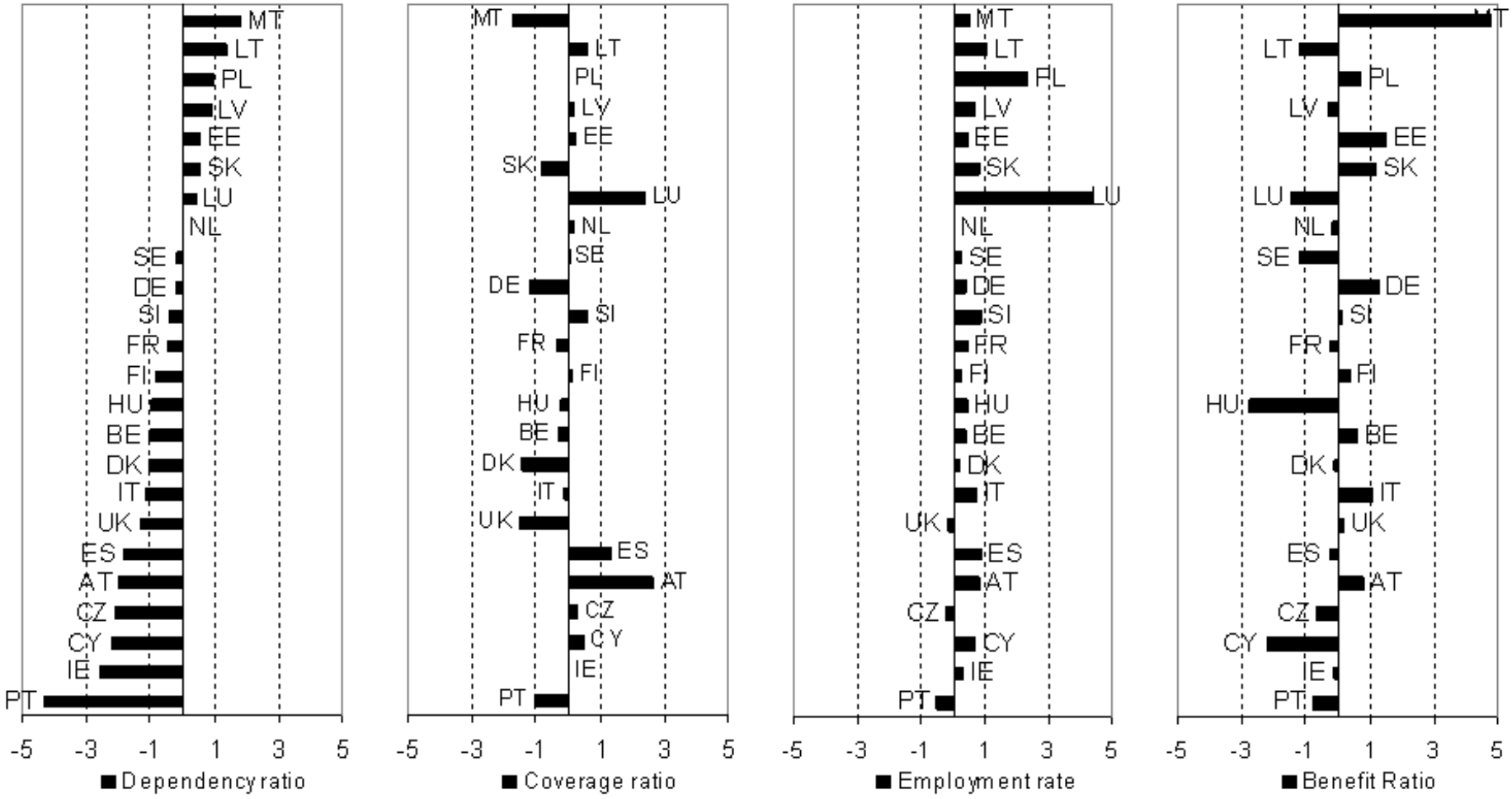
- The other factors are in general offsetting the increase that follows from the larger number and share of older people. In the 2009 projection exercise, the fall in coverage is more accentuated, thus offsetting the dependency effect to a greater extent in a majority of countries. These reflect changes in pension policies that have aimed at increasing the

effective retirement age either through increases in the statutory retirement age and/or through tightening access to early and disability pension schemes. Compared with the 2006 projection exercise, the largest reductions in the coverage ratio are projected in Malta, Denmark and the UK. By contrast, it increases in Austria, Spain and Luxembourg. An increase in the coverage effect may be due to a higher take-up of pensions by women thanks to their increasing participation in the labour market even if there is a lower take-up of pensions by men due to reforms undertaken.

- The employment effect contributes to offset the dependency effect too. As already seen before, the effect is rather small in most countries and it generally offsets less in the current exercise compared with the 2006 projection. This partly follows from the fact that employment rates have generally risen in the period since the previous projection was carried out and that the structural unemployment rates have not been reduced to the same extent. This leads to lower gains in employment rates over the projection period compared with the situation at the time of the previous projection.

- The benefit effect shows the extent to which average pensions increase at a different pace than average income (proxied by output per worker). The benefit effect can offset the dependency effect if: (i) the determination of the value of (future) accrued pension rights – eventually becoming pension benefits - is changed; (ii) the evolution of the pension after retirement is slower than average income (pension indexation below wage growth). It helps to offset the dependency effect in almost all countries, reflecting in many cases reforms that have been introduced so as to make the public pension systems more robust to demographic changes. In the Czech Republic, Denmark, Ireland, Spain, France, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, the Netherlands, Portugal, Sweden, the offsetting impact of the relative benefit reduction has increased compared with the previous 2006 projection and in particular for Hungary, Cyprus, Luxembourg, Sweden, Lithuania, Portugal and the Czech Republic. A common feature for some of these latter set of countries (Hungary, Portugal, the Czech Republic) is that they have introduced strong pension reforms since the completion of the 2006 Ageing Report. As a result, the overall increase in the public pension ratio is now projected to be considerably smaller.

Graph 64 - Change in the public pension to GDP (2007-50) compared: 2006 Ageing Report and current projection (in percentage points)



Source: Commission services, EPC.

Table 21 - Decomposition of the public pension/GDP ratio over 2007–50 in the 2006 and 2009 projections (in percentage points)

	Projection year	Dependency ratio	Coverage ratio	Employment rate	Benefit Ratio	Change 2007 - 2050 in %
BE	2006	7.7	-0.4	-0.9	-1.2	5.1
	2009	6.7	-0.7	-0.5	-0.6	4.8
BG	2006					
	2009	7.5	-2.2	-0.3	-1.8	2.5
CZ	2006	10.5	-3.5	-0.3	-0.6	5.6
	2009	8.3	-3.2	-0.5	-1.2	2.4
DK	2006	7.2	-2.8	-0.4	-0.5	3.2
	2009	6.2	-4.2	-0.2	-0.6	0.5
DE	2006	7.5	-0.6	-1.1	-3.5	1.9
	2009	7.3	-1.8	-0.7	-2.2	1.9
EE	2006	3.1	-1.5	-0.6	-3.8	-3.0
	2009	3.7	-1.3	-0.1	-2.3	-0.3
IE	2006	7.9	-1.4	-0.5	0.8	6.5
	2009	5.3	-1.4	-0.2	0.6	4.0
EL	2006					
	2009	12.7	-1.2	-0.7	1.8	12.3
ES	2006	12.4	-2.3	-1.8	-0.8	7.0
	2009	10.6	-1.0	-0.9	-1.1	7.0
FR	2006	8.7	-1.8	-0.9	-3.5	2.0
	2009	8.2	-2.1	-0.5	-3.8	1.2
IT	2006	11.5	-3.2	-2.0	-5.3	0.4
	2009	10.4	-3.3	-1.2	-4.2	0.7
CY	2006	10.2	1.2	-1.2	2.5	12.8
	2009	8.0	1.6	-0.5	0.2	9.2
LV	2006	3.4	-1.3	-0.7	-2.3	-0.9
	2009	4.3	-1.1	0.0	-2.6	0.4
LT	2006	5.4	-2.1	-1.0	-0.2	1.9
	2009	6.8	-1.4	0.1	-1.3	3.6
LU	2006	7.2	2.5	-4.4	2.1	7.4
	2009	7.6	4.9	0.0	0.6	13.4
HU	2006	10.5	-4.5	-1.1	2.0	6.4
	2009	9.5	-4.7	-0.7	-0.8	2.4
MT	2006	7.3	-1.0	-1.2	-5.0	-0.5
	2009	9.1	-2.8	-0.7	-0.2	4.8
NL	2006	6.3	-1.6	-0.2	-0.4	3.8
	2009	6.3	-1.5	-0.2	-0.5	3.7
AT	2006	11.3	-5.8	-1.3	-4.3	-1.0
	2009	9.3	-3.1	-0.5	-3.6	1.2
PL	2006	10.4	-5.7	-3.2	-6.3	-5.7
	2009	11.3	-5.7	-0.9	-5.6	-2.5
PT	2006	13.7	-0.9	-0.2	-3.0	9.3
	2009	9.4	-1.9	-0.7	-3.8	2.0
RO	2006					
	2009	10.6	-3.5	0.5	2.0	8.3
SI	2006	13.3	-3.6	-1.0	-0.9	7.3
	2009	12.9	-3.0	-0.1	-0.7	8.3
SK	2006	9.0	-2.5	-1.3	-3.1	1.5
	2009	9.6	-3.3	-0.4	-1.9	2.6
FI	2006	8.8	-3.1	-0.9	-0.8	3.3
	2009	7.9	-2.9	-0.6	-0.5	3.2
SE	2006	4.8	-0.2	-0.6	-2.8	0.9
	2009	4.6	-0.2	-0.4	-4.0	-0.5
UK	2006	4.7	0.0	-0.1	0.0	1.9
	2009	3.4	-1.5	-0.3	0.2	1.5
NO	2006					
	2009	7.4	-1.3	0.2	-1.7	4.5

Source: Commission services, EPC.

Note: The dependency contribution measures the impact of the changes in the dependency ratio over the projection period as the ratio of persons aged 65 and over to the population aged 15 to 64.

The employment contribution measures changes in the share of the population of working age (15 to 64) relative to the number of the employed, i.e. an inverse employment rate.

The coverage contribution of pensions measures changes in the share of pensioners relative to the population aged 65 and over.

The benefit contribution captures changes in the average pension relative to average income.

See Box DECOMPOSITION for details.

3. HEALTHCARE EXPENDITURE

3.1. Introduction

The main objectives of the health care systems are defined as 'improving the health of the population they serve; responding to people's expectations and providing financial protection against the costs of ill-health'.[54]

This chapter does not aim at assessing the quality or measuring the extent to which the objectives of health care systems are being achieved in the Member States of the European Union. Instead, it concentrates on the financial side of the system and the impact of various factors related mainly, although not exclusively, to the ageing of the population on public spending devoted to the provision of health care.

Health care expenditure is an important and constantly rising component of total government spending.

Box: Public health expenditure: a historical perspective

The governments of all EU Member States are heavily involved in the financing, and in some cases in the provision, of health care.[55] Consequently, health care spending is a major, and over time growing, source of fiscal pressure. Table 22 presents the development of public spending on health care[56], its share in total expenditure and total government outlays over the last decades.

Over the last decades, public health spending followed similar trends as total health care expenditure, increasing rapidly during the 1960s and 1970s. In the 1980s and 1990s, the increasing trend slowed down, and even reversed in a few countries, due to overall budgetary consolidation efforts. It picked up again in late 1990s and especially in the first decade of the 21st century to reach an average level of 8% of GDP in 2007 (ranging from less than 3% of GDP in Cyprus to over 10% of GDP in Sweden). A convergence or catch-up process is evident across countries, with the largest increases over time occurring in countries with the lowest initial levels.[57] Public spending on health care now accounts for between 10 and 15% of total primary government spending in most EU countries, although the dispersion is wide ranging from 6.0% in Cyprus to 18% in Norway. However, this share has been growing, especially during the 1990s suggesting that health care budgets fared better than other expenditure items during periods of fiscal consolidation.

[54] World Health Organization (2000), The World Health Report 2000. Health Systems: Improving Performance, p.8.

[55] This may reflect a shared view on the economic rationale for public sector involvement in health care markets based on efficiency and equity considerations. Health care markets suffer from the typical problems of insurance markets such as adverse selection (which may make it difficult for persons with higher health risks to obtain affordable coverage leading to a sub-optimal consumption of health care services), moral hazard (whereby the insured person may have an incentive to over consume health care services as they do not bear the full cost) and other asymmetric information (whereby health care providers may be in a position to induce the demand for treatment and extract economic rents).

[56] The historical data do not allow for a precise distinction between health care and long-term spending, the latter concept being precisely defined and analysed only over the last decade. Consequently, the figures presented in this box include both health and long-term care.

[57] For example, public spending on health care in Portugal grew from 1.5% of GDP in 1970 to 7.3% of GDP in 2007, in Spain from 2.3% to 6.1% and Greece from 2.3% to 6.0%.

Table 22 - Past trends in public health spending (including health and long-term care) in EU Member States, in %, 1970-2007

	Public health expenditure as % of GDP						total health expenditure			general government total outlays		
	1970	1980	1990	2000	2006	2007	1990	2000	2006	1990	2000	2005
BE	:	:	:	6.5	7.6	9.1	:	76	73	:	13.4	13.2
BG	:	:	5.2	:	:	4.9	100	:	:	:	8.6	12.1
CZ	:	:	4.6	5.9	6.0	6.4	97	90	88	:	14.1	13.8
DK	:	7.9	6.9	6.8	8.0	7.7	83	82	84	12.3	12.7	15.7
DE	4.4	6.6	6.3	8.2	8.1	8.3	76	80	77	:	18.2	17.9
EE	:	:	:	4.1	3.7	5.0	:	77	73	:	11.3	11.5
IE	4.1	6.8	4.4	4.6	5.9	6.7	72	74	78	10.2	14.6	17.3
EL	2.3	3.3	3.5	4.7	5.6	6.0	54	61	62	7.9	10.1	13.3
ES	2.3	4.2	5.1	5.2	6.0	6.1	79	72	71	:	13.2	15.5
FR	4.1	5.6	6.4	8.0	8.8	9.5	77	79	80	13.0	15.5	16.6
IT	:	:	6.1	5.8	6.9	7.5	80	73	77	11.6	12.7	13.9
CY	0.9	1.5	1.8	2.4	:	2.7	40	42	:	:	6.4	6.0
LV	:	:	2.5	3.5	3.8	3.8	100	74	63	:	8.8	10.8
LT	:	:	3.0	4.3	4.3	5.0	90	72	70	:	14.6	11.9
LU	2.8	4.8	5.0	5.2	6.6	7.1	93	89	91	13.2	13.9	17.1
HU	:	:	:	4.9	5.9	6.0	:	71	71	:	10.6	11.2
MT	:	:	:	6.1	6.6	5.7	:	77	76	:	12.0	14.6
NL	:	5.1	5.4	5.0	7.6	8.2	67	63	82	9.8	11.4	13.2
AT	3.3	5.1	6.1	7.5	7.7	7.7	73	76	76	11.9	14.6	15.6
PL	:	:	4.4	3.9	4.3	4.4	92	70	70	:	9.4	9.9
PT	1.5	3.4	3.8	6.4	7.2	7.3	66	73	71	9.6	14.9	15.5
RO	:	:	2.9	3.9	3.9	3.5	100	100	100	:	9.9	12.4
SI	4.2	4.4	5.6	6.9	:	7.7	100	87	:	:	13.1	13.4
SK	:	:	:	4.9	5.1	5.2	:	89	68	:	9.5	13.6
FI	4.1	5.0	6.2	5.1	6.2	7.3	81	73	76	13.0	10.6	12.7
SE	5.8	8.2	7.4	7.0	7.5	10.7	90	85	82	:	12.6	13.8
UK	3.9	5.0	5.0	5.8	7.3	8.3	84	81	87	11.9	14.8	16.4
NO	4.0	5.9	6.3	6.9	7.3	7.8	83	83	84	11.9	16.4	18.0

Source: OECD Health Data 2007; European health for all database (HFA-DB), World Health Organisation Regional Office for Europe; Commission Services.

Public expenditure on health care depends on a series of factors affecting both demand for and supply of health care goods and services. Although depending to a considerably smaller extent than private expenditure on the market variables (such as prices, individual income, etc.), it is still a result of an interaction between independent market participants and public actors.

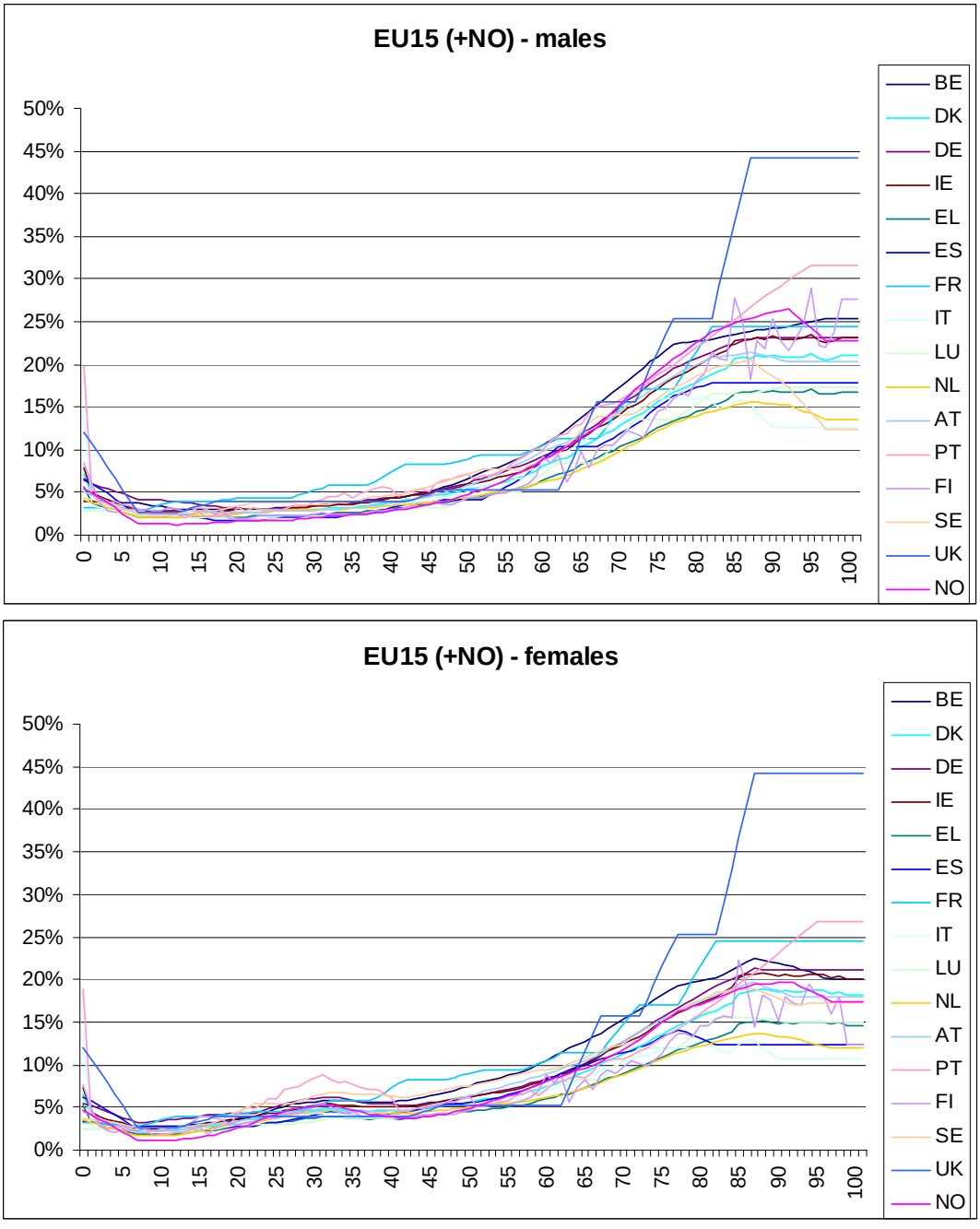
3.2. Demand side factors

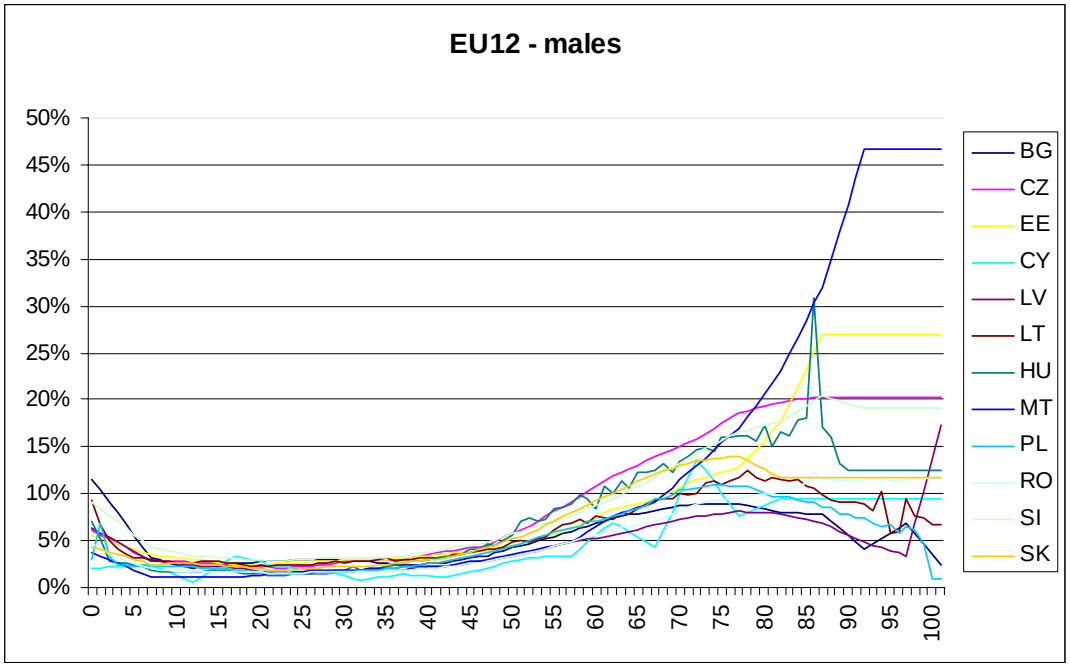
Intuitively, demand for health care is mainly driven by the number and health status of potential patients. Although generally true, this simple correlation may be affected by the legal provisions or government policy regulating the provision of care. In practical terms, in many countries the contracts between public payers and health care providers are pre-determined in terms of total budget or amount of services to be paid for. This way, health authorities can artificially reduce demand for services which can result in underprovision. The discrepancy can often be complemented by additional private provision. To some, although much lower degree, an opposite situation may take place when (excessively) easy and free access to health care leads to excessive use of health care, higher than what would be justified by the actual social needs for this kind of services.

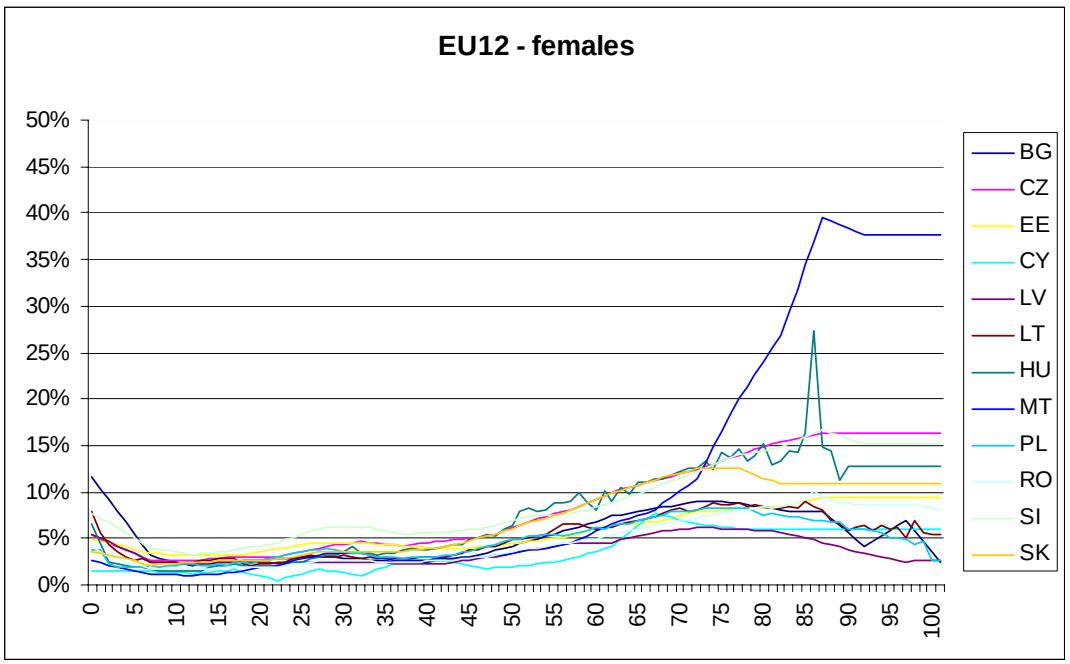
3.2.1. Demographic structure of the population

Abstracting from the features of individual health care systems, demand for health care goods and services depends naturally on the number of people in need of care. The need for health treatment is determined by the health status of the population which, in turn, is highly correlated to, but not completely dependent on, the average age of the population. The relationship between the age of an individual and his demand for health care is well exemplified by so-called "*age-related expenditure profiles*".

Graph 65 - Age-related expenditure profiles of health care provision (spending per capita as % of GDP per capita)







Source: Commission services, EPC.

Graph 65 plots average public per capita spending on health care against the age of health care beneficiaries in each country of the EU.[58] If spending increases generally with the age of a person, it is mainly because the prevalence of morbidity and disability grows with age. However, high spending in the early childhood and in the birth-giving period in case of women, as much as an significant reduction in spending towards the end of the life-span[59]

[58] The profiles have been provided by Member States and updated to the base year 2007 by applying GDP per capita growth rate.

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

may be due to the fact that along with real needs driven by biological factors, social, economic and even cultural considerations affects the division of the scarce resources between different age groups of the population.

An interesting phenomenon is a visible difference in the age-related expenditure profiles between EU15 and EU12. The current spending on health care is significantly higher in both absolute (as % of GDP) and relative (per capita) terms in the old Member States of the EU. While this phenomenon can be easily and quite plausibly justified by an important gap in income levels between the two groups of countries, the visible difference in the shape of per capita expenditure is much harder to interpret. In fact, the gap in per capita spending between EU15 and EU12 increases dramatically at old ages. Not only the peak in per capita spending is significantly lower in the newly acceded Member States, but it is reached at much lower age.[60]

3.2.2. Developments in health status

While the changes in the demographic structure of the population are relatively straightforward to analyse, based on the observed trends in fertility and mortality rates (for detailed description of demographic trends in Europe, see Chapter 1), forecasting future evolution in the health status of a population is a considerably more challenging exercise for two main reasons. First, there are definitional problems; second, changes in morbidity and epidemiological variables are highly unpredictable.

To tell if the population is more or less healthy one needs to have an operational measure of health or, by default, of ill-health. To define this concept, a number of indicators have been proposed[61], none of which is fully satisfactory and available on a comparable basis.

Problems with establishing trends in the health status of the population derive partially from the discussed difficulties in finding appropriate indicators, but to the largest extent they are due to the lack of comparable data covering long enough periods of time. While evolution in mortality rates and life expectancy can be estimated quite accurately on the basis of basic administrative information (censuses, surveys, etc.), more detailed epidemiological data is subject to much higher degree of uncertainty.

The researchers practically unanimous in stating that life expectancy is constantly increasing over time all over the world due to falling mortality rates in all age cohorts and constantly growing ability of medicine to save people's life. Both average life expectancy and maximum age are rising over time, increasing the share of elderly and the oldest old in total population.

[60] This phenomenon may be due to the gap in life expectancy in line with the death-related costs hypothesis: health care needs depend on the distance to death rather than on the biological age of a person. Thus with increasing life expectancy, average health status of each age cohort improves accordingly. However, the size of the gap, not possible to be explained solely by the difference in life expectancy, suggests that some other, probably economic or social factors may play a role. Differences in health care costs, in particular for very old persons, may also be due to differences between countries with respect to distribution of costs between health and long term care.

[61] The suggested indicators range from the simplest and most aggregate (life expectancy interpreted as a measure for overall physical condition), having the advantage of including all dimensions of health but abstracting completely from the 'quality' of life, through more complex (e.g. disability-adjusted life years, combining total life expectancy with years of life lost from premature death and years of life lived with disabilities) to the highly specific and precisely defined, but lacking the value of universality, indicators like causes of death or prevalence rates of a number of selected conditions.

However, this increase in life expectancy usually occurs at the detriment of people's health or 'quality' of life. While the medical advancement is able to save human life from a growing number of diseases, it is not as apt at keeping people in good health, which thus very often meansextending the time spent in chronic illness. The observed change in the morbidity pattern in the industrialised countries confirms this statement: the infectious diseases are being replaced as main sources of burden of disease by non-communicable diseases, with chronic diseases accounting for more than 60% of deaths globally.[62]

Three different hypotheses have been put forward to predict possible future interaction between evolution in life expectancy and changes in the prevalence of disability and ill-health. The optimistic hypothesis of "compression of morbidity" proposed by Fries (1980, 1989), suggested that disability and ill-health is compressed towards the later period of life at a faster pace than mortality, thus people are expected to live not only longer, but also in better health. The contrary hypothesis, posited by Gruenberg (1977), Verbrugge (1984), and Olshansky et al. (1991) stated that decline in mortality is largely due to decreasing fatality rate for diseases, rather than reduction in their prevalence/incidence. Consequently, falling mortality is accompanied by an increase in morbidity and disability, leading to an "expansion of morbidity". A third hypothesis of "dynamic equilibrium", proposed by Manton (1982) suggests counterbalancing effects of two phenomena: decreased fatality rates leading to longer prevalence of disability and decreasing prevalence/incidence of chronic diseases.

Recent empirical evidence has not discarded any of the presented hypotheses. Higher levels of some disabling conditions (dementia, musculoskeletal diseases) observed over the last years are accompanied by decreasing rates of prevalence of others (cardiovascular and chronic respiratory diseases). International evidence suggests that health may continue to improve, but some causes of disability may at the same time become more prominent.[63] It is therefore still very difficult to predict the levels of morbidity and therefore potential demand for health care even in the very near future.

3.2.3. Individual and national income

Another important factor affecting health care expenditure is the level of income. The correlation between income and health care spending is observable at both individual and national level, although the transition mechanism works in a slightly different way and the elasticity of health care spending with respect to income depends on the institutional structure of health care system.

[62] Nine leading causes of the burden of disease (concept using the disability-adjusted life years as an indicator allowing to assess the total loss of health from different causes) in High Income Countries in 2003 have been non-communicable diseases (unipolar depressive disorders; ischaemic heart disease; cerebrovascular disease; alcohol use disorders; alzheimer and other dementias; adult-onset hearing loss; chronic obstructive pulmonary disease; trachea, bronchus and lung cancers; and diabetes mellitus), three of which (unipolar depressive disorders, adult-onset hearing loss and alcohol use disorders) have been characterised by few direct deaths but large disability. At the same time, in Low and middle-income countries, five of the leading ten main causes have been communicable diseases (lower respiratory infections; HIV/AIDS; diarrhoeal diseases; malaria; tuberculosis). Source: Global Forum for Health Research (2006), Monitoring Financial Flows for Health Research 2006: The changing landscape of health research for development, p. 71.

[63] Global Forum for Health Research (2008), Monitoring Financial Flows for Health Research 2008: Prioritizing research for health equity, p. 65.

At the individual level, spending on health care in relation to income depends on whether a treatment/medicine is covered by a universal or voluntary insurance. If an individual is covered by the health insurance, marginal spending on health care does not depend on income. Consequently, the income elasticity of health care spending could be close to or even below zero. On the other hand, the situation may be reversed if a treatment or drug is not covered by universal insurance. In such case, health care may be considered as a luxury good, especially having in mind that treatments which are not covered by social insurance are those which in most cases do not save people's life, but just 'improve its quality' (plastic surgery, dentistry, etc.).

Neither of these two situations described above reflect public spending at an aggregate level. On the one hand, as public health care spending is not part of a pooled fund and must be entirely covered by revenues, there is no moral hazard, no incentives for government to spend more, as is the case for individuals purchasing services and goods that are covered by universal insurance. This is why correlation between health care spending and income is much stronger at an aggregate than at an individual level. On the other hand, given budgetary constraints and caps on spending, public expenditures are not linearly correlated to GDP, especially in periods of fluctuating economic growth. Furthermore, while comparing data for different countries, it seems that the status of health care evolves over time. As long as it is not universally available public good, it has some features of luxury good, and the (both public and total) spending tends to increase faster than the revenue growth. Once entire population is provided with basic health services, they loose the luxury character and are purchased by the governments and individuals as normal goods, in line with the increase in disposable income.

A number of empirical studies attempted to estimate the type of correlation between income and health care expenditure. Most of them led to a general conclusion that "Health care is an individual necessity and a national luxury"[64] or in other words, health care spending is highly inelastic at an individual level, but at the national level its elasticity with respect to income exceeds unity. An average coefficient of elasticity of public spending on health care with respect to income can be estimated, based on a number of studies, as close to 1.1.[65]

3.3. Supply side factors

On the supply side, a large number of factors interact to determine the amount of health care provided to the population in response to its needs. Those factors are both external, depending on objective economic and social developments and policy-related. The main ones are technological development and medical progress, legal and institutional organisation of the health care provision system, and available resource inputs, both financial and human. The present report aims at sketching the exogenous risks for public spending, thus concentrates on the objective, no-policy driven developments.

[64] For an overview of the empirical studies, see: Getzen (2000).

[65] Using the historical data (OECD Health Data) European Commission has run an econometric specification aiming at the establishment of the income elasticity coefficient in the European countries. Having specified only two (demographic and income) explanatory variables, the regression has been run resulting in an estimated coefficient of 1.19 for all the available countries. The estimates differ considerably for EU15 and EU12, mainly due to the poor data quality and short time series available for four EU12 countries (Czech Republic, Hungary, Poland, Slovakia) included in the OECD database.

3.3.1. Technological development

Technological development is almost unanimously quoted among the major factors behind the growth in health care expenditure. Empirical studies suggest that the significant increase in health care expenditure observed in the recent decades across the industrialised world cannot be fully explained either by demographical or epidemiological changes, or by growth in the global well-being. This 'gap' is supposedly filled by technology which, according to early studies (Newhouse 1992, Cutler 1995) was supposed to account for between 50% and 75% of health care costs increases, while currently, with health care being less and less labour-intensive sector, may contribute to the expenditure growth to an even higher degree.

According to an econometric exercise done by the Commission (see Annex 2), over the last decades almost 2 percentage points of the yearly increase in health care expenditure per capita could be attributed to non-demographic and non-income factors.[66] Assuming that institutional and policy factors partially cancel out, this amount can be mostly attributed to the effect of more expensive[67] and wider spread modern medical technologies. In a similar exercise, the OECD[68] concluded that about 1 percentage point of the yearly increase in health care expenditure over the past decades can be assigned to technological development.

3.3.2. Legal and institutional setting

Apart from the objective, exogenous drivers, public (and private) expenditure on health care is strongly influenced by the legal setting and institutional arrangements according to which health care is provided and financed (see the box below). As such, they play a major role in public policies by limiting the health care costs and establishing the right balance between the principles of solidarity and efficiency that each health care system is supposed to respect.

Box: Classification of health care systems

The OECD classifies existing health care systems according to the main characteristics of the schemes: (public/private) ownership and management of the entities providing health care as well as the way of financing them. The result is a general classification in which the health care systems of the OECD Member States have been divided into three groups:

- *the public-integrated model* links budgetary financing with public health care providers. It mainly concerns hospital care, with staff being employed as public-sector employees while ambulatory doctors and other health care services providers are often private or independent contractors. This model facilitates universal coverage and aggregate cost containment as the health care spending is built into overall government budget limits. However, it may be less conducive at inducing economic incentives favouring quality and efficiency. The health care systems of the Nordic (Denmark, Sweden, Finland) and Mediterranean (Italy, Greece, Portugal) countries could be characterised as falling under this model.
- *the public-contract model* combines public payers (either a State agency or social security fund) with private health care providers. The advantages with respect to the other models are not unequivocal. While the single payer enjoys strong position against providers and can negotiate lower prices and better quality of services, the functioning of independent providers requires stricter regulation and supervision by public authorities

[66] Since technological development is naturally faster in wealthier countries, income coefficient can explain significant part of the technological impact on health care expenditure. However, if a separate variable is specified for technology, the impact of income turns out to be much lower, suggesting that large part of the income effect works through high investment in medical research and technology. For more details, see Annex 2

[67] Intuitively, development of new technologies should lead to more efficient (faster, less intrusive) treatment of already known diseases and conditions. This cost-reducing effect is however more than offset by higher investment in R&D and the growing demand induced by the availability of treatment of the previously incurable diseases.

[68] OECD (2006b).

and incurs higher administrative costs. The health care systems of most continental countries could be broadly characterised as falling under this model.

- *the private insurance/provider model* is the least used in EU Member States. It involves private insurance entities contracting private health care providers. Coverage may be mandatory or voluntary. With the strongest competitive base among the mentioned approaches, the model has the potential to guarantee wide responsiveness to patient needs and incentives for quality improvement, although the evidence of this having happened is mixed. An important additional drawback is the difficulty in ensuring price and cost control. The health care systems of the US or CH could be characterised as falling under this model.

Source: E.Docteur, H.Oxley (2003), Health-care systems: lessons from the reform experience, OECD Health Working Papers, No. 9 DELSA/ELSA/WD/HEA (2003)9

The issue of the impact of institutional organisation of health care provision and financing system is however a highly complex and controversial question and despite several studies contributing to the analysis of the possible relationship between the type of system and health care expenditure[69], it is not feasible to draw unequivocal conclusions or estimate at least approximate correlation coefficients between the qualitative features of health care system organisation and quantitative measures of public expenditure on health care.

3.3.3. Human and physical capital

Equally problematic is the issue of human resources and physical capital devoted to the health care sector, which are mostly determined by ad hoc political decisions, often driven by current needs of fiscal stability. Those policy decisions may affect the number of professionals allowed to execute the job or the access to basic and professional health care (qualitative limits and qualitative requirements on the access to medical schools or professional certificates, decisions on the location of hospitals and clinics, legal regulations on the density of health care staff per number of population, etc.). As in the case of institutional setting, a number of studies have attempted to find statistical correlation between the size of medical staff and health expenditure,[70] but the results are not conclusive, not allowing for a clear conclusions and policy recommendations.

3.4. Short overview of the projection methodology

3.4.1. The model

The level of public expenditure on health care is the combined effect of a number of factors described and discussed in the previous section. Given that many of them are either not quantifiable, or depending on ad hoc policy decisions, a great deal of caution and uncertainty surround prediction of future expenditure level. The present projection exercise aims at estimating the correlation coefficients between public expenditure and a number of factors empirically found to affect it and to project the potential impact each of them can have, ceteris paribus, over the time span of one generation. Consequently, the results of the projections should not be interpreted as the forecast of expenditure. Instead, by presenting a series of scenarios and sensitivity tests, it should serve as a catalogue of drivers and help assess the potential impact each of them is expected to have on public spending on health care.

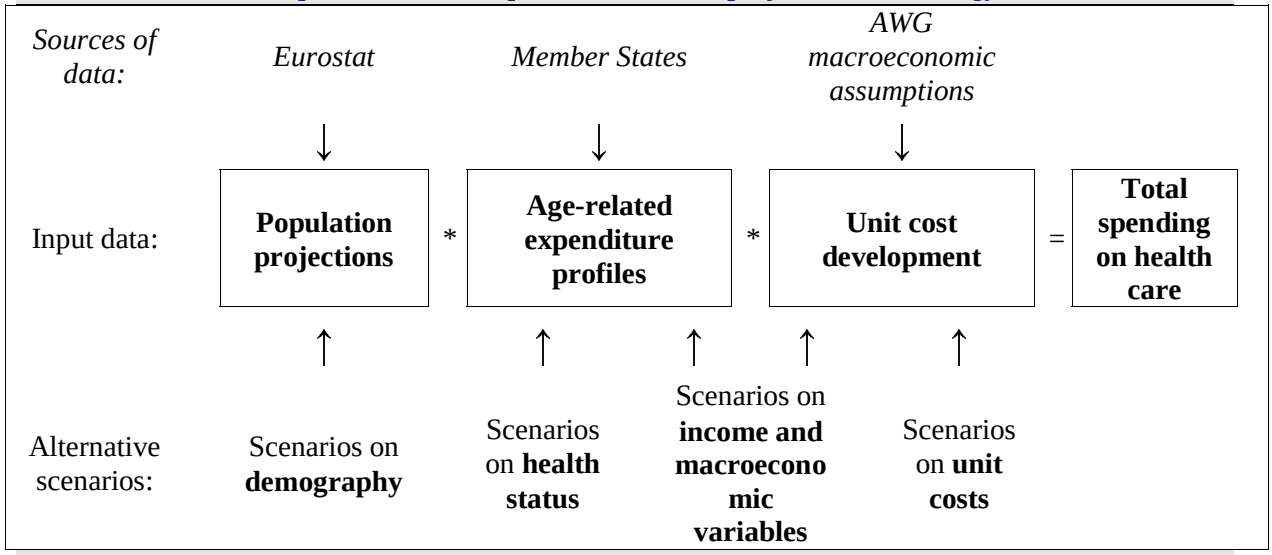
[69] Gerdtham et al. (1992, 1992a and 1992b), L'Horty et al. (1997), Leu (1986), Bac (2004).
[70] Getzen (1990), Murthy and Ukpolo (1994), Bac (2004), Schulz (2005), Bac and Balsan (2001); Rochaix and Jacobzone (1997).

The model used to project future expenditure on health care is a traditional simulation model whereby the overall population is disaggregated into a number of groups having a common set of features. Each group represents a combination of characteristics. As the number of individuals in each group changes over time, so do the aggregate value of the endogenous variable. The schematic methodology to project health care expenditure is presented in Graph 66 below.

The common elements of all scenarios are the macroeconomic assumptions agreed by the Ageing Working Group and population projections provided by Eurostat. The age and gender-specific per capita expenditure profiles provided by the Member States are applied to the demographic projections provided by Eurostat to calculate nominal spending on health care.

The adjustments reflecting the effects of different factors on health care spending are applied by correspondingly changing one of three main inputs: demographic projection scenario, development over time of the age-related expenditure profiles, and pattern of unit cost developments (driven by the macroeconomic variables).

Graph 66 - Schematic presentation of the projection methodology



Source: Commission services, EPC.

The list of factors whose impact can be modelled is obviously not exhaustive. The AWG model focuses on exogenous and objective factors, not depending on government policy or intentional action by any individual participant of the health care market. As such, most scenarios, including the AWG reference scenario, should be considered 'no-policy change' scenarios.[71]

3.4.2. Scenarios

The present projections concentrate on a number of factors whose effect on public expenditure can be modelled and expressed quantitatively. These are: changes in demographic

[71] The only exception is the unit cost convergence scenario showing the effect of a convergence of cost profiles of the EU12 countries towards the average profile of the EU15 countries. However, even such evolution in unit costs may be explained as the combined effect of objective factors (increase in individual and national income, diffusion of modern technologies, higher living standards leading to higher public expectations on quantity and quality of health care provided by the government, etc.) which forces a change in the amount of goods and services provided to the population by the government.

structure of the population, possible evolution of health status of the population, incorporation of the 'death-related costs' concept, higher income elasticity of demand for health care, alternative pattern of unit cost evolution and the real convergence process leading to convergence in the age profiles of health care expenditure. The overview of the scenarios is presented in Table 23 below.

Table 23 - Overview of different scenarios used to project health care spending

	Pure demographic scenario	High life expectancy scenario	Constant health scenario	Death-related costs scenario	Income elactity scenario	EU12 cost convergence scenario	Labour intensity scenario	*AWG reference scenario*
Population projection	Europop 2008	Alternative high life expectancy scenario	Europop 2008	Europop 2008	Europop 2008	Europop 2008	Europop 2008	Europop 2008
Age-related expenditure profiles	2007 age-related expenditure profiles held constant over projection period	2007 age-related expenditure profiles held constant over projection period	2007 profiles shift in line with changes in age-specific life expectancy	2007 profiles held constant but split into profiles of decedents and survivors	2007 age-related expenditure profiles held constant over projection period	Individual EU12 country profiles converging to the average EU15 profile over the projection period	2007 age-related expenditure profiles held constant over projection period	*2007 profiles shift by half the change in age-specific life expectancy*
Unit cost development	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per worker	*GDP per capita*
Income elasticity of demand	1		1	1	1,1 in 2007 converging to 1 by 2060	1	1	*1,1 in 2007 converging to 1 by 2060*

Source: Commission services, EPC.

1. *Pure demographic scenario* attempts to isolate the 'pure' effect of an ageing population on health care spending. It assumes that age-specific morbidity rates do not change over time or, in practical terms, that age-related public health care spending per capita (considered as the proxy for morbidity rate[72]) remains constant in real terms over the whole projection period. Since this constancy in health status is accompanied by a gradual increase in life expectancy underlying demographic projections, all gains in life expectancy are implicitly assumed to be spent in bad health, while the number of years spent in good health remains constant. As such, this scenario is in line with the *expansion of morbidity* hypothesis discussed above. The constant age profile is applied to the population projections with an assumption that the costs evolve in line with GDP per capita. Such evolution of unit cost levels can be considered to be neutral in macroeconomic terms – if no change in the age structure of the population occurs, the share of health care sector in GDP would remain the same over the projection period.

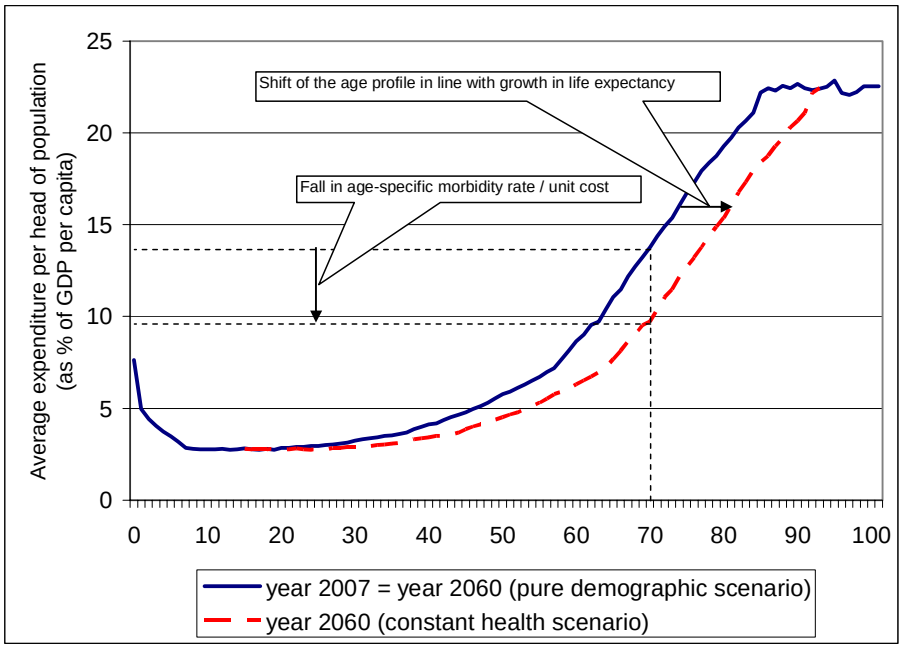
2. *High life expectancy scenario* is built as a sensitivity test for measuring the impact of alternative assumptions on mortality rates (life expectancy at birth being one year higher at the end of projection period than in the baseline demographic scenario). The scenario is

[72] Strictly speaking, age profiles of expenditure illustrate exclusively public health care spending per person of a given age cohort. As such it is not the measure of health status or morbidity. However, given the lack of a reliable and comparable data on the latter, one can plausibly assume that the shape of the profile follows the evolution of health status over the lifespan. To avoid counterintuitive developments, it has been assumed that the decreasing segments of the curve (early childhood, old age and child-giving period for women) will be kept constant over time.

methodologically identical to the *"pure demographic scenario"*, but alternative input data on demography and GDP are used.

3. *Constant health scenario* is inspired by the *dynamic equilibrium* hypothesis and captures the potential impact of possible improvements in the health status in line with projected decline in mortality rates. It assumes that the number of years spent in bad health during a life time remains constant over the whole projection period, i.e. all future gains in life expectancy are spent in good health. As the morbidity rate (proxied by expenditure age profiles) is assumed to fall precisely in line with the decline in the mortality rate, this process is modelled by progressively shifting the age-related expenditure profile observed in the base year outwards, in direct proportion to the projected gains in age and gender specific life expectancy, embedded in the baseline population projection. This procedure is illustrated in Graph 67 below by the dotted line, which illustrates the stylised age-related expenditure profile that would be applied in the year 2060.

Graph 67 - Stylized illustration of the different scenarios on future morbidity/disability and longevity using age-profiles of health care costs



Source: Commission services, EPC.

In the 2006 projection exercise an alternative "*improved health scenario"*, based on *morbidity compression* hypothesis, was performed. It has been decided to drop this scenario in the present round of exercise due to the lack of convincing empirical evidence confirming the highly optimistic hypothesis behind it and difficulties in quantifying the improvement in health status beyond the fall in mortality rates.

4. *Death-related costs scenario* employs an alternative method to project health care spending, taking into account probable reduction in health care spending resulting from the evolution of mortality rates. The methodology links health care spending to the number of remaining years of life, given the strong empirical evidence that a large share of total spending on health care during a person's life is concentrated in the final years of life. Therefore, as mortality rates decline and smaller share of each age cohort are in their terminal phase of life, health care expenditure calculated using constant expenditure profiles may be overestimated. The reasoning behind the death-related costs theory resolves to similar

arguments as in the "*constant health scenario"* presented above. Over time a growing inconsistency appears between two basic assumptions underlying the "*pure demographic scenario"* methodology. On the one hand, the assumption of constant age profiles which is a central element of the "*pure demographic scenario"* implies constant morbidity rates and constant unit cost of health care (as % of GDP per capita) at each age. On the other hand, falling mortality rates embedded in the population projections lead to a fall in the share of those in terminal phase of their lives in each age cohort which, in accordance with the empirical evidence, accounts for a disproportionately large share of total health care spending. To address this inconsistency, an average profile of *death-related costs* by age has been constructed based on available empirical data[73] supplied by the Member States, where unit costs are differentiated between decedents and survivors. Then, using age and gender-specific mortality rates each age group has been split into the group of decedents and survivors and the respective unit cost has been applied to each one. The two groups are then added and the usual indexation rule is applied.

4. ***Income elasticity scenario*** shows the effect of income elasticity of demand exceeding unity on the evolution of total spending over time. The strengthened impact of income growth may incorporate the effect of a number of potential positive factors: higher living standards, fulfilment of the basic needs leading to growing expectations and social pressure to catch-up with the quality and coverage of health care provided to the populations in the neighbouring countries, and above all development of medical knowledge and technologies.[74] In practical terms, it is identical to the "*pure demographic scenario"* except that the income elasticity of demand is equal to 1.1 in the base year and converges in a linear manner to 1 by the end of projection horizon in 2050. The elasticity coefficient at the beginning of the period has been chosen to take account of empirical evidence on developments in this value over the recent decades.

5. ***EU12 cost convergence scenario*** is meant to capture the possible effect of a convergence in real living standards (which emerges from the macroeconomic assumptions) on health care spending. It concerns only the recently acceded Member States (EU12) in which current spending on health care (both in nominal terms and as a % of GDP per capita) is well below the levels observed in the EU15 countries. By taking the lower and flatter 2007 age-related expenditure profiles (see Graph 65) as the basis of the health care projections, the projected budgetary impact of ageing will be less in the EU12 countries as compared to EU15. "*Cost convergence scenario"* assumes therefore that the individual age-related expenditure profiles of the EU12 countries in the base year 2007 will progressively increase to the average age-related expenditure profile of EU15 countries by 2060.

6. ***Labour intensity scenario*** is an attempt to estimate the evolution in health care expenditure under the assumption that health care is a highly labour-intensive sector and, consequently,

[73] The average death-related costs profile used for all the countries has been constructed as a simple average of the profiles, expressed as the ratio between the costs borne by a decedent (a person that is going to die within one year) and a survivor (a person that is going to survive at least one year), provided by nine Member States (Belgium, Czech republic, Spain, France, Italy, the Netherlands, Austria, Poland, Finland) and completed with the data coming from academic sources covering four other countries (see: Madsen (2004) for Denmark, Busse, Krauth, Schwartz (2002) for Germany, Batljan and Lagergren (2004) for Sweden, and Seshamani, Gray (2004) for the UK). The reported individual country-specific profiles differ significantly (due to different samples, methodologies, definition of 'time close to death, etc.), so that using them instead of an average would negatively affect comparability of the results.

[74] The impact of technological development has been assessed in a separate scenario, which uses the econometric analysis of past trends in public health care expenditure, demographic, income and non-income variables. For details, see Annex 2.

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

7. *Fast cost growth scenario* investigate the responsiveness of health care spending to a given change in the unit cost of health care provision. It presents a purely stylised situation of the faster evolution of unit costs in the entire health care sector which can be an effect of any possible supply side factor, such as technology, relative prices, regulation of health care sector, etc. The methodology is identical to the "*pure demographic scenario"*, but instead of following GDP per capita rate of growth, unit costs are increasing by 1 percentage point above that rate in the first ten years of the projection exercise (2007-18) and thereafter, between 2019 and 2060, according to the simple GDP per capita growth rate.

8. *AWG reference scenario*. As discussed above, actual spending on health care is a combined result of the whole set of interrelated demographic and non-demographic factors. Therefore, any measure of separate effect of individual factors, as modelled in the sensitivity tests, can only provide a very partial view of the future. Furthermore, given the complexity of those interconnections and difficulties in defining the most probable course of development in the underlying variables, the projection is subject to high uncertainty. Nonetheless, even if highly risky, an attempt to choose a highly plausible scenario is a potentially very informative exercise, notably in the context of the analysis of sustainability of public finances policy and the public health care provision, both of which need to be based on the most reliable forecasts of the expected development in the whole range of health-related variables.

Facing the dilemma of the right choice of the factors to be taken into consideration, the Ageing Working Group took a pragmatic approach by deciding to combine the pure demographic impact of ageing population with a neutral assumption on the evolution of health status (which is broadly supported by the empirical evidence on the death-related costs) and the assumption on the moderate impact of national income on the health care spending (chosen on the basis of the past trends). In practical terms, it has been assumed that half of extra years of life gained through higher life expectancy are spent in good health. Furthermore, income elasticity of demand is assumed to equal 1.1 in the base year and converge to unity by 2060.

3.5. Projection results

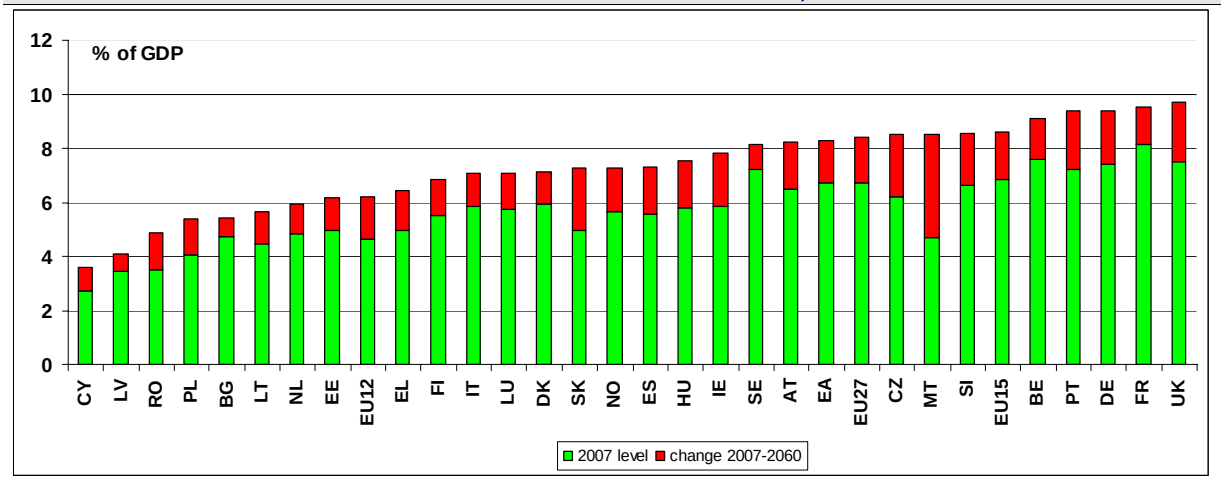
The results of the health care projection exercise should be interpreted with due caution. More emphasis should be put on the expected impact of the respective factors than on the resulting overall level of expenditure.

3.5.1. The impact of future changes in demography and the health status

The impact of demographic changes on public health expenditure is projected to be significant (an average (EU27) increase from 6.7 to 8.4% of GDP), although not as equally pronounced across all countries. The increase varies from 0.4% of GDP in Norway to 3.8 % of GDP in Malta (or, in relative terms, from 6 to 80% of the initial level), but for most

countries it is contained between 1 and 2.5% of GDP (or 15 and 40% of the initial level). The projected impact is relatively stronger for the EU12 (increase by 1.6% of GDP from the initial level of 4.9% of GDP) than for the EU15 (similar increase 1.7% but from a significantly higher level of 6.9%), which is mainly due to the faster growth in national income per capita in the new Member States. The demographic impact on health care spending in the individual countries is shown in Graph 68 and Table 24 below.

Graph 68 – Impact of demographic change on public expenditure on health care (public spending on health care, % of GDP, 2007-2060)



Source: Commission services, EPC.

Table 24 – Pure demographic scenario (public spending on health care, % of GDP)

	Level	*Change 2007-2060*		Level
	2007	*% points of GDP*	*%*	2060
BE	7.6	*1.5*	*19*	9.1
BG	4.7	*0.7*	*15*	5.4
CZ	6.2	*2.3*	*37*	8.5
DK	5.9	*1.2*	*20*	7.1
DE	7.4	*2.0*	*27*	9.4
EE	4.9	*1.2*	*25*	6.2
IE	5.8	*2.0*	*34*	7.8
EL	5.0	*1.5*	*30*	6.4
ES	5.5	*1.8*	*32*	7.3
FR	8.1	*1.4*	*17*	9.5
IT	5.9	*1.2*	*21*	7.1
CY	2.7	*0.9*	*32*	3.6
LV	3.5	*0.7*	*19*	4.1
LT	4.5	*1.2*	*27*	5.7
LU	5.8	*1.3*	*23*	7.1
HU	5.8	*1.7*	*30*	7.5
MT	4.7	*3.8*	*80*	8.5
NL	4.8	*1.1*	*23*	6.0
AT	6.5	*1.7*	*27*	8.2
PL	4.0	*1.3*	*33*	5.4
PT	7.2	*2.2*	*30*	9.4
RO	3.5	*1.4*	*40*	4.9
SI	6.6	*1.9*	*29*	8.6
SK	5.0	*2.3*	*46*	7.3
FI	5.5	*1.4*	*25*	6.9
SE	7.2	*0.9*	*13*	8.1
UK	7.5	*2.2*	*29*	9.7
NO	5.6	*1.6*	*29*	7.3
EU27	6.7	*1.7*	*25*	8.4
EU15	6.9	*1.7*	*25*	8.6
EU12	4.7	*1.5*	*33*	6.2
EA	6.7	*1.6*	*23*	8.3

Source: Commission services, EPC.

The results of a sensitivity test on high life expectancy give an illustration the impact of a marginal change in demographic assumptions. If mortality rates evolve in a way that life expectancy at birth at the end of the projection period is one year higher, health care expenditure is projected to be on average higher by 2.2% of GDP (or 32% in absolute terms) in comparison to the scenario based on the baseline demographic assumptions(see Table 25 below).

Table 25 – High life expectancy scenario (public spending on health care, % of GDP)

	Level	*change 2007_2060*		Level	
	2007	*% points of GDP*	*%*	2060	*Diffference to pure demographic scenario*
BE	7.6	*2.0*	*26*	9.6	*0.5*
BG	4.7	*1.0*	*21*	5.7	*0.3*
CZ	6.2	*2.8*	*45*	9.0	*0.5*
DK	5.9	*1.6*	*27*	7.5	*0.4*
DE	7.4	*2.5*	*34*	9.9	*0.5*
EE	4.9	*1.7*	*34*	6.6	*0.5*
IE	5.8	*2.4*	*41*	8.2	*0.4*
EL	5.0	*1.8*	*36*	6.7	*0.3*
ES	5.5	*2.1*	*38*	7.6	*0.3*
FR	8.1	*1.8*	*23*	10.0	*0.4*
IT	5.9	*1.5*	*26*	7.4	*0.3*
CY	2.7	*1.2*	*43*	3.9	*0.3*
LV	3.5	*0.9*	*27*	4.4	*0.3*
LT	4.5	*1.6*	*36*	6.1	*0.4*
LU	5.8	*1.7*	*30*	7.5	*0.4*
HU	5.8	*2.5*	*43*	8.3	*0.7*
MT	4.7	*4.4*	*94*	9.1	*0.6*
NL	4.8	*1.4*	*29*	6.2	*0.3*
AT	6.5	*2.1*	*33*	8.6	*0.4*
PL	4.0	*2.0*	*49*	6.0	*0.6*
PT	7.2	*2.7*	*38*	9.9	*0.6*
RO	3.5	*1.8*	*52*	5.3	*0.4*
SI	6.6	*2.4*	*36*	9.0	*0.4*
SK	5.0	*2.7*	*54*	7.6	*0.4*
FI	5.5	*1.9*	*35*	7.4	*0.5*
SE	7.2	*1.3*	*18*	8.5	*0.4*
UK	7.5	*2.8*	*37*	10.3	*0.6*
NO	5.6	*2.1*	*36*	7.7	*0.4*
EU27	6.7	*2.2*	*32*	8.9	*0.5*
EU15	6.9	*2.2*	*31*	9.0	*0.5*
EU12	4.7	*2.1*	*44*	6.7	*0.5*
EA	6.7	*2.0*	*30*	8.7	*8.7*

Source: Commission services, EPC.

The *"pure demographic scenario"* implicitly adopts the morbidity expansion hypothesis about the evolution of the population's health status. Meanwhile, the alternative *"constant health scenario"* illustrates a more optimistic *dynamic equilibrium hypothesis*. Given that both scenarios are based on the same demographic projections, and the only difference is the shift in the age profile serving as a proxy for the evolution in health status, the gap in final spending projected between the two scenarios illustrates the potential savings which can be expected if the health status of population follows a more optimistic path.

As expected, public expenditure on health care calculated according to the *"constant health scenario"* is considerably lower than the spending under the pure demographic effect. It increases from 6.7 to 7.5% of GDP for EU27, thus the pure impact of demographic change (1.7% of GDP) is more than halved (see Table 26). The effect of positive health development

on total expenditure drives the increase in spending down to less than 1% of GDP for 19 out of 28 countries and in case of Poland and Norway it even leads to a decrease in absolute terms. The difference compared to the *"pure demographic scenario"* varies across countries, due to their current morbidity (and age-related expenditure) profile and the expected evolution in life expectancy. The positive health effect is seen particularly strongly in the EU12 for which the additional expenditure to be made over the projection period falls from 1.6% of GDP in the *"pure demographic scenario"* to 0.3% of GDP in constant health scenario.

Table 26 – Constant health scenario (public spending on health care, % of GDP)

	Level	*Change 2007-2060*		Level	
	2007	*% points of GDP*	*%*	2060	*Difference to pure demographic scenario*
BE	7.6	*0.3*	*4*	7.9	*-1.1*
BG	4.7	*0.0*	*-1*	4.7	*-0.7*
CZ	6.2	*1.1*	*18*	7.3	*-1.2*
DK	5.9	*0.3*	*4*	6.2	*-0.9*
DE	7.4	*0.9*	*12*	8.3	*-1.1*
EE	4.9	*0.4*	*7*	5.3	*-0.9*
IE	5.8	*1.0*	*16*	6.8	*-1.0*
EL	5.0	*0.7*	*15*	5.7	*-0.7*
ES	5.5	*1.0*	*17*	6.5	*-0.8*
FR	8.1	*0.4*	*5*	8.5	*-1.0*
IT	5.9	*0.5*	*8*	6.3	*-0.7*
CY	2.7	*0.1*	*4*	2.8	*-0.8*
LV	3.5	*0.1*	*2*	3.5	*-0.6*
LT	4.5	*0.3*	*8*	4.8	*-0.9*
LU	5.8	*0.4*	*8*	6.2	*-0.9*
HU	5.8	*0.2*	*4*	6.0	*-1.5*
MT	4.7	*2.2*	*48*	6.9	*-1.5*
NL	4.8	*0.4*	*9*	5.3	*-0.7*
AT	6.5	*0.7*	*11*	7.2	*-1.0*
PL	4.0	*-0.6*	*-14*	3.5	*-1.9*
PT	7.2	*0.9*	*13*	8.1	*-1.2*
RO	3.5	*0.7*	*19*	4.2	*-0.7*
SI	6.6	*1.0*	*15*	7.6	*-1.0*
SK	5.0	*1.2*	*25*	6.2	*-1.1*
FI	5.5	*0.2*	*4*	5.7	*-1.2*
SE	7.2	*0.0*	*0*	7.2	*-0.9*
UK	7.5	*1.0*	*13*	8.5	*-1.2*
NO	5.6	*0.6*	*11*	6.3	*-1.0*
EU27	6.7	*0.7*	*10*	7.4	*-1.0*
EU15	6.9	*0.7*	*10*	7.6	*-1.0*
EU12	4.7	*0.2*	*5*	4.9	*-1.3*
EA	6.7	*0.6*	*9*	7.4	*-0.9*

Source: Commission services, EPC.

As expected, incorporating the concept of death-related costs in the projection methodology reduces the health care expenditure in each year of the projection period[75]. Over the entire period, total spending results between 0.1 and 1.2% of GDP lower than in the pure demographic scenario (see Table 27).

As discussed above, *"death-related costs scenario"* follows a similar logic as the constant health scenario: the years spent with disability (which are obviously most costly for health authorities) are compressed towards the later period of life. However, a different

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

methodological approach and different character of data used lead to results varying considerably between the two scenarios. Moreover, it should be stressed that the methodology behind death-related costs scenario does not perfectly illustrate the underlying concept. In particular, the period of time defined as 'close to death' is limited to one year, while several studies argue that the health care costs of decedents are higher than those of survivors up to six years before death.

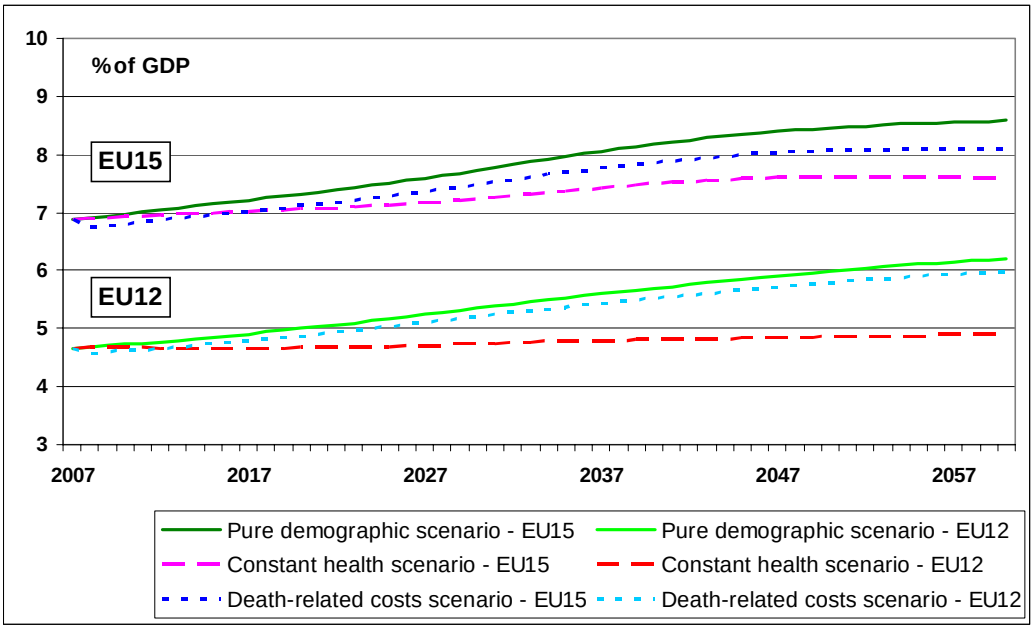
Table 27 – Death-related costs scenario (public spending on health care, % of GDP)

	Level	Change 2007-2060		Level	
	2007	% points of GDP	%	2060	Difference to pure demographic scenario
BE	7.6	1.2	15	8.8	-0.3
BG	4.7	0.6	13	5.3	-0.1
CZ	6.2	2.0	32	8.2	-0.3
DK	5.9	0.9	16	6.9	-0.2
DE	7.4	1.5	20	8.9	-0.5
EE	4.9	1.0	21	6.0	-0.2
IE	5.8	1.7	28	7.5	-0.3
EL	5.0	1.2	25	6.2	-0.2
ES	5.5	1.5	27	7.0	-0.3
FR	8.1	1.1	13	9.2	-0.3
IT	5.9	1.0	17	6.9	-0.2
CY	2.7	0.7	27	3.5	-0.1
LV	3.5	0.6	17	4.0	-0.1
LT	4.5	1.0	23	5.5	-0.2
LU	5.8	1.0	18	6.8	-0.3
HU	5.8	1.3	22	7.1	-0.4
MT	4.7	2.6	56	7.3	-1.2
NL	4.8	0.9	19	5.8	-0.2
AT	6.5	1.4	21	7.8	-0.4
PL	4.0	1.2	30	5.2	-0.1
PT	7.2	1.7	23	8.9	-0.5
RO	3.5	1.2	35	4.7	-0.2
SI	6.6	1.6	25	8.2	-0.3
SK	5.0	2.0	41	7.0	-0.3
FI	5.5	1.1	20	6.6	-0.2
SE	7.2	0.7	10	7.9	-0.2
UK	7.5	1.1	15	8.6	-1.0
NO	5.6	1.4	24	7.0	-0.3
EU27	6.7	1.2	18	7.9	-0.5
EU15	6.9	1.2	18	8.1	-0.5
EU12	4.7	1.3	28	6.0	-0.2
EA	6.7	1.2	19	8.0	-0.3

Source: Commission services, EPC.

Graph 69 below shows a comparison of the results of the three scenarios on health status. The comparison between the shapes of the curves for EU15 and EU12 allows for two features to be stressed. The first one is the more pronounced growing path of pure demographic scenario in the EU12 driven by more dynamic demographic developments but also faster national income growth. The second one is a stronger potential effect of (positive) health status evolution in the same group of countries represented by the wider gap between pure demographic and constant health scenarios at the end of the projection period.

Graph 69 -Impact of demography and health status. Comparison between scenarios



Source: Commission services, EPC.

3.5.2. The impact of future changes in income and macroeconomic variables

The pure demographic scenario implicitly includes the impact of income growth as unit health care spending at each age is kept constant in relative terms, following yearly per capita income growth. However, empirical evidence suggests that growth in both public and total health care spending exceeds the growth rate of national income, be it due to the impact of technological development, or of an improvement in living standards. Consequently, simply keeping relative weight of health care spending constant may lead to its underestimation. To address this concern, the *"income elasticity scenario"* projects health care spending by assuming an elasticity coefficient of 1.1 evolving to unity over the projection period.

The results, see Table 28, suggest that the *"pure demographic scenario"* probably underestimates the total growth of health care expenditure by assuming a neutral relation between income and health care spending. Taking a conservative assumption of a relatively low elasticity which converges to one adds an extra 0.2% to 0.6% of GDP to the initial impact of demographic changes and neutral GDP per capita development. The additional impact is similar for EU15 and EU12 as the gap in GDP rate of growth has already been included in the pure demographic scenario.

Table 28 – Income elasticity scenario (public spending on health care, % of GDP)

	Level	Change 2007-2060		Level	
	2007	% points of GDP	%	2060	Difference to pure demographic scenario
BE	7.6	*1.8*	*24*	9.5	*0.4*
BG	4.7	*1.2*	*24*	5.9	*0.4*
CZ	6.2	*2.8*	*45*	9.0	*0.5*
DK	5.9	*1.5*	*25*	7.4	*0.3*
DE	7.4	*2.4*	*32*	9.8	*0.4*
EE	4.9	*1.7*	*34*	6.6	*0.5*
IE	5.8	*2.3*	*40*	8.1	*0.3*
EL	5.0	*1.8*	*36*	6.8	*0.3*
ES	5.5	*2.1*	*37*	7.6	*0.3*
FR	8.1	*1.8*	*22*	9.9	*0.4*
IT	5.9	*1.5*	*25*	7.3	*0.3*
CY	2.7	*1.1*	*39*	3.8	*0.2*
LV	3.5	*1.0*	*28*	4.4	*0.3*
LT	4.5	*1.6*	*37*	6.1	*0.4*
LU	5.8	*1.7*	*30*	7.5	*0.4*
HU	5.8	*2.2*	*38*	8.0	*0.5*
MT	4.7	*4.2*	*89*	8.9	*0.4*
NL	4.8	*1.3*	*28*	6.2	*0.2*
AT	6.5	*2.1*	*32*	8.5	*0.3*
PL	4.0	*1.7*	*43*	5.7	*0.4*
PT	7.2	*2.6*	*36*	9.8	*0.4*
RO	3.5	*1.8*	*51*	5.3	*0.4*
SI	6.6	*2.4*	*37*	9.0	*0.5*
SK	5.0	*2.9*	*57*	7.8	*0.6*
FI	5.5	*1.7*	*30*	7.2	*0.3*
SE	7.2	*1.3*	*18*	8.5	*0.3*
UK	7.5	*2.6*	*35*	10.1	*0.4*
NO	5.6	*1.9*	*33*	7.5	*0.3*
EU27	6.7	*2.1*	*31*	8.8	*0.4*
EU15	6.9	*2.1*	*30*	8.9	*0.4*
EU12	4.7	*2.0*	*42*	6.6	*0.4*
EA	6.7	*1.9*	*28*	8.6	*0.3*

Source: Commission services, EPC.

For the newly acceded Member States, the impact of the spread of technology, growing living standards and high expectations due to the process of real convergence linked to the last wave of accession is illustrated in the cost convergence scenario. This scenario, performed solely for the 12 recently acceded Member States suggests that achieving by 2060 the level of health care provision per person (expressed as % of GDP per capita spending) equal to that of the 15 "old" Member States of the EU can be a very costly process. Depending on the current expenditure profile, governments would need to spend from 2.5 to 5.4% of GDP over the five decades to come, while the extra expenditure over what is due to the demographic changes is expected to be between 0.6 and 4.4% of GDP (Table 29).

Table 29 – Cost convergence scenario (public spending on health care, % of GDP)

	Level	Change 2007-2060		Level	
	2007	% points of GDP	%	2060	Difference to pure demographic scenario
BG	4,7	*4,2*	*88*	8,9	*3,4*
CZ	6,2	*2,9*	*46*	9,1	*0,6*
EE	4,9	*3,4*	*68*	8,3	*2,1*
CY	2,7	*4,9*	*181*	7,6	*4,0*
LV	3,5	*5,1*	*148*	8,6	*4,5*
LT	4,5	*4,2*	*94*	8,7	*3,0*
HU	5,8	*3,1*	*53*	8,8	*1,3*
MT	4,7	*5,4*	*114*	10,1	*1,6*
PL	4,0	*4,9*	*122*	8,9	*3,6*
RO	3,5	*5,3*	*151*	8,8	*3,9*
SI	6,6	*2,6*	*39*	9,2	*0,6*
SK	5,0	*4,1*	*83*	9,1	*1,9*
EU12	4,7	4,2	*90*	8,9	*2,7*

Source: Commission services, EPC.

An alternative perspective of unit costs evolution is illustrated by the *"labour intensity scenario"*, which presents supply- rather than demand-driven evolution of health care spending. Given that the cumulated increase in productivity (and therefore real wages) exceeds the growth in per capita income in all but one (Luxembourg) Member States, while wages are in fact only one of several factors on the supply side of health care provision (the others being investment in technological progress, legal and institutional setting, etc.), the impact of supply-side drivers is expected to exceed considerably that of demand factors. The mere effect of labour productivity/wages replacing income as the driver of unit costs of health care provision in the projections would amount to an additional spending of 0.7% of GDP (2.4 p.p. increase against 1.7 p.p. increase in the pure demographic scenario), while a number of other factors remain not quantifiable (Table 30). Again, given the assumed catching-up in terms of labour productivity, the effect is stronger in the recently acceded Member States (increase by 2.8 p.p. from initial level of 4.9% of GDP) than in the EU15 (2.4 p.p. from 6.9 % of GDP).

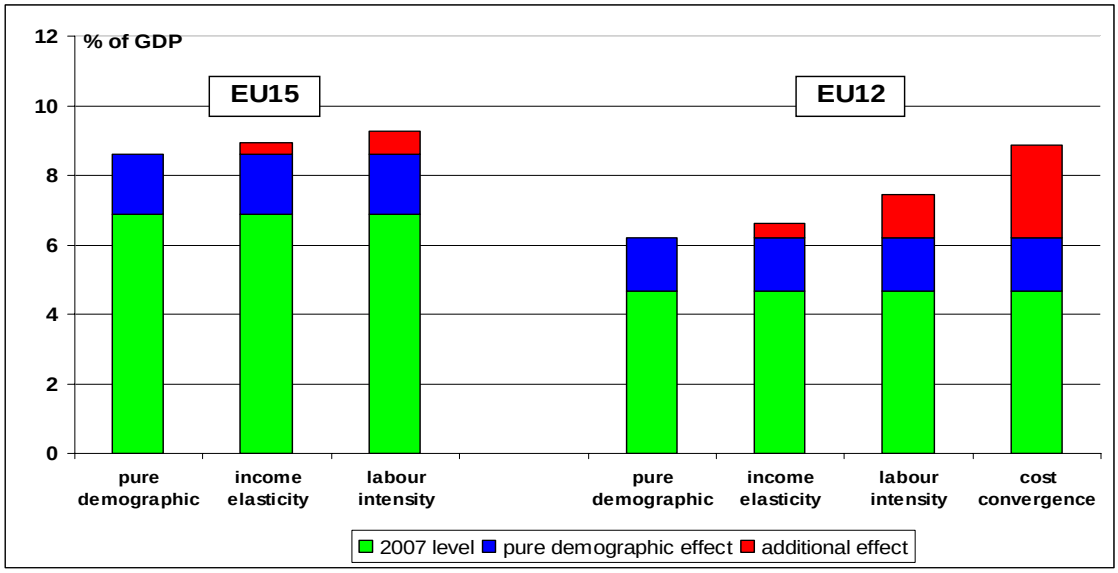
Table 30 – Labour intensity scenario (public spending on health care, % of GDP)

	Level	Change 2007-2060		Level	
	2007	% points of GDP	%	2060	Difference to pure demographic scenario
BE	7.6	2.1	28	9.7	0.7
BG	4.7	1.6	33	6.3	0.9
CZ	6.2	3.8	62	10.0	1.5
DK	5.9	1.7	29	7.7	0.5
DE	7.4	2.8	38	10.2	0.8
EE	4.9	2.3	46	7.2	1.1
IE	5.8	2.9	49	8.7	0.9
EL	5.0	2.4	47	7.3	0.9
ES	5.5	2.6	47	8.1	0.8
FR	8.1	2.1	26	10.3	0.7
IT	5.9	1.8	31	7.7	0.6
CY	2.7	1.2	45	3.9	0.3
LV	3.5	1.6	47	5.1	1.0
LT	4.5	2.5	56	6.9	1.3
LU	5.8	1.1	19	6.9	-0.2
HU	5.8	3.0	51	8.8	1.2
MT	4.7	5.0	105	9.7	1.2
NL	4.8	1.8	37	6.6	0.7
AT	6.5	2.6	40	9.1	0.9
PL	4.0	2.4	59	6.4	1.0
PT	7.2	3.1	43	10.3	0.9
RO	3.5	2.7	78	6.2	1.4
SI	6.6	4.1	62	10.7	2.2
SK	5.0	3.7	74	8.6	1.4
FI	5.5	2.0	36	7.5	0.6
SE	7.2	1.7	24	8.9	0.8
UK	7.5	2.8	37	10.3	0.6
NO	5.6	2.6	46	8.3	1.0
EU27	6.7	2.4	36	9.2	0.7
EU15	6.9	2.4	35	9.3	0.7
EU12	4.7	2.8	59	7.4	1.2
EA	6.7	2.3	35	9.1	0.8

Source: Commission services, EPC.

The joint analysis of the three scenarios based on the income and macroeconomic variables (Graph 70) allows us to draw some important conclusions. First, supply-side factors, whose impact remains still relatively unknown and very difficult to quantify, seem to push health care spending up to a considerably higher degree than relatively well specified and quantified demographic and demand-side factors. This argument is strengthened by the alternative technological scenario (see Annex 2) which, although based on highly uncertain data and set of assumptions, gives a broad idea of the range of increase that may be expected due to the technological development and medical progress. In this sense, the projected increase in public spending, as presented in this report, should be considered as probably on the low side, underestimating of the likely budgetary pressures coming from the technical and economic process of producing and providing increasingly more sophisticated and advanced health care goods and services. Second, it seems highly probable that the governments of countries where the current provision of health care appears to be not considered as satisfactory by citizens or does not cover the entire population (thus mainly EU12 countries) will be pushed by their citizens to substantively increase the level of spending in order to reach – at least over the long term – the coverage and standards guaranteed already today to the citizens of most of the EU15 countries.

Graph 70 - Impact of income and macroeconomic variables – HC spending in 2060 according to different scenarios



Source: Commission services, EPC.

3.6. AWG reference scenario

The so-called *"AWG reference scenario"* is the one that will be used as "central scenario" when calculating the overall budgetary impact of ageing. It is a combination of a number of factors affecting health care spending and, as such, it is considered by the Ageing Working Group as a plausible scenario for assessing potential future needs for public spending on health care. It incorporates the demographic impact of the changing population structure, moderately positive developments of health status and the strengthened impact of the national income incorporating a number of demand and supply factors pushing expenditure up. The joint impact of those factors results in a projected increase in spending of about 1.6% in the EU27. Individual countries' results range between 0.2% (Norway) and 3.4% (Malta) of GDP, or between 4% and 71% of the initial level, but most of them (21 Member States) show increases by between 10 and 30% (Table 31). As such, the results are on average slightly lower than the pure demographic scenario.

Table 31 –AWG reference scenario (public spending on health care, % of GDP)

	Level	Change 2007-2060		Level	
	2007	% points of GDP	%	2060	Difference to pure demographic scenario
BE	7.6	1.2	16	8.8	-0.2
BG	4.7	0.7	16	5.4	0.0
CZ	6.2	2.2	35	8.4	-0.1
DK	5.9	1.0	16	6.9	-0.2
DE	7.4	1.8	24	9.2	-0.2
EE	4.9	1.2	24	6.1	0.0
IE	5.8	1.8	30	7.6	-0.2
EL	5.0	1.4	28	6.4	-0.1
ES	5.5	1.6	30	7.2	-0.1
FR	8.1	1.2	15	9.4	-0.2
IT	5.9	1.1	19	6.9	-0.1
CY	2.7	0.6	23	3.3	-0.3
LV	3.5	1.4	39	4.8	0.7
LT	4.5	1.1	25	5.6	-0.1
LU	5.8	1.2	21	7.0	-0.1
HU	5.8	1.3	22	7.0	-0.5
MT	4.7	3.3	71	8.0	-0.4
NL	4.8	1.0	20	5.8	-0.1
AT	6.5	1.5	24	8.0	-0.2
PL	4.0	1.0	24	5.0	-0.4
PT	7.2	1.9	26	9.1	-0.3
RO	3.5	1.4	39	4.9	0.0
SI	6.6	1.9	28	8.5	-0.1
SK	5.0	2.3	45	7.2	0.0
FI	5.5	1.0	17	6.5	-0.4
SE	7.2	0.8	11	8.0	-0.1
UK	7.5	1.9	26	9.4	-0.3
NO	5.6	1.3	24	7.0	-0.3
EU27	6.7	1.5	22	8.2	-0.2
EU15	6.9	1.5	22	8.4	-0.2
EU12	4.7	1.3	29	6.0	-0.2
EA	6.7	1.4	21	8.1	-0.2

Source: Commission services, EPC.

3.7. Conclusions

The high level of involvement of the EU governments in the provision of health care and the steadily growing public spending over the last decades puts the issue of health care financing in the centre of the debates on the long-term sustainability of public finances and the efficiency of public spending.

Financing of health care is shared between public and private sector, but in almost all EU Member States the governments cover a large majority of overall payments. Private spending has a complementary character in many Member States, concentrating on the treatments that are not provided to the same extent by the public schemes, those considered as not necessary for saving human life (dentistry, plastic surgery etc.) and on pharmaceutical goods. Therefore, most general trends concerning entire health care sector affect also proportionally public expenditure.

As seen in the past trends, increases in spending on health care should be credited only to a limited degree to demographic or morbidity developments. Instead, policy decisions to expand access and improve quality, as a result of rising living standards and societal expectations, as well as technological progress, are the main factors driving expenditure up over the last decades.

Similar trends are expected to occur in the future. Continuous change in the structure of the population is expected to have an impact on health care expenditure mainly through the parallel evolution in the health status of the population directly affecting demand for care. As shown in the *"pure demographic"* and *"constant health"* scenarios, future potential increases in spending may be significantly reduced if negative trends in morbidity rates are replaced by more optimistic assumptions about development of healthy life years, pointing to the need for cost-effective prevention policies.

The impact of the other, non-demographic factors is expected to push the spending further up. National income growth forces governments to provide more and high quality care to the population through two main channels. First, growing living standards change people's attitude to their own health and raise expectations on the quantity and quality of care provided by the state. Second, higher income induces investment in medical research and adoption of modern technologies. The latter can have two-directional effect on spending. On one hand, they can decrease costs of care by making it faster, less invasive and more efficient. On the other hand, the very costs of developing and adopting new technologies plus extra expenditure related to the treatments of previously unknown or incurable diseases have a strong increasing, and probably prevailing, effect on public spending.

Although considered the strongest factor behind the cost growth, technology is just one element of the total cost of health care provision. The remaining ones, wages, salaries, investment in physical capital and pharmaceutical spending, are also supposed to contribute to further increase in health care costs. Although technology has become more prevalent, health care is still highly labour-intensive and will remain so. Wages and salaries constitute still a large share of the overall costs, reflecting high market valuation of human skills and expertise as well as the labour-intensity of the sector, but also strong bargaining power of health care professionals in a number of countries. Consequently, given that over long term the wages are expected to follow the labour productivity path exceeding GDP per capita growth, they are projected to contribute to the increase in health care expenditure to an even higher degree than national income growth. This phenomenon, illustrated by the so-called "labour intensity scenario", exemplifies the impact of the supply-side factors on public health expenditure. Although the present set of projections is not capable of disentangling the contribution of the remaining components of costs, it is highly probable that growth in wages and salaries, combined with the increase in pharmaceutical spending, being the most market-driven and thus probably fastest growing component of costs, will constitute a strong driving force of costs, adding to the effect of growing demand due to demographic, health and income changes.

The trends described above affect each health care system to a varying extent. Different institutional and legal setting (financing mechanisms, ownership structure, organisation of health provision, etc.) does not allow to run more detailed projections for each country on a comparable basis. The results allow however to distinguish two groups of countries for which slightly different conclusions can be drawn.

The current spending on health care is significantly higher in both absolute (as % of GDP) and relative (per capita) terms in the old Member States of the EU. Moreover, the shape of the expenditure profile suggests large differences in the provision of health care due not only to the gap in life expectancy, but also to normative health and social policy considerations.

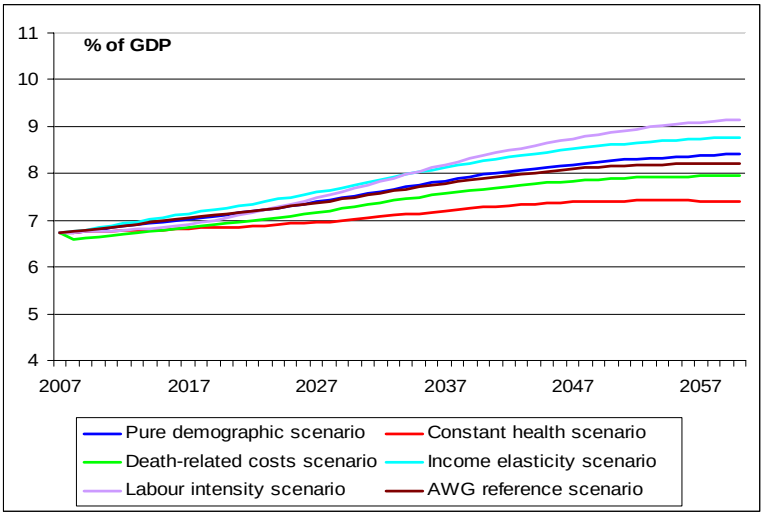
The impact of various factors on health care expenditure differs, as well between the two groups of countries. First, given the more profound demographic changes to be experienced by the new Member States, the demographic impact, quantified in the *"pure demographic scenario"* will be stronger in the EU12 than in the EU15. On the other hand, the same group of EU12 countries is expected to undergo more dynamic improvement in health status, which is projected to partially offset the demography-driven increase in expenditure.

The EU12 countries are also expected to be affected more profoundly by the changes linked to income growth and the effect of some supply-side factors. Given the current gap in the health care provision and the ongoing process of convergence in terms of national income growth, a considerably faster growth in demand for health care is expected to occur in the decades to come as compared to EU15. The same observation applies to the supply-side factors. First, growth in wages and salaries in the EU12, following the raising path of labour productivity, is expected to exceed for at least a few decades the increase in wages experienced by the EU15 workers. Second, the ongoing process of deregulation in the market for pharmaceuticals and medical goods results in a more market-driven price-setting mechanism leading, at least in its initial phase, to a considerable increase in prices in these countries.

To conclude, predicting concrete level of expenditure over several decades to come leads to a range of outcomes reflecting the variation in drivers of costs over the projection period (see Graph 71 and Graph 72 presenting the range of projected results for EU27, EU15 and EU12).

Still, the projections presented lead to the conclusion that public spending on health care across Member States is expected to follow a broadly similar pattern of convergence towards higher levels of expenditure (both in terms of both total spending and expenditure per capita). Although in nominal terms the 'old' Member States are still going to spend more for a couple of decades, the rates of growth is expected to be regularly higher in the newly acceded Member States of the EU12.

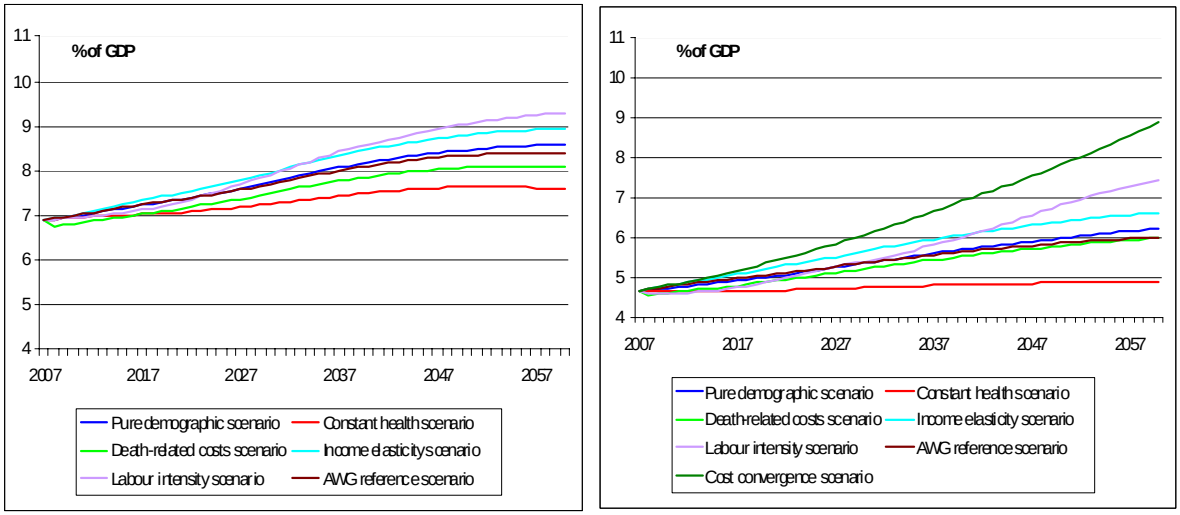
Graph 71 – Range of results from different scenarios on health care, EU27



Source: Commission services, EPC.

Graph 72 – Range of results from different scenarios on health care, comparison between EU15 and EU12

EU15 **EU12**



Source: Commission services, EPC.

4. LONG-TERM CARE

4.1. Introduction

Long-term care services are necessary for people who depend on help to carry out daily activities such as eating, bathing, dressing, going to bed, getting up or using the toilet.[76] Long-term care is delivered informally by families and friends – mainly spouses, daughters and step-daughters – and formally by care assistants who are paid under some form of employment contract. To be considered informal, the provision of care cannot be paid as if purchasing a service, even though an informal care giver may receive income transfers and, possibly, some informal payments from the person receiving care. Formal care is given at home or in an institution (such as care centres and nursing homes). Cash benefits are payments, which can be used to purchase formal care at home or in an institution or which can be paid to informal caregivers as income support.

The governments of most EU Member States are involved in either the provision or financing of long-term care services, or often both, although the extent and nature of their involvement differs widely across countries. In the future, the demand for formal care services by the population is likely to grow substantially. Long-term care needs start to rise exponentially from around 75 or 85 years-old (OECD, 2005). The numbers of persons who reach 80 years and above are growing faster than any other segment of the population in all EU Member States and are expected to triple by 2060, according to the population projection EUROPOP2008. The ageing of the population is expected to put pressure on resources demanded to provide long-term care services for the frail elderly and the ratio of long-term care expenditure to GDP is expected to rise in the future.

In making projections of expenditure in long-term care, it is important to bear in mind the extent to which Member States rely on the informal provision of care to the elderly, which has no direct bearing on public finances. Some Member States rely heavily on the informal provision of long-term care and their expenditure on formal care is accordingly small, while other Member States provide extensive public services to the elderly and devote a significant share of GDP to fund their policies. Pressure for increased public provision and financing of long-term care services may grow substantially in coming decades, especially in Member States where the bulk of long-term care is currently provided informally. The current institutional arrangements for the provision and financing of long-term care by the public sector may be under strong pressure in the future, as the availability of informal carers and their propensity to provide care could diminish, due to changes in family structure and the growing participation of women in the labour market, which may constrain the future supply of informal care provision within households and families. The increase in life expectancy could also bring about a higher potential supply of informal care by elderly partners and retired children. To illustrate the impact of possible future policy changes by which Member States would decide to provide more formal care services to the elderly, additional scenarios have been prepared.

Availability and access to formal care services will increasingly shape the welfare of elderly citizens and their families. It may also have broader economic implications as greater provision of formal care may increase labour participation among women who currently provide informal care. An additional public policy consideration concerns the impact on

[76] Long-term care brings together a range of supports and services for people who need help with basic activities of daily living over an extended period of time, often in combination with rehabilitation and basic medical services (OECD, 2005).

public finances, as the unit cost of providing care can be very high, especially when provided in an institution. Moreover, pressure for increased public expenditure (or tax expenditures) on formal care services need to be seen in conjunction with the projected impact of ageing on other expenditure items, notably pensions and health care.

4.2. Public expenditure on long-term care

Public expenditure on long-term care is defined, according to the System of Health Accounts classification, as the sum of publicly financed (HF1) items:[77]

(i) **services of long-term nursing care (HC.3),** which is also called 'the medical component of long-term care' or 'long-term health care', and

(ii) **social services of long-term care (HC.R.6.1)**, which is the part of *'administration and provision of social services in kind to assist living with disease and impairment'* (HC.R.6) that covers *'a range of services of care assistance aimed predominantly at providing help with instrumental activities of daily living (IADL) restrictions to persons with limited ability to perform these tasks on their own'*.

Services of long-term nursing care (HC.3) are a range of services required by persons with a reduced degree of functional capacity, physical or cognitive, and who are consequently dependent on help with basic activities of daily living (ADL), such as eating, bathing, dressing, getting in and out of bed or chair, moving around and using the toilet. The underlying physical or mental disability can be the consequence of chronic illness, frailty in old age, limitations of mental functioning and/or cognitive capacity. In addition, it includes help with monitoring the status of patients in order to avoid further worsening of their ADL status.

This main personal care component is frequently provided in combination with help with basic medical services such as wound dressing, pain management, medication, health monitoring, prevention, rehabilitation or services of palliative care. Depending on the setting in which long-term care is provided and/or the national programme design, long-term care services can include lower-level care of home help or help with instrumental activities of daily living (IADL) more generally, such as help with activities of housework, meals, shopping, transport and social activities.

The notion of long-term health care services usually refers to services delivered over a sustained period of time, sometimes defined as lasting at least six months.[78]

Social services of long term care (HC.R.6.1) comprise services of home help and residential care services: care assistance which are predominantly aimed at providing help with IADL restrictions to persons with functional limitations and a limited ability to perform these tasks on their own without substantial assistance, including supporting residential services (in assisted living facilities and the like).

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[77] As in the case of health care, the figures on public expenditure on long-term care are available in two separate databases: EUROSTAT database available at NewCronos Website and a parallel OECD database 'OECD Health Data', for details see European Commission-EPC (2008).

[78] For more details, see: OECD (2006a), *Costs of Care for Elderly Populations. Guidelines for estimating long-term care expenditure*, DELSA/HEA/DIS (2006)4, 14 February 2006, pp. 9-11.

As in the case of health care, the figures on public expenditure on long-term care are available in two separate databases: EUROSTAT database available at NewCronos Website and a parallel OECD database 'OECD Health Data', for details see European Commission-EPC (2008).

4.2.1. Expenditure on home versus institutional care

Long-term care is provided in different settings: at home and in the community, or in various types of institutions, including nursing homes and long-stay hospitals. Mixed forms of residential care and (internally or externally provided) care services exist in the form of assisted living facilities, sheltered housing, etc., for which a wide range of national arrangements and national labels exist. For a vast majority of households, home care continues to be the preferred setting (OECD, 2005).

Services at home include services provided by external home care providers, both public and private, in a person's private home on a long-lasting basis. Also included are services received on a day-case basis or in the form of short-term stays in institutions, for example in the form of respite care. During these stays, persons are not considered as 'institutionalised', but rather receiving temporarily services, which support their continued stay at home.[79]

Services in institutions include services provided to people with moderate to severe functional restrictions who live permanently or for an extended period of time (usually for six months or longer) in specially designed institutions, or in a hospital-like setting where the predominant service component is long-term care, although this may frequently be combined with other services (basic medical services, help with getting meals, social activities, etc.). In these cases, eligibility is often explicitly assessed and defined by level (severity) of dependency and level of care needs.

4.2.2. Public expenditure on cash benefits

Public expenditure on cash benefits is projected separately from expenditure on long-term care services provided 'in kind' at home or in the institutions. The cash benefits include social programmes offering care allowances introduced in a number of countries in order to allow households choice over care decisions, and to support care provided at home. They are addressed to persons with long-term care needs who live in their own homes. However, the design of these programmes varies widely across countries, which reduces the comparability between them.

At least three types of cash-benefit programmes and/or consumer-choice programmes can be distinguished:

- personal budgets and consumer-directed employment of care assistants;
- payments to the person needing care who can spend it as she/he likes, but has to acquire sufficient care;
- payments to informal caregivers as income support.

[79] OECD (2007), Data collection on long-term care (focussing on recipients). Meeting of OECD Health Data National Correspondents, DELSA/HEA/HD(2007)7, 28 September 2007, p.12.

4.3. Dependency rates

Dependency rates are an indicator of the need for care; however those needs may not necessarily translate into actual public expenditure, as most long-term care is provided by unpaid informal carers.

To estimate the fraction of the elderly population who may need long-term care services, we use disability rates. Disability is usually measured through the inability of performing one or more Activities of Daily Living (ADL). Disability rates are drawn from the SHARE survey conducted in 12 countries of the EU (Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, Belgium, the Czech Republic, Poland), and, for the remaining Member States, from the Survey on Income and Living Conditions (SILC) conducted by the national statistical offices and gathered by Eurostat.

The SHARE database includes information on the percentage of people with *'the prevalence of 1+ limitations with activities of daily living among men and women over 50 years of age'*. The SILC survey includes the percentage of people in a given age group who *'are severely restricted in activities they usually do because of health problems for at least the last 6 months'*.[80]

4.4. The future need for long-term care services and the exploration of different policy settings

DG ECFIN used the model built for the 2006 projection exercise, based on a proposal by Comas-Herrera et al., (2005).[81] The approach aims to maximise the inclusion of variables which affect long-term care expenditure that can be examined, while making sure that a large number of Member States can provide the data necessary to run the projections. Specifically, the methodology aims at analysing the impact of changes in the assumptions made about:

- the future numbers of elderly people, through changes in the population projections used;
- the future numbers of dependent elderly people, by making changes to the prevalence rates of dependency;
- the balance between formal and informal care provision;
- the balance between home (domiciliary) care and institutional care within the formal care system;
- the costs of a unit of care.

Data availability plays a major role in designing the methodology of long-term care expenditure projections.[82] The methodology allows projecting the future need for long-term services, in numbers of people who will need long-term care services. This is done by using dependency rates, to estimate the fraction of the elderly population which is dependent, i.e. has some disability which requires the provision of a care service. Three types of long-term

[80] More detailed information to be found on the websites of SHARE http://www.share-project.org/ and Eurostat http://europa.eu.int/estatref/info/sdds/en/hlth/hlth_index.htm.

[81] See Annex for a summary description of the model.

[82] See European Commission-EPC (2008).

care are considered: (i) formal care at home, (ii) formal care in institutions and (iii) informal care.

4.5. Projection results

The scenarios carried out in the projection exercise illustrate the future budgetary impact of changes in (i) demography, (ii) disability, (iii) policy setting.

4.5.1. The impact of future demographic change

The "pure demographic scenario" examines the impact of future numbers of elderly people on the public expenditure of long-term care. It is a “no policy change scenario” which assumes that the probability of receiving formal care at home and formal care in an institution remains constant at the 2007 level. Disability rates by age are also constant, so the disabled population grows at the same rate as the total elderly population. This implies that there is no improvement in the dependency status of the elderly population as its longevity increases. According to the scenario, the rate of dependency of an 80-year old in the future is the same as that of an 80-year old today, but there will be more people living to their 80th birthday in the future than today. Arguably, it is a pessimistic scenario since it assumes that the average lifetime consumption of long-term care services will increase over time.

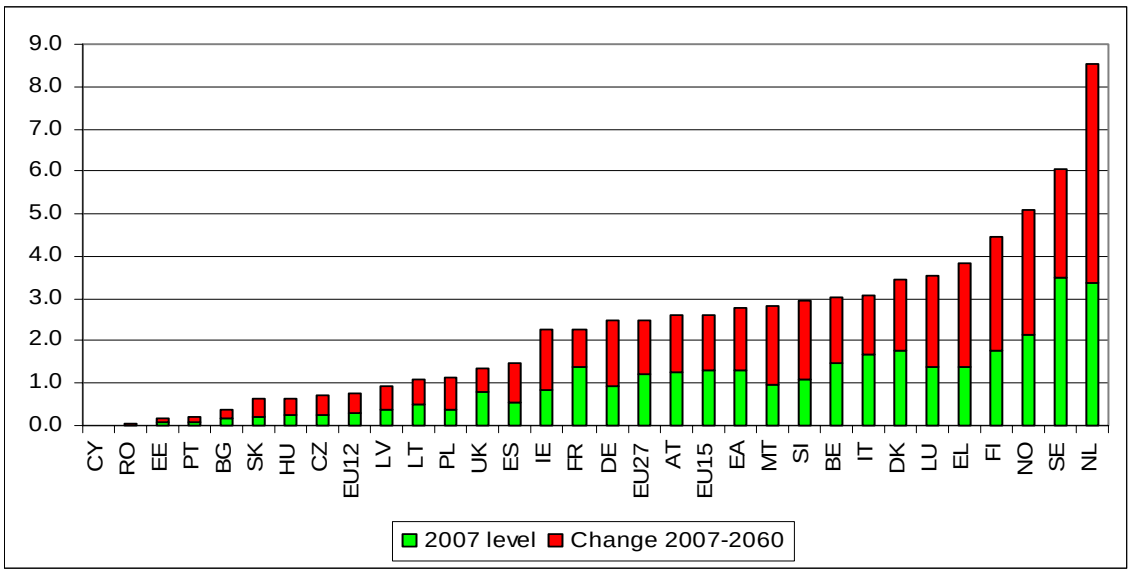
The scenario is similar to the pure demographic scenario for health care expenditure, except that the main driver of costs is GDP per worker rather than GDP per capita. Given the currently predominating deficit of formal care provision and its high labour-intensive character, public expenditure seems supply- rather than demand-driven. For that reason, GDP per worker is the main driver of unit costs, which is assumed to reflect changes in the labour productivity and, at the same time, the wage evolution in the care sector.

Given that level of expenditure in the base year determines to a large extent the projected increase, an increase in relative terms illustrates somewhat better the degree of the challenge facing European societies. Public expenditure is projected to increase by 115% on average for the EU27. The projected increase ranges from 65% in France and the UK to 175% and above in the Czech Republic, Spain, Malta, Poland, Romania and Slovakia.

Extrapolating forward on the basis of existing policies and expenditure does not capture the full scale of the policy challenge, which goes beyond examining the future increases in public expenditure projected if policies are unchanged. Future changes in the numbers of people receiving informal or no care and whether they will receive the care services they need are also crucial policy questions. Countries with low levels of formal care provision today (and thus low levels of public expenditure) will also witness a very large increase in the projected numbers of persons in need of care, 82% on average for the EU27 and more than doubling in the EU12. Pressure is likely to emerge in the future for policy changes to increase formal care provision, especially as the future availability of informal care is likely to diminish rather than increase. The gap between the need for care and supply of formal care will grow due to the growing numbers of elderly persons and a likely reduction in the supply of informal care within households (although the scale of this effect will depend on the starting employment rates of women, among other factors). In Denmark, Malta, the Netherlands and Sweden, current expenditure is among the highest in the EU, but the long-term care needs of the population are fully covered within the formal system and are expected to remain fully covered in the future. In contrast, large numbers of people do not receive formal care services and rely exclusively on informal care in most Member States and considerable increases of people relying in informal care are projected in the future. The projections show that with an

ageing population, the number of elderly people with disability who rely on informal care only would nearly double in the EU27, and increase by more than 120% in seven EU Member States: the Czech Republic, Ireland, Cyprus, Luxemburg, Poland, Romania and Slovakia. Under no policy change, a growing gap may occur between the number of elderly citizens with disability who are in need of care and the actual supply of formal care services.

Graph 73 - Pure demographic scenario – public expenditure on long-term care as % of GDP



Source: Commission services, EPC.

Table 32 – Pure demographic scenario – increase of public expenditure on long-term care over the period 2007 to 2060

	Level 2007	*Increase 2007-2060*		Level 2060
		% points of GDP	*%*	
BE	1.5	*1.6*	*105*	3.0
BG	0.2	*0.2*	*115*	0.4
CZ	0.2	*0.5*	*194*	0.7
DK	1.7	*1.7*	*98*	3.5
DE	0.9	*1.5*	*165*	2.5
EE	0.1	*0.1*	*134*	0.1
IE	0.8	*1.4*	*166*	2.3
EL	1.4	*2.4*	*172*	3.8
ES	0.5	*0.9*	*176*	1.5
FR	1.4	*0.9*	*64*	2.3
IT	1.7	*1.4*	*86*	3.1
CY	0.0	*0.0*	*102*	0.0
LV	0.4	*0.5*	*141*	0.9
LT	0.5	*0.6*	*124*	1.1
LU	1.4	*2.2*	*159*	3.6
HU	0.3	*0.4*	*149*	0.6
MT	1.0	*1.9*	*193*	2.8
NL	3.4	*5.2*	*154*	8.5
AT	1.3	*1.3*	*107*	2.6
PL	0.4	*0.7*	*184*	1.1
PT	0.1	*0.1*	*158*	0.2
RO	0.0	*0.0*	*221*	0.1
SI	1.1	*1.8*	*166*	2.9
SK	0.2	*0.4*	*197*	0.6
FI	1.8	*2.7*	*150*	4.5
SE	3.5	*2.6*	*73*	6.0
UK	0.8	*0.5*	*66*	1.4
NO	2.2	*2.9*	*135*	5.1
EA	1.3	*1.5*	*115*	2.8
EU27	1.2	*1.3*	*103*	2.5
EU15	1.3	*1.3*	*102*	2.6
EU12	0.3	*0.5*	*161*	0.8

Source: Commission services, EPC.

Box: Taking account of existing policy settings in the Member States

Germany

In the projection, unit costs are indexed to GDP per worker or GDP per capita. Under current rules in Germany, all long-term care benefits (that is the benefits paid out by the public insurance for people receiving formal care at home, care in institutions or cash benefits) are indexed to prices. The difference between the amounts financed by the State and the costs of long term care are either recovered by private insurance or are paid by the beneficiaries themselves.

To better reflect the current German legislation, an alternative projection has been run where unit costs of long-term care services remain constant in real terms. This would mean that the amounts financed by the State are adjusted in line with prices.

Assuming constant unit costs in real terms, the long-term care public expenditure is projected to remain around 1% of GDP over the whole projection period, as compared to an increase from close to 1% of GDP today up to 2.47% of GDP when assuming unit costs evolve in line with GDP per worker. The results of the two scenarios illustrate the difference between what the State is projected to spend under these two assumptions.

	2007	2010	2020	2030	2040	2050	2060	*2007-2060*
Unit costs are constant in real terms	0,93	0,93	0,94	0,99	1,01	1,06	0,96	*0,03*
Unit costs evolve in line with GDP per worker	0,93	0,97	1,18	1,49	1,82	2,28	2,47	*1,54*

Spain

Law 39/2006 on Long Term Care establishes the right to receive social services and cash benefits for people with Activities of Daily Living (ADL) restrictions according to their degree of dependency and their economic capacity. Accordingly, the projections incorporate an increase in the number of recipients with the concomitant spending in social services (at home and institutions) and in cash benefits.

Table 33 - Number of older people receiving informal or no care in the pure demographic scenario, 000s

	Persons relying only on informal (or no) care						
	Numbers of persons				*relative to the number of dependent persons*		
	in 000s		*Change 2007-2060*		*as % of dependent population*		*Change 2007-2060*
	2007	**2060**	***absolute***	***in %***	***2007***	***2060***	***in p.p.***
BE	207	321	*114*	*55*	*46*	*33*	*-13*
BG	744	1023	*279*	*38*	*88*	*85*	*-4*
CZ	133	333	*199*	*150*	*52*	*48*	*-3*
DK	:	:	:	:	:	:	:
DE	1612	2359	*747*	*46*	*50*	*39*	*-11*
EE	71	117	*46*	*64*	*88*	*85*	*-3*
IE	30	83	*52*	*172*	*33*	*22*	*-11*
EL	100	160	*60*	*61*	*29*	*20*	*-10*
ES	1366	2215	*849*	*62*	*79*	*47*	*-32*
FR	758	1327	*569*	*75*	*33*	*27*	*-6*
IT	1992	3998	*2006*	*101*	*79*	*79*	*-1*
CY	32	122	*90*	*284*	*92*	*91*	*-1*
LV	110	173	*63*	*58*	*90*	*88*	*-2*
LT	152	281	*129*	*85*	*80*	*77*	*-2*
LU	7	17	*10*	*142*	*48*	*35*	*-12*
HU	508	910	*401*	*79*	*86*	*83*	*-3*
MT	:	:	:	:	:	:	:
NL	:	:	:	:	:	:	:
AT	83	125	*42*	*51*	*31*	*21*	*-10*
PL	1235	2884	*1649*	*134*	*83*	*81*	*-3*
PT	471	853	*382*	*81*	*67*	*57*	*-10*
RO	743	1658	*915*	*123*	*76*	*74*	*-2*
SI	52	95	*44*	*85*	*68*	*61*	*-7*
SK	208	562	*353*	*170*	*87*	*85*	*-2*
FI	168	260	*92*	*55*	*61*	*50*	*-12*
SE	:	:	:	:	:	:	:
UK	1741	3151	*1410*	*81*	*56*	*49*	*-8*
NO	:	:	:	:	:	:	:
EU27	*12272*	*22328*	*10056*	*82*	*59*	*50*	*-9*
EU15	*8285*	*14176*	*5891*	*71*	*52*	*42*	*-11*
EU10	*2500*	*5471*	*2971*	*119*	*81*	*78*	*-3*
EU12	*3987*	*8152*	*4165*	*104*	*81*	*78*	*-4*

Source: Commission services, EPC.

Note: The number of older people receiving formal long-term care in Denmark, Malta, the Netherlands, Sweden and Norway is higher than the disabled population estimated in the projection, so the data are not presented.

Table 34 - Number of people receiving formal care and informal or no care in the pure demographic scenario, in thousands

	Number of dependent older persons				of which:											
					Number of persons receiving formal care								Number of persons relying only on informal (or no) care			
					Receiving care in an institution				Receiving care at home							
	2007	2060	Change 2007-2060		2007	2060	Change 2007-2060		2007	2060	Change 2007-2060		2007	2060	Change 2007-2060	
	(000s)		absolute	*in %*	(000s)		absolute	*in %*			absolute	*in %*	(000s)		absolute	*in %*
BE	455	978	523	*115*	118	349	231	*196*	130	308	178	*137*	207	321	114	*55*
BG	841	1207	366	*44*	35	68	33	*94*	62	116	54	*88*	744	1023	279	*38*
CZ	256	687	430	*168*	51	155	105	*207*	73	199	126	*173*	133	333	199	*150*
DK	164	362	199	*122*	60	158	99	*166*	111	255	144	*129*	:	:	:	:
DE	3201	6036	2835	*89*	561	1433	871	*155*	1028	2244	1216	*118*	1612	2359	747	*46*
EE	81	137	57	*70*	4	8	4	*94*	6	13	8	*132*	71	117	46	*64*
IE	93	383	291	*314*	22	113	92	*422*	40	187	147	*364*	30	83	52	*172*
EL	338	820	481	*142*	76	247	171	*226*	163	413	250	*153*	100	160	60	*61*
ES	1728	4721	2993	*173*	180	1148	968	*536*	181	1357	1176	*648*	1366	2215	849	*62*
FR	2263	4833	2570	*114*	552	1302	750	*136*	953	2204	1251	*131*	758	1327	569	*75*
IT	2515	5092	2576	*102*	165	374	209	*127*	359	720	360	*100*	1992	3998	2006	*101*
CY	35	134	100	*288*	3	12	9	*340*	0	0	0	*0*	32	122	90	*284*
LV	123	197	74	*60*	6	12	6	*86*	6	11	5	*85*	110	173	63	*58*
LT	191	364	173	*90*	32	67	36	*113*	7	15	8	*116*	152	281	129	*85*
LU	14	47	32	*225*	3	14	11	*340*	4	17	12	*273*	7	17	10	*142*
HU	594	1098	503	*85*	45	100	56	*124*	41	88	47	*113*	508	910	401	*79*
MT	9	27	18	*186*	2	6	4	*216*	9	26	17	*187*	:	:	:	:
NL	387	984	598	*155*	123	398	275	*223*	499	1189	690	*138*	:	:	:	:
AT	268	607	339	*126*	63	184	121	*192*	122	298	176	*144*	83	125	42	*51*
PL	1485	3582	2096	*141*	1	2	2	*319*	250	696	446	*178*	1235	2884	1649	*134*
PT	698	1494	796	*114*	75	240	165	*220*	152	401	249	*163*	471	853	382	*81*
RO	971	2237	1266	*130*	82	213	131	*159*	146	366	220	*150*	743	1658	915	*123*
SI	76	157	81	*107*	9	23	14	*160*	16	39	24	*151*	52	95	44	*85*
SK	239	662	423	*177*	0	0	0	*0*	31	100	70	*226*	208	562	353	*170*
FI	274	525	251	*91*	50	134	84	*166*	56	131	75	*133*	168	260	92	*55*
SE	312	639	327	*105*	111	253	141	*127*	207	424	218	*105*	:	:	:	:
UK	3094	6465	3371	*109*	469	1257	787	*168*	883	2057	1174	*133*	1741	3151	1410	*81*
NO	155	385	230	*149*	41	124	82	*200*	120	311	191	*159*	:	:	:	:
EU27	*20705*	*44473.4*	*23768*	*115*	*2897*	*8271*	*5373*	*185*	*5536*	*13875*	*8339*	*151*	*12272*	*22328*	*10502*	*84*
EU15	*15804*	*33985.2*	*18182*	*115*	*2629*	*7604*	*4975*	*189*	*4890*	*12205*	*7315*	*150*	*8285*	*14176*	*6333*	*74*
EU10	*3089*	*7043.98*	*3955*	*128*	*151*	*386*	*234*	*155*	*438*	*1188*	*749*	*171*	*2500*	*5471*	*2975*	*119*
EU12	*4902*	*10488.2*	*5587*	*114*	*269*	*666*	*398*	*148*	*646*	*1670*	*1024*	*158*	*3987*	*8152*	*4169*	*105*

Source: Commission services, EPC.

Note: The number of dependent older persons is estimated using dependency rates and projected population and differs from national statistics.

4.5.2. The impact of future changes in the prevalence of disability

Improvements in the disability status of elderly people might mitigate the rise in the demand for long-term care services, and hence the associated public expenditure, as the number and share of elderly people (aged 65 and above) continues to grow. The narrowing of the gap between female and male life expectancy, assuming both men and women live in good health and free of disability, could bring a higher potential supply of informal care by old spouses.

However, there is substantial debate about the changes in the prevalence of disability as longevity improves (Robine and Michel, 2004). Trends in ADL-dependency rates have decreased in the United States (Crimmins, 2004), and some European countries, but they have increased in several other European countries and Japan and have remained stable in Australia (OECD, 2007).

The OECD (2007) assesses the most recent evidence on trends in disability among the elderly in 12 OECD countries. It finds clear evidence of a decline in disability among elderly people in Denmark, Finland, Italy and the Netherlands, while Belgium and Sweden report an increasing rate of severe disability among people aged 65 and over during the past five to ten years. In France and the UK, the available evidence is mixed and does not allow reaching any definite conclusion on the direction of the trend. The US reports a declining rate in disability, while Japan reports an increasing rate of severe disability and Australia reports a stable rate.

The "constant disability scenario" explores an alternative assumption, whereby trends in age-specific disability rates decline in the future. It is analogous to the constant health scenario in the health care expenditure projections. It assumes that the rate of dependency of an 80-year old in the future is lower than that of an 80-year old today. The profile of disability rates by age is assumed to shift in line with life expectancy: the future disability rate of an elderly 80-year old in the future is the same as that of a person aged (80-x) years today (x being the future increase in the life expectancy of an 80 years-old today). This results in a gradual decrease over time in the prevalence of disability for each age cohort.

The results show that an improved disability status would lead to a considerably lower number of disabled persons at each specific age in the future who would have some need for care. This moderates the expected increase in expenditure due to rising numbers of older people. Expenditure would increase by 1 p.p. for the EU as a whole, with smaller increases in EU12 Member States (0.4 p.p. on average).

Table 35 - Number of older dependent people in the constant disability scenario, 000s, % change and difference relative to the pure demographic scenario

								Change 2007-2060		
	2007	2010	2020	2030	2040	2050	2060	in 000s	in %	Diff. to pure demographic
BE	455	475	548	647	765	841	866	411	90	-25
BG	841	840	923	995	1067	1165	1184	343	41	-3
CZ	256	274	343	417	473	516	578	322	126	-42
DK	164	168	199	252	285	304	312	148	90	-31
DE	3201	3383	3982	4469	5076	5563	5190	1989	62	-26
EE	81	81	89	97	106	115	123	42	52	-18
IE	93	101	133	175	227	291	338	246	266	-49
EL	338	368	449	490	570	649	686	348	103	-40
ES	1728	1830	2117	2523	3147	3799	4086	2358	136	-37
FR	2263	2399	2788	3336	3976	4212	4250	1987	88	-26
IT	2515	2659	3024	3362	3873	4379	4407	1891	75	-27
CY	35	37	51	68	84	104	123	88	256	-32
LV	123	124	129	143	155	170	182	59	48	-12
LT	191	197	213	245	280	306	322	131	69	-22
LU	14	16	20	25	32	38	42	27	190	-35
HU	594	612	716	783	869	973	1038	443	75	-10
MT	9	10	14	18	20	21	23	14	143	-43
NL	387	408	502	654	789	856	842	456	118	-37
AT	268	279	312	384	457	524	527	259	96	-30
PL	1485	1526	1967	2433	2738	3053	3285	1800	121	-20
PT	698	735	860	1004	1174	1326	1377	679	97	-17
RO	971	984	1123	1256	1518	1731	1928	957	98	-32
SI	76	81	101	122	139	150	148	72	95	-12
SK	239	248	319	409	478	554	604	365	153	-24
FI	274	288	374	449	479	480	484	210	77	-15
SE	312	318	359	434	479	508	539	228	73	-32
UK	3094	3197	3667	4334	4973	5418	5847	2754	89	-20
NO	155	160	190	239	292	322	348	193	125	-24
EU27	20705	21640	25321	29523	34231	38047	39331	18626	90	-25
EU15	15804	16625	19334	22539	26303	29189	29793	13990	89	-27
EU10	3089	3192	3941	4734	5343	5962	6426	3336	108	-20
EU12	4902	5016	5987	6984	7928	8858	9537	4636	95	-19

Source: Commission services, EPC.

Table 36 - Constant disability scenario – Public expenditure on long-term care, % of GDP

	Constant disability				Diff. to pure demographic
	Level	Increase 2007-2060		Level	Increase 2007-2060
	2007	% points of GDP	%	2060	
BE	1.5	1.2	81	2.7	-0.4
BG	0.2	0.2	112	0.4	0.0
CZ	0.2	0.4	163	0.6	-0.1
DK	1.7	1.3	74	3.0	-0.4
DE	0.9	1.3	141	2.2	-0.2
EE	0.1	0.1	114	0.1	0.0
IE	0.8	1.2	145	2.1	-0.2
EL	1.4	2.0	140	3.4	-0.5
ES	0.5	0.8	155	1.3	-0.1
FR	1.4	0.7	52	2.1	-0.2
IT	1.7	1.1	69	2.8	-0.3
CY	0.0	0.0	89	0.0	0.0
LV	0.4	0.5	132	0.9	0.0
LT	0.5	0.5	110	1.0	-0.1
LU	1.4	1.9	138	3.3	-0.3
HU	0.3	0.4	138	0.6	0.0
MT	1.0	1.4	149	2.4	-0.4
NL	3.4	4.2	126	7.6	-0.9
AT	1.3	1.1	84	2.3	-0.3
PL	0.4	0.7	165	1.1	-0.1
PT	0.1	0.1	145	0.2	0.0
RO	0.0	0.0	188	0.0	0.0
SI	1.1	1.7	153	2.8	-0.1
SK	0.2	0.4	175	0.6	0.0
FI	1.8	2.5	138	4.2	-0.2
SE	3.5	2.0	56	5.5	-0.6
UK	0.8	0.4	54	1.3	-0.1
NO	2.2	2.5	118	4.7	-0.4
EA	1.3	1.2	95	2.5	-0.3
EU27	1.2	1.0	85	2.3	-0.2
EU15	1.3	1.1	84	2.4	-0.2
EU12	0.3	0.4	144	0.7	-0.1

Source: Commission services, EPC.

4.5.3. The impact of future changes in policy: the effect of a shift from informal to formal care

This scenario illustrates the impact of an increase in the provision of formal care, according to the type of care provided: in institutions, at home or a mix of the two. In particular, this sensitivity test examines the budgetary impact of a yearly shift into the formal sector of care of 1% of disabled elderly who so far received only informal care. This shift takes place during the first 10 years of the projection period.

Three alternative options are envisaged:

(a) shift from informal to institutional care only: all 'new' beneficiaries move into institutions and nobody into home care;

(b) shift from informal to home care only: everybody moves into formal home care and nobody into institutions;

(c) shift from informal to institutional and home care: half move to home care and half to institutions.

The unit cost of formal care in an institution is relatively higher than the cost of a unit of care provided in the home of the beneficiary, which translates into higher increases in long-term care expenditure projected when the additional long-term care services are provided in institutions rather than at home. For the EU15, public expenditure would increase by 2 p.p. between 2007 and 2060 if the population newly entitled to formal long-term care services was placed in an institution, by 1.5 p.p. if the care services were delivered in their homes and by 1.7 p.p. if half went to institutional care and half received long-term care services in their homes. For the EU10, smaller changes in expenditure are projected, of 0.7 p.p. (in Poland and Slovakia, a higher increase is projected when home care is provided rather than institutional care, in contrast to all other Member States).

Table 37 - Shift from informal to formal care by different types of care – Public expenditure on long-term care, % of GDP

	Increase 2007-2060								
	points of GDP			in			*Diff. to pure demographic*		
	at home	mix home-institution	institution	at home	mix home-institution	institution	*at home*	*mix home-institution*	*institution*
BE	1.8	2.0	2.2	120	134	147	0.2	0.4	0.6
BG	0.3	0.3	0.3	163	171	178	0.1	0.1	0.1
CZ	0.5	0.6	0.7	204	238	272	0.0	0.1	0.2
DK	2.1	1.9	1.7	118	108	98	0.3	0.2	0.0
DE	1.7	1.8	2.0	180	197	215	0.1	0.3	0.5
EE	0.1	0.1	0.2	139	229	318	0.0	0.1	0.1
IE	1.5	1.7	1.8	182	200	218	0.1	0.3	0.4
EL	2.6	2.8	3.0	187	201	216	0.2	0.4	0.6
ES	1.0	1.5	2.8	185	285	524	0.0	0.6	1.8
FR	1.0	1.1	1.3	69	81	93	0.1	0.2	0.4
IT	1.9	2.2	2.5	115	133	151	0.5	0.8	1.1
CY	0.0	0.0	0.0	102	155	208	0.0	0.0	0.0
LV	0.6	1.1	1.5	162	283	404	0.1	0.5	1.0
LT	0.7	0.8	0.9	139	163	187	0.1	0.2	0.3
LU	2.4	2.7	2.9	174	194	215	0.2	0.5	0.8
HU	0.6	0.7	0.8	228	265	303	0.2	0.3	0.4
MT	1.9	2.2	2.5	195	227	259	0.0	0.3	0.6
NL	5.4	5.8	6.2	161	173	185	0.2	0.6	1.1
AT	1.5	1.5	1.4	120	116	113	0.2	0.1	0.1
PL	1.0	0.9	0.8	245	219	194	0.2	0.1	0.0
PT	0.1	0.2	0.2	171	216	261	0.0	0.0	0.1
RO	0.0	0.1	0.1	225	349	472	0.0	0.0	0.0
SI	2.1	2.2	2.4	188	203	219	0.2	0.4	0.6
SK	0.6	0.5	0.4	277	237	197	0.2	0.1	0.0
FI	2.9	3.3	3.8	162	187	211	0.2	0.7	1.1
SE	2.8	3.1	3.4	81	89	98	0.3	0.6	0.9
UK	0.6	0.6	0.7	71	76	81	0.0	0.1	0.1
NO	3.0	3.4	3.9	140	159	179	0.1	0.5	0.9
EA	1.7	1.9	2.3	128	147	174	0.2	0.4	0.8
EU27	1.4	1.6	1.9	115	131	151	0.2	0.3	0.6
EU15	1.5	1.7	1.9	114	129	151	0.2	0.4	0.6
EU12	0.6	0.6	0.6	206	209	212	0.1	0.1	0.2

Note: According to internal Spanish projections the expenditure calculated in the scenario of shift from informal care to home care is underestimated and the expenditure of the shift to institutions is overestimated, due to differences in the definitions used.
Source: Commission services, EPC.

4.5.4. The impact of future changes in the cost of a unit of care

The demand-driven expenditure scenario examines the assumption that changes in long-term care provision are mainly demand-driven, and follow the general increase in national income rather than growth in unit labour costs. It is identical to the pure ageing scenario, except that costs are assumed to evolve in line with GDP per capita instead of GDP per worker. The increase in expenditure projected is somewhat smaller compared to the pure ageing scenario where unit costs evolve in line with GDP per worker, this reflects the different patterns in the evolution of GDP per capita and GDP per worker, but the differences are very small.

Table 38 - Demand-driven expenditure scenario – Public expenditure on long-term care, % of GDP

	Per capita				*Diff. to pure demographic*
	Level	*Increase 2007-2060*		Level	*Increase 2007-2060*
	2007	*% points of GDP*	*%*	2060	
BE	1.5	1.3	90	2.8	*-0.2*
BG	0.2	0.2	88	0.3	*0.0*
CZ	0.2	0.4	147	0.6	*-0.1*
DK	1.7	1.4	82	3.2	*-0.3*
DE	0.9	1.3	141	2.2	*-0.2*
EE	0.1	0.1	102	0.1	*0.0*
IE	0.8	1.1	135	2.0	*-0.3*
EL	1.4	2.0	139	3.4	*-0.5*
ES	0.5	0.8	150	1.3	*-0.1*
FR	1.4	0.7	51	2.1	*-0.2*
IT	1.7	1.2	71	2.8	*-0.2*
CY	0.0	0.0	82	0.0	*0.0*
LV	0.4	0.4	96	0.7	*-0.2*
LT	0.5	0.4	85	0.9	*-0.2*
LU	1.4	2.2	163	3.6	*0.1*
HU	0.3	0.3	114	0.6	*-0.1*
MT	1.0	1.5	155	2.5	*-0.4*
NL	3.4	4.2	124	7.6	*-1.0*
AT	1.3	1.1	86	2.3	*-0.3*
PL	0.4	0.5	138	0.9	*-0.2*
PT	0.1	0.1	132	0.2	*0.0*
RO	0.0	0.0	157	0.0	*0.0*
SI	1.1	1.2	111	2.3	*-0.6*
SK	0.2	0.3	150	0.5	*-0.1*
FI	1.8	2.3	128	4.1	*-0.4*
SE	3.5	2.0	58	5.5	*-0.5*
UK	0.8	0.4	54	1.3	*-0.1*
NO	2.2	2.3	107	4.5	*-0.6*
EA	1.3	1.2	95	2.5	*-0.3*
EU27	1.2	1.0	85	2.3	*-0.2*
EU15	1.3	1.1	84	2.4	*-0.2*
EU12	0.3	0.4	118	0.7	*-0.1*

Source: Commission services, EPC.

4.5.5. Fast/slow growth in unit cost scenario

This sensitivity test measures the impact of an external shock to the long-term care system increasing or reducing by 1% a year the underlying rate of growth in unit costs. The only difference with the pure demographic scenario concerns the evolution of unit costs, which are not assumed to evolve in line with GDP per worker. Instead, they are assumed to grow by one percentage point above/below GDP per worker growth rate for the first ten years of the projection exercise (2008-1017) and thereafter (between 2018 and 2060) according to the GDP per worker growth rate. This implies a proportional increase in total long-term care expenditure of approximately 10% with respect to the baseline.

Under the assumption of a high growth in unit costs, expenditure would increase by 1.5 p.p. for the EU, compared to 1 p.p. under the assumption of a slow growth in unit costs. The impact of changes in the unit cost assumption is stronger in EU15 than in EU10 Member States, Bulgaria and Romania, given the higher level of total expenditure in the baseline.

Table 39 - Fast/slow growth scenario –Public expenditure on long-term care, % of GDP

	Increase 2007-2060					
	% points of GDP		in %		*Diff. to pure demographic*	
	Fast growth	Slow growth	Fast growth	Slow growth	Fast growth	Slow growth
BE	1.9	1.3	127	86	0.3	-0.3
BG	0.3	0.2	137	95	0.0	0.0
CZ	0.5	0.4	224	166	0.1	-0.1
DK	2.1	1.4	118	79	0.4	-0.3
DE	1.8	1.3	193	140	0.3	-0.2
EE	0.1	0.1	157	112	0.0	0.0
IE	1.6	1.2	193	142	0.2	-0.2
EL	2.8	2.1	200	147	0.4	-0.4
ES	1.0	0.8	198	156	0.1	-0.1
FR	1.1	0.7	81	48	0.2	-0.2
IT	1.7	1.1	105	68	0.3	-0.3
CY	0.0	0.0	123	83	0.0	0.0
LV	0.6	0.4	166	118	0.1	-0.1
LT	0.7	0.5	148	103	0.1	-0.1
LU	2.5	1.8	185	134	0.4	-0.3
HU	0.5	0.3	175	126	0.1	-0.1
MT	2.1	1.6	223	165	0.3	-0.3
NL	6.1	4.4	180	130	0.9	-0.8
AT	1.6	1.1	128	88	0.3	-0.2
PL	0.8	0.6	213	158	0.1	-0.1
PT	0.1	0.1	184	133	0.0	0.0
RO	0.0	0.0	254	191	0.0	0.0
SI	2.1	1.6	193	141	0.3	-0.3
SK	0.5	0.4	227	170	0.1	-0.1
FI	3.1	2.3	175	126	0.5	-0.4
SE	3.2	2.0	91	57	0.6	-0.6
UK	0.7	0.4	83	50	0.1	-0.1
NO	3.4	2.4	160	113	0.5	-0.5
EA	1.8	1.2	137	95	0.3	-0.3
EU27	1.5	1.0	124	84	0.0	-0.5
EU15	1.6	1.1	123	83	0.3	-0.2
EU12	0.6	0.4	188	137	0.0	-0.2

Source: Commission services, EPC.

4.5.6. AWG reference scenario

The "AWG reference scenario" is based on a set of prudent assumptions whose main aim is to facilitate the comparison of budgetary projections across expenditure items, and is similar to the "AWG reference scenario" for health care. It assumes that some half of projected longevity gains up to 2060 would be spent in good health and free of disability and accordingly, age-specific disability rates shift along the age profile by half of the projected increase in life expectancy. Furthermore, the unit cost is linked to GDP per worker in case of LTC services and to GDP per capita in case of cash benefits.

The projected increase in public expenditure lies midway between the results of the “pure ageing” and the “constant disability” scenario, an increase of 1.1 p.p. for the EU27. The effects of the “AWG reference scenario” are stronger for long-term care than for health care, i.e. in terms of mitigating the projected increase in public expenditure. This occurs because unlike the health care projection exercise, there is no assumption regarding an income elasticity of demand being greater than unity. Also, the age-specific disability rates used in the long-term care projection rise at a much steeper pace compared with the (implicit) assumptions on age-specific morbidity rates used in the health care projection (which uses the age-related expenditure profile as a proxy for morbidity).

Table 40 - AWG reference scenario – Public expenditure on long-term care, % of GDP

	AWG reference scenario				*Diff. to pure demographic*
	Level	*Increase 2007-2060*		Level	*Increase 2007-2060*
	2007	*% points of GDP*	*%*	2060	
BE	1.5	1.4	93	2.9	*-0.2*
BG	0.2	0.2	114	0.4	*0.0*
CZ	0.2	0.4	178	0.7	*0.0*
DK	1.7	1.5	86	3.2	*-0.2*
DE	0.9	1.4	153	2.4	*-0.1*
EE	0.1	0.1	124	0.1	*0.0*
IE	0.8	1.3	156	2.2	*-0.1*
EL	1.4	2.2	156	3.6	*-0.2*
ES	0.5	0.9	166	1.4	*-0.1*
FR	1.4	0.8	58	2.2	*-0.1*
IT	1.7	1.3	77	3.0	*-0.1*
CY	0.0	0.0	96	0.0	*0.0*
LV	0.4	0.5	136	0.9	*0.0*
LT	0.5	0.6	117	1.1	*0.0*
LU	1.4	2.0	148	3.4	*-0.1*
HU	0.3	0.4	144	0.6	*0.0*
MT	1.0	1.6	171	2.6	*-0.2*
NL	3.4	4.7	140	8.1	*-0.5*
AT	1.3	1.2	96	2.5	*-0.1*
PL	0.4	0.7	175	1.1	*0.0*
PT	0.1	0.1	151	0.2	*0.0*
RO	0.0	0.0	204	0.0	*0.0*
SI	1.1	1.8	160	2.9	*-0.1*
SK	0.2	0.4	186	0.6	*0.0*
FI	1.8	2.6	144	4.4	*-0.1*
SE	3.5	2.3	65	5.8	*-0.3*
UK	0.8	0.5	60	1.3	*-0.1*
NO	2.2	2.7	127	4.9	*-0.2*
EA	1.3	1.4	105	2.7	*-0.1*
EU27	1.2	1.1	94	2.4	*-0.1*
EU15	1.3	1.2	93	2.5	*-0.1*
EU12	0.3	0.5	152	0.8	*0.0*

Source: Commission services, EPC.

4.6. Conclusions

An ageing population will place strong upward pressure on public expenditure on long term care. This is because frailty and disability rises sharply at older ages, especially amongst the very old (aged 80 years and above). Increasing numbers of elderly are expected to need care, as longevity increases and the numbers and share of elderly expand. However, the projections do not only examine the demographic driver of expenditure, but also look at the impact of changes in the prevalence of disability, as well as possible future policy changes to respond to needs for long-term care.

In a "AWG reference" scenario based on current policy settings, public expenditure on long-term care is projected to increase by 1.1 p.p. for the EU as a whole, between less than 0.1 in Estonia, Cyprus, Portugal and Romania and more than 2 p.p. of GDP in Greece, Luxemburg, the Netherlands, Finland and Sweden between 2007 and 2060. The projected changes in public expenditure are very diverse reflecting very different approaches to the provision/financing of formal care. Countries with very low projected increases in public expenditure have very low current levels of formal care provision. Projections of age-related expenditure increases are low as their elderly citizens in need of care currently rely on informal care. Given that initial level of expenditure determines to a large extent the projected increase, an increase in relative terms (from about 60% of initial level in France, the UK and Sweden to over 170% in the Czech Republic, Romania, Malta and Slovakia) illustrates somewhat better the degree of the challenge facing European societies.

Public expenditure is very sensitive to trends in the prevalence of disability among the elderly. The "constant disability scenario" illustrates that an improved disability status would lead to a lower number of disabled persons at each specific age in the future who would have some need for care. This would moderate the future increase in expenditure due to ageing populations, and the projected increase in expenditure would be 0.2 p.p. lower for the EU as a whole. However, the available evidence indicates that the ageing of the population and the extended longevity of people can be expected to lead to increasing numbers of elderly with severe disability and in need of long-term care, so it would not be prudent for policymakers to anticipate strong moderations in future long-term care expenditure on account of possible reductions in future disability rates.

The projections show that, with an ageing population, the number of elderly people with disability who rely on informal care only would nearly double in the EU27, and increase by more than 120% in 7 EU Member States: the Czech Republic, Ireland, Cyprus, Luxemburg, Poland, Romania and Slovakia. Under no policy change, a growing gap may occur between the number of elderly citizens with disability who are in need of care and the actual supply of formal care services. On top of an ageing population, this gap could further grow as changes in family structure and the growing participation of women in the labour market may constrain the future supply of informal care provision within households and families.

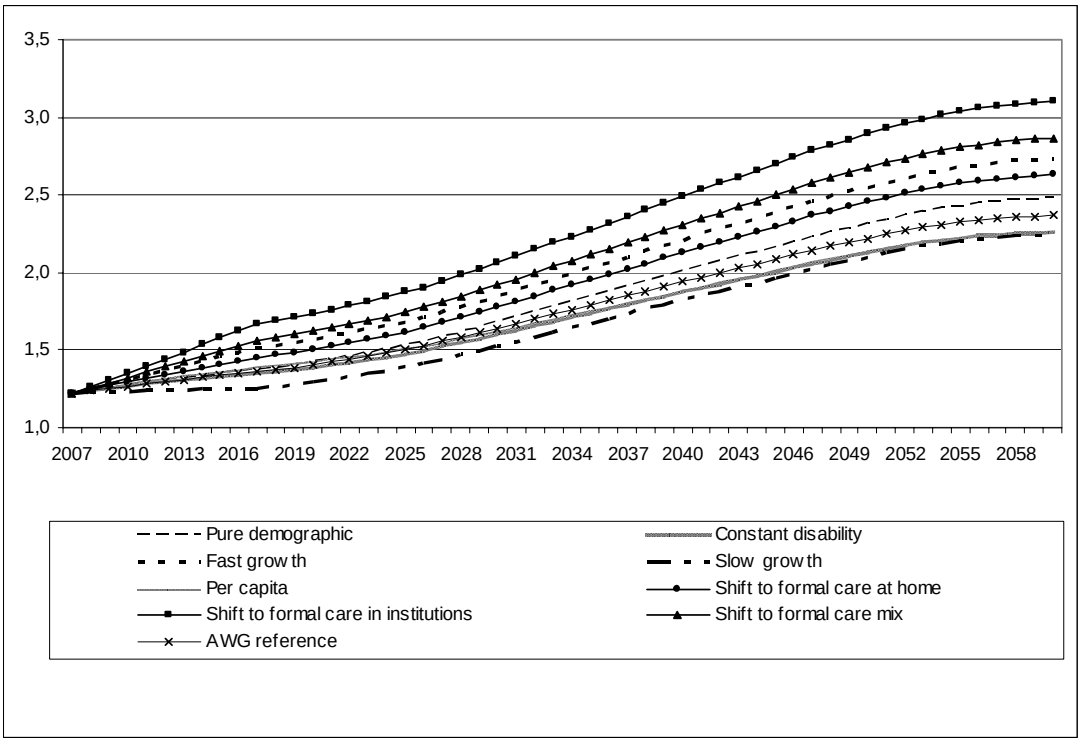
For countries with less developed formal care systems today, the headline projected increase in public expenditure on long-term care could only partially capture the pressure on public finances, as pressure for future policy changes in favour of more formal care provision will emerge and be difficult to resist. Additional scenarios have been prepared to assess the impact of possible future policy changes, e.g. assuming an increase in the provision of more formal care services to the dependent elderly.

The unit cost of formal care in an institution is relatively higher than the cost of a unit of care provided in the home of the beneficiary (on average people in institutions have higher degrees of disability and are normally provided with a full set of services ranging from accommodation and food to medical care, while care at home is, in most cases, limited to a necessary selection of services), which translates into higher increases in long-term care expenditure projected when the additional long-term care services are provided in institutions rather than at home.

Assuming an increase in the provision of formal care, public expenditure would increase by 2 p.p. between 2007 and 2060 in the EU15 if the population newly entitled to formal care services was placed in an institution, by 1.5 p.p. if the care services were delivered in their homes and by 1.7 p.p. if half went to institutional care and half received long-term care services in their homes. For the EU12, smaller changes in expenditure are projected, of about 0.7 p.p.

Improvements in the health status that may reduce disability among the elderly or policy measures which favour provision of formal care at home rather than in institutions, whenever possible, can contribute to moderating the expected future increase in public expenditure on long-term care.

Graph 74 – Projected expenditure according to the different scenarios, EU27, % of GDP



Source: Commission services, EPC.

5. EDUCATION

5.1. Introduction

Public expenditure on education is broadly related to demographic developments, as people in the young age are potential recipients of publicly funded education. However, many other factors have also a relevant impact on public expenditure on education. The level of state involvement in the educational sector, the structure of the education system, the length of obligatory education, admission criteria, evolution in wages, the level of investment in human and physical capital, the average size of classes and most other factors that are either part of a long-term education strategy or ad-hoc government decisions drive the quality and the quantity of the public provision of education.

The main aim of the present exercise is to assess the impact on public finances stemming from the demographic transition in Europe; thus, projections on future spending on education are limited to the evolution of demographic and labour market developments, under the assumption of "no policy changes", and abstracting from the distinctive characteristics of each national system. Obviously, such an exercise has a purely informative character and does not pretend to illustrate the complexity of the Member States' education systems and policy challenges facing each of them.

In the light of the above considerations, the baseline scenario to assess the impact of demographic changes on education expenditure takes into account only the demographic evolution underlying the changes in the number of people being recipients of publicly funded provision.

Two sensitivity tests are also presented - one related to a quality improvement and the other aimed at testing the impact of higher compensation in the education sector - in order to illustrate the budgetary impact of a stylised change in two aspects of education policy, namely the reduction in the average size of classes and growth in wages and salaries faster than labour productivity.

Furthermore, the Commission has recently released a Communication on *"Updated Strategic Framework for European Cooperation in Education and Training"*[83] presenting, inter alia, a set of policy objectives. An attempt to measure the budgetary costs of achieving two of these quantifiable targets, higher tertiary education attainment and lower number of early school leavers, has been carried out (henceforth referred to as the "Lisbon strategy scenario").

5.2. General characteristics of the national education systems

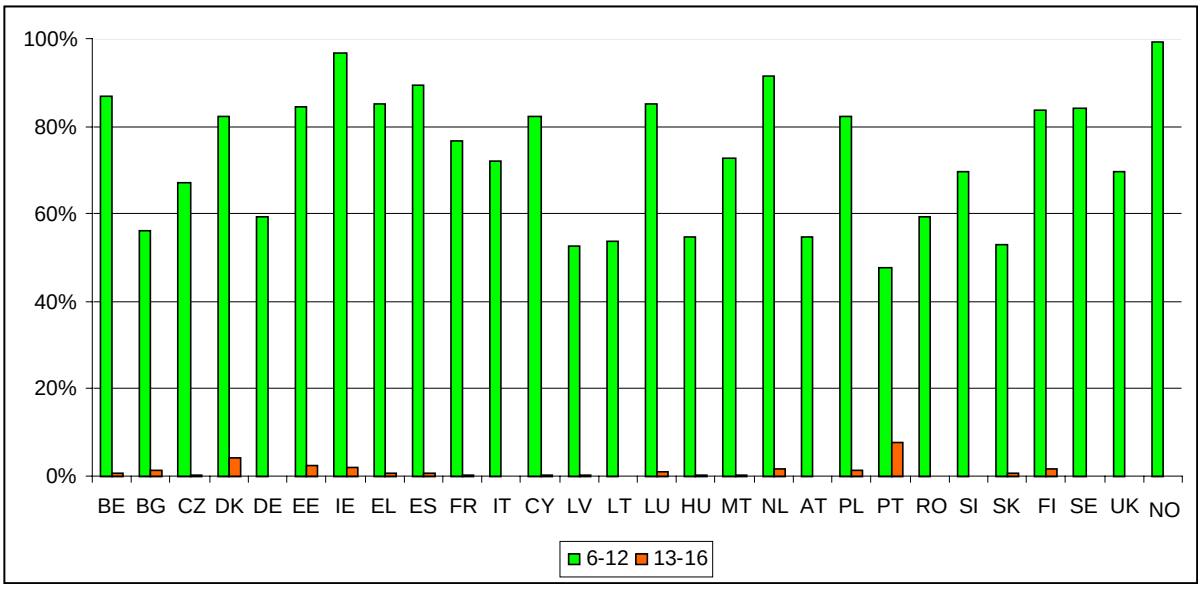
As mentioned above, the methodology used to project future education expenditure is based on a simplified model that abstracts from the distinctive characteristics of each individual Member States' education systems. The methodology, nevertheless, allows for proper consideration of the basic features of the education systems, and in particular of those concerning enrolment and financial aspects.

[83] An updated strategic framework for European cooperation in education and training", Communication from the Commission, COM(2008) 865, 16 December 2008

5.2.1. Enrolment rates in the EU

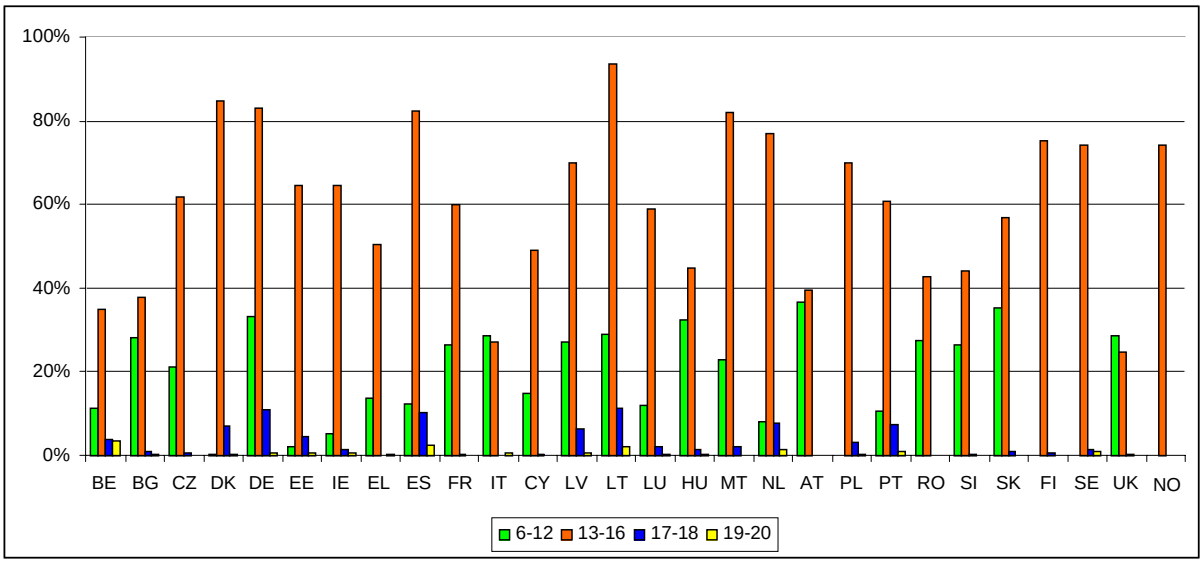
The institutional structure of the education system varies considerably across Member States. Although the border between compulsory and non-compulsory education is generally similar across countries (compulsory education starting at the age of 5 to 7 and finishing at the age of 13 to 16), the education path a young person can follow is different in each country. This poses problems when measuring the actual enrolment rate across different levels of education given the cross-country inconsistency of the "statutory age" at which a person is attending a given level of education with the actual distribution of students across the levels of education. The phenomenon is clearly visible in Graph 75 to Graph 78, which present enrolment rate of some selected age cohorts at each level of education.

Graph 75 – Enrolment rates (percentage of population of a given age cohort) in primary education (ISCED 1)



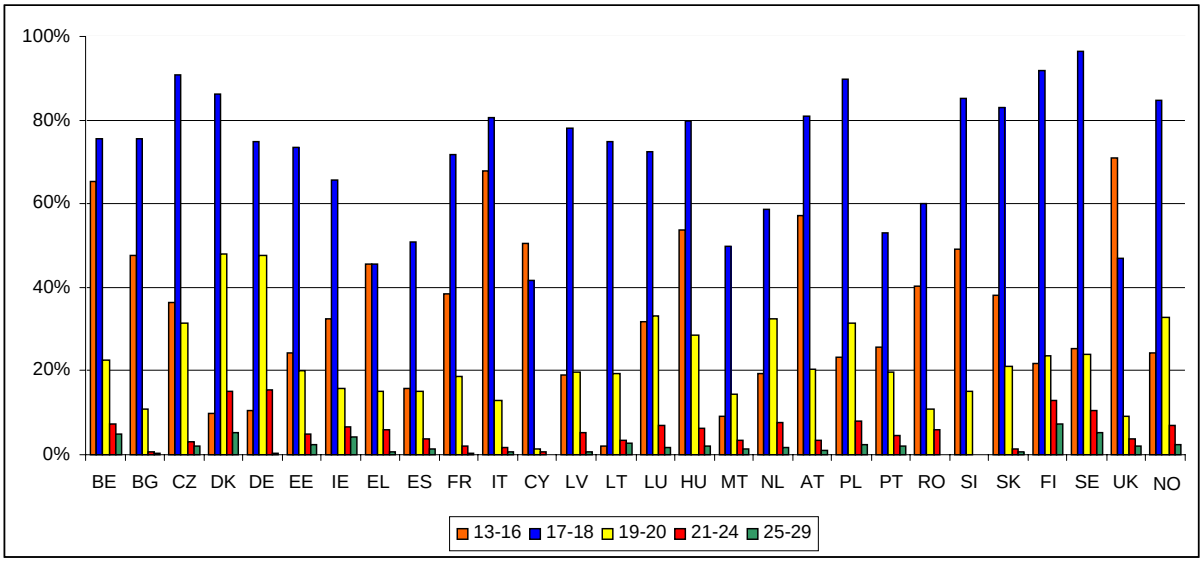
Source: Commission services, EPC.
* For some countries, enrolment in ISCED 1 starts at the age of 5 but it's not captured in the above graph.

Graph 76 – Enrolment rates (percentage of population of a given age cohort) in lower secondary education (ISCED 2)



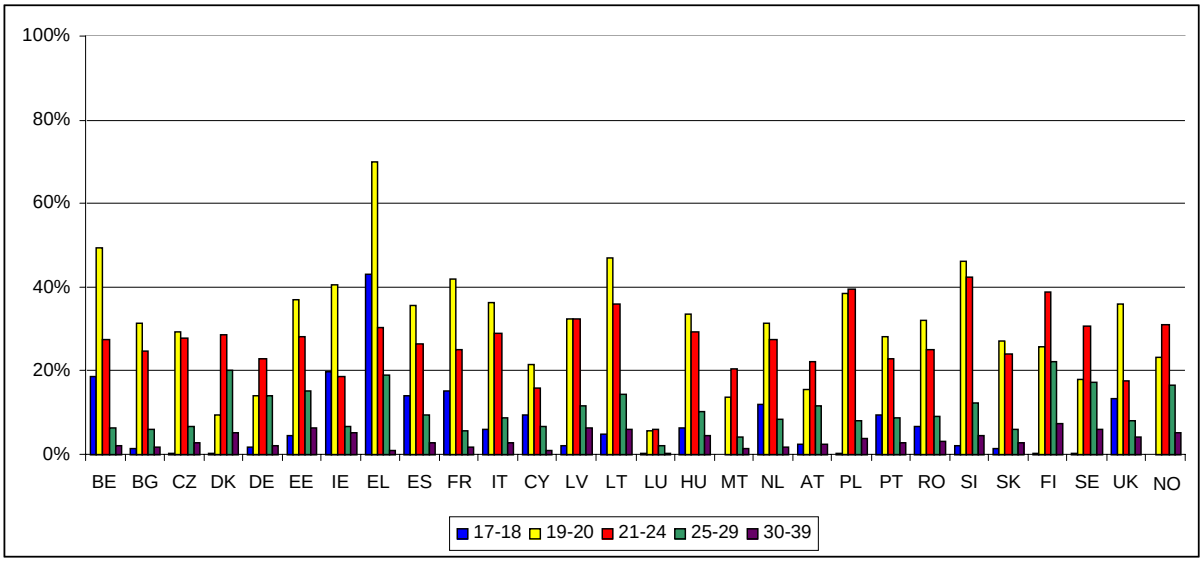
Source: Commission services, EPC.

Graph 77 – Enrolment rates (percentage of population of a given age cohort) in upper secondary education (ISCED 3 and 4)



Source: Commission services, EPC.

Graph 78 – Enrolment rates (percentage of population of a given age cohort) in tertiary education (ISCED 5 and 6)



Source: Commission services, EPC.

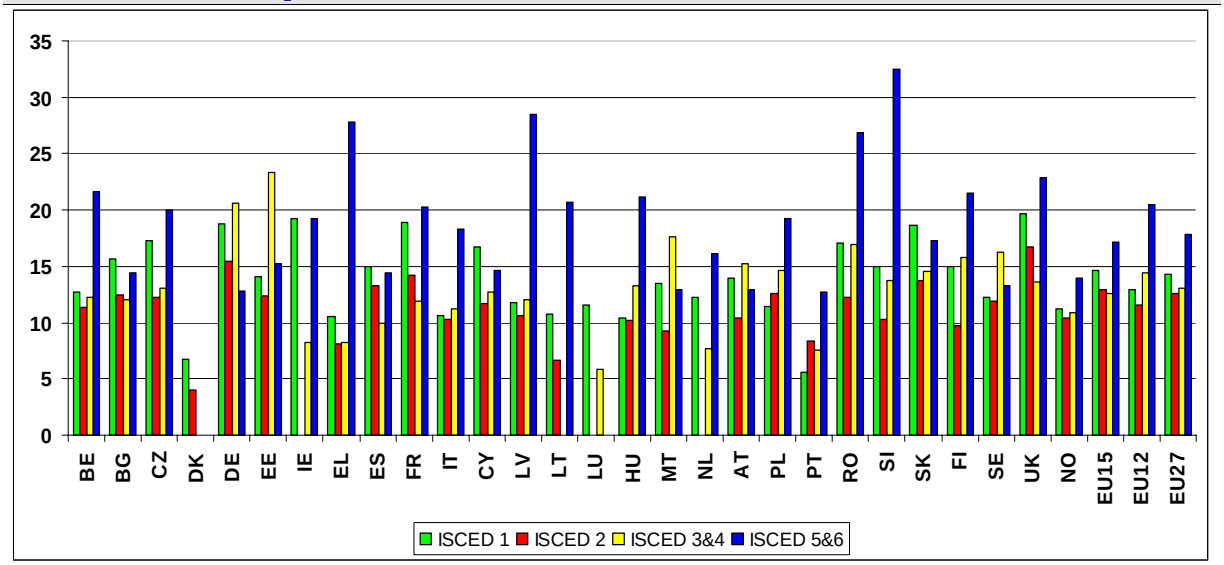
5.2.2. Teacher/students ratio

The number of students assigned to one teacher (or, in other words, the average class size) is the broadest and most general quantitative measure of investment in the quality of education, although a number of other, mainly qualitative, factors stand behind the success of educational process.

As seen in the Graph 79 below, the ratio teacher/students varies significantly both by level of education and across countries. In most countries, the size of class is largest in tertiary education, which can be easily explained by the teaching methods, relying much more than in the lower levels on individual research and library work. The size of primary education classes is on average slightly larger than that of secondary (both lower and upper).

When comparing individual countries, one can see a wide variety, due undoubtedly to the specific organisational features of each education system. Moreover, on average, EU15 countries have slightly less students per teacher than EU12 countries, which is probably due to the lower financial resources devoted to the sector in newly acceded Member States.

Graph 79 – Students/Teacher ratio in different levels of education



Note: *The data for ISCED 3&4 in Germany does not take into account the Dual System, a special form of apprenticeship which comprises education and training both at vocational school and in an enterprise (as students-teacher ratios are based on data on full-time equivalents, students in the Dual System are only taken into account by a factor of 0.4 relating to the proportion of school-based component (Berufsschulen)).*
EU15, EU12 and EU27 calculated as unweighted averages.

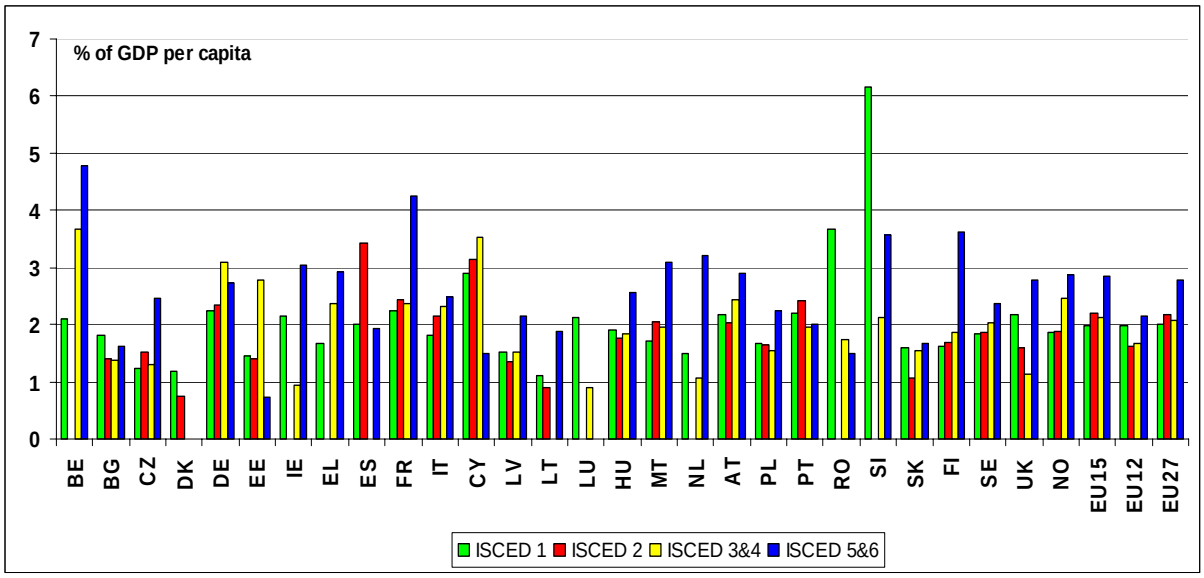
Source: Commission services, EPC.

5.2.3. Staff compensation

Wages and salaries of the staff employed in the education system vary significantly across countries (Graph 80 below). The obvious reason for such diversity is a very broad scope of the measure which includes the compensation of all types of staff, both teaching (professors, assistants) and non-teaching. The overall measure depends on the relative number of teaching and non-teaching staff employed in the educational sector and the wage gap between different types of jobs. The general finding is that wages are on average highest in the tertiary level of education, which is probably due to the fact that teaching staff is generally better qualified. Somewhat less paid are the teachers in primary education, which is probably due to specific pedagogical skills required to teach young children, while the lowest-paid levels seem to be lower- and upper secondary education. Moreover, the available data suggests that the staff compensation is slightly higher in the EU12 countries (non-weighted average) than in the EU15 for all education levels.

Three countries (Romania, Greece, Slovenia) do not report data on lower secondary education, which in their systems are classified as part of primary education. In Belgium lower secondary education (ISCED 2) is reported as part of upper secondary education (ISCED 3-4). The same happens in Spain where financial data for ISCED 2 and 3-4 are combined. Luxembourg does not have on its territory any tertiary education entity (all tertiary students originating from this country are enrolled abroad), thus no public expenditure on this level of education is officially reported.

Graph 80 – Average compensation per member of staff in different levels of education (expressed as % of GDP per capita)

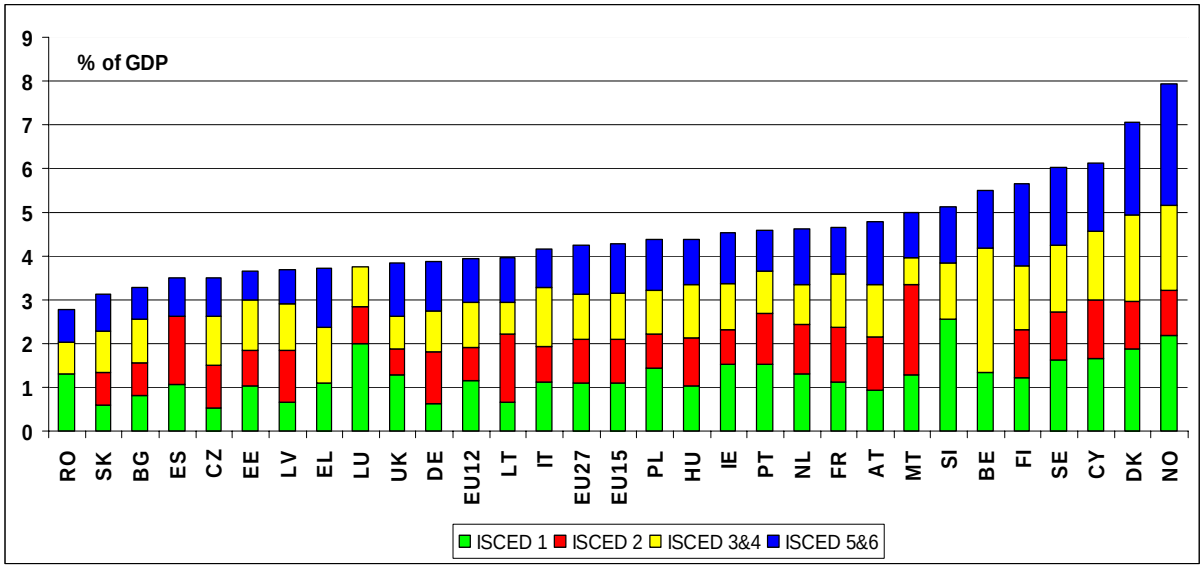


Source: Commission services, EPC.

5.2.4. Total expenditure on education

Graph 81 below presents total public spending on education in 2007 decomposed into four levels of education. Total public expenditure ranges between 2.8 (Romania) and 7.9 (Norway) % of GDP. Contribution of each level to the total expenditure varies across countries although it seems that the highest spenders in general are those countries which invest most heavily in tertiary education. The differences are however not pronounced enough to draw any general conclusions.

Graph 81 – Structure of public education expenditure in 2007 (% of GDP)



Source: Commission services, EPC.

5.3. Methodology and results – baseline scenario

5.3.1. Short overview of the methodology

The methodology[84] to project future public expenditure on education is a simple simulation model, whereby the total expenditure on education is the sum of three main components: spending on staff compensation (gross wages and salaries of teaching and non-teaching staff), other costs (capital investment plus current expenditure) and direct or indirect transfers to students and their households (scholarships and public loans, public subsidies for educational activities to private institutions or non-profit organisations). Spending on staff compensation is calculated by multiplying the unit compensation (wages and salaries, growing over time in line with labour productivity) by the number of staff, which, in turn evolves in line with the number of students (assuming constant teacher/students ratio). The number of students, which is also a driver for two other components of total costs, is calculated by matching the demographic and labour market projections with the projected enrolment rate. The available data allows performing the same calculations for each education level. As can be concluded from this short overview, the crucial element of the projection exercise is the number of students, which is the result of the interaction between demographic trends and evolution in the enrolment rate.

5.3.2. Projection results

The baseline scenario illustrates the pure impact of demographic changes on total education expenditure in the EU Member States and as such it does not take into account any policy changes in the public provision on education. It follows a number of general assumptions on the future evolution of costs which have been considered to be the most plausible developments of underlying variables by the AWG. The way to calculate the number of

[84] For a detailed presentation of the methodology used, see: "The 2009 Ageing Report: Underlying Assumptions and Projection Methodologies for the EU-27 Member States (2007-2060), European Economy, No. 7/2008, European Commission, Brussels.

students differs according to the level of education. For the compulsory education levels (which are, by convention, primary and lower secondary education, ISCED1 and ISCED2[85]), enrolment rate is projected to reach 100% over the first decade of the projection period. For the non-compulsory levels (thus, by convention, upper secondary and tertiary education, ISCED 3 and 4 and ISCED 5 and 6[86]), developments in enrolment rate are assumed to depend also on developments in labour market situation. Indeed, enrolment rate is calculated as the complement to the participation rate, taking into account the share of working students and those who neither work nor study[87]. The number of teachers and non-teaching staff is assumed to follow the same path as the number of students, so that the student-to-teacher ratio remains constant over the whole projection period. Wages of staff are projected to evolve in line with labour productivity in the whole economy, and the other costs (current expenditure plus capital investment) are assumed to remain constant as a share in total costs, thus automatically adjusting to the changes in wages and salaries.

Due to the gradual decrease in the share of the young cohorts in the overall population, the ongoing demographic change is expected to have a decreasing impact on the public spending on education. The results of the baseline scenario, aimed at presenting the impact of demographic evolution with the assumption of no changes in the education policy, are presented in Table 41 below[88]. The total public expenditure falls in all but four countries (Slovenia, Spain, Denmark and Norway) and the average decrease is of 0.2% of GDP. However, the impact varies considerably across individual countries both in absolute (from a decline of 1.2% of GDP in Cyprus and Poland to an increase of 0.4% of GDP in Slovenia) and in relative terms (from a decline of almost 30% of initial level in Poland and Slovakia to an increase of 9% in Slovenia). An interesting observation is also the difference in the demographic impact between the old and the new Member States of the EU. While the EU15 countries can expect a moderate decrease of 0.14% of GDP, the newly acceded Member States see their education expenditure falling by 0.71% of GDP as a result of a faster change in the population structure, a non-negligible factor to be taken into account when considering necessary investment in the education sector to increase its quality.

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[85] Basic (primary plus lower secondary) education. Level 1 and 2 of ISCED classification. Level 1 is the start of compulsory education (the first stage of basic education) with a legal age of entry usually not lower than five years old and higher than seven years old. This level covers in principle six years of full-time schooling. Level 2 is lower secondary school (or a second stage of basic education). The end of this stage is usually after nine years of schooling after the beginning of primary education and often coincides with the end of the compulsory education. It includes general education as well as pre-vocational or pre-technical education and vocational and technical education. See Unesco, 1997.

[86] Upper-secondary education. Level 3 and 4 of ISCED classification. Level 3 is upper-secondary school and the entry is typically 15 or 16 year old. It also includes vocational and technical educational. Level 4 is post-secondary non-tertiary education and these programmes are typically designed to prepare students to the following level (university). Tertiary education. Level 5 and 6 of ISCED classification. Level 5 covers at least two years of education and the minimal access requirements is the completion of level 3 and 4. However a Master course that implies up to 6 years of tertiary education is included in level 5. Level 6 includes tertiary programmes which lead to the award of an advance research qualification. See Unesco, 1997.

[87] The calculation takes into account people who study and work simultaneously and those who follow neither of the two activities. Their share in the total number of students and in total population respectively is calculated in the base year, and kept constant over the whole projection period.

[88] The results of all scenarios for Italy take into account a recent education system reform which envisages a gradual increase of the students/teachers ratio by 1 unit over the 3-year period 2009-2011.

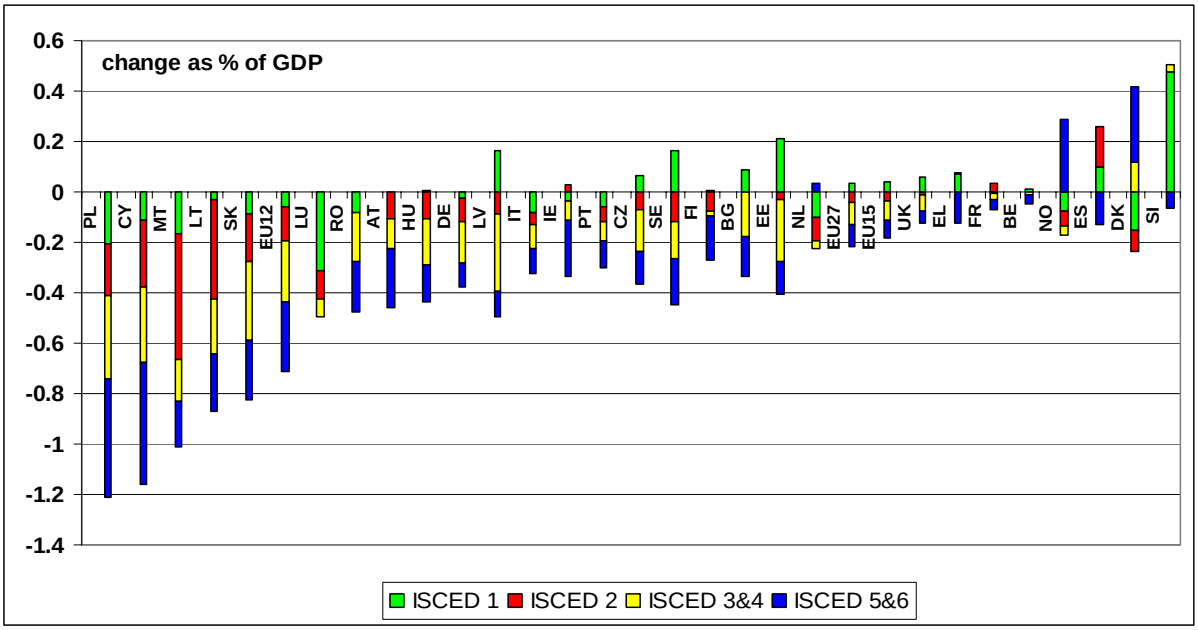
Table 41 - Results of the baseline scenario (public education expenditure as % of GDP)

	Level 2007	change 2007-2060 % points of GDP	change 2007-2060 %	Level 2060
BE	5.5	*0.0*	*-1*	5.5
BG	3.3	*-0.2*	*-8*	3.0
CZ	3.5	*-0.3*	*-9*	3.2
DK	7.1	*0.2*	*3*	7.2
DE	3.9	*-0.4*	*-10*	3.5
EE	3.7	*-0.2*	*-5*	3.5
IE	4.5	*-0.3*	*-7*	4.2
EL	3.7	*0.0*	*-1*	3.7
ES	3.5	*0.1*	*4*	3.6
FR	4.7	*0.0*	*-1*	4.6
IT	4.1	*-0.3*	*-8*	3.8
CY	6.1	*-1.2*	*-19*	5.0
LV	3.7	*-0.3*	*-9*	3.3
LT	4.0	*-0.9*	*-22*	3.1
LU	3.8	*-0.5*	*-13*	3.3
HU	4.4	*-0.4*	*-10*	4.0
MT	5.0	*-1.0*	*-20*	4.0
NL	4.6	*-0.2*	*-4*	4.4
AT	4.8	*-0.5*	*-10*	4.3
PL	4.4	*-1.2*	*-28*	3.2
PT	4.6	*-0.3*	*-7*	4.3
RO	2.8	*-0.5*	*-17*	2.3
SI	5.1	*0.4*	*9*	5.6
SK	3.1	*-0.8*	*-26*	2.3
FI	5.7	*-0.3*	*-5*	5.4
SE	6.0	*-0.3*	*-5*	5.8
UK	3.8	*-0.1*	*-2*	3.8
NO	7.9	*0.1*	*1*	8.1
EU27	4.3	*-0.2*	*-4*	4.1
EU15	4.3	*-0.1*	*-3*	4.1
EU12	3.9	*-0.7*	*-18*	3.2
EA	4.2	*-0.2*	*-4*	4.1

Source: Commission services, EPC.

The evolution in spending on respective levels of education is quite similar across Member States. Comparing the contribution of each education level to total change in spending between 2007 and 2060 (see Graph 82 below), it seems a rule that secondary level of education (ISCED 2, 3 and 4) contribute most to the fall in spending (the only exception being Spain and France), followed by tertiary level (only the countries where total spending is projected to increase: Denmark, Norway plus the Netherlands will see their expenditure on tertiary education grow). At the same time, primary level is the only one having an opposite, increasing effect (it is the case in almost half of the countries: Slovenia, Estonia, Sweden, Latvia, Spain, Bulgaria, Greece, the Czech Republic, the UK, Belgium, Hungary, Finland, Austria) or at least pushing spending down to a significantly lower degree.

Graph 82 – Changes in public spending on respective levels of education 2007-2060 (% of GDP)



Source: Commission services, EPC.

5.3.3. Decomposition of results

The forces behind the changes in education expenditure can be better explained by decomposing the total change into a series of factors. The ratio of total education spending to GDP can be indeed decomposed into four elements, according to the following formula:

$$\frac{EDU}{GDP} = \frac{S}{POP_Y} * \frac{POP_Y}{POP_W} * \frac{POP_W}{N} * \frac{EDUps}{GDPpw} \qquad [1]$$

where:
EDU is total expenditure on education,
S is the number of students,
POP_Y is the young population (aged 5-25),
POP_W is the working age population (aged 15-64),
N is total employment,
EDUps is expenditure per student,
GDPpw is GDP per worker.

In this decomposition the first component, $\frac{S}{POP_Y}$ represents enrolment in education (share of young population attending studies); the second one, $\frac{POP_Y}{POP_W}$ is the ratio of young population to working age population; the third one, $\frac{POP_W}{N}$ is the inverse of employment rate; and the fourth one, $\frac{EDUps}{GDpw}$ is the average cost per student as compared to national income per capita.

Table 42 – Decomposition of the change in education expenditure according to the baseline scenario (% change in total expenditure to GDP ratio and in each component)

	Enrolment	Young share	Inverse of employment	Relative cost per student	Total change 2007-2060
BE	2%	3%	-6%	1%	-1%
BG	4%	0%	-8%	-3%	-8%
CZ	2%	1%	-10%	-2%	-9%
DK	-1%	4%	-4%	4%	3%
DE	0%	-1%	-10%	1%	-10%
EE	4%	-4%	-3%	-2%	-5%
IE	2%	-3%	-7%	1%	-7%
EL	1%	5%	-6%	-2%	-1%
ES	3%	11%	-11%	3%	4%
FR	0%	4%	-5%	0%	-1%
IT	-1%	5%	-10%	-2%	-8%
CY	4%	-14%	-10%	1%	-19%
LV	6%	-9%	-2%	-4%	-9%
LT	3%	-17%	-5%	-3%	-22%
LU	-2%	2%	0%	-13%	-13%
HU	1%	-4%	-8%	1%	-10%
MT	4%	-15%	-9%	-1%	-20%
NL	-1%	-1%	-4%	2%	-4%
AT	-2%	-1%	-7%	0%	-10%
PL	1%	-19%	-12%	1%	-28%
PT	3%	-3%	-9%	3%	-7%
RO	4%	-15%	-3%	-3%	-17%
SI	4%	6%	-3%	1%	9%
SK	6%	-19%	-14%	0%	-26%
FI	-1%	4%	-7%	-1%	-5%
SE	-4%	5%	-7%	1%	-5%
UK	3%	0%	-7%	3%	-2%
NO	0%	-1%	2%	1%	1%

Enrolment *is defined as total number of students over the population aged 5-25 years.*
The ***young share*** *is defined as the population aged 5-25 years over population aged 15-64.*
The ***inverse of employment*** *is defined as the population aged 15-64 over employment.*
The ***cost level*** *is defined as the expenditure per student over GDP per worker.*

Source: Commission services, EPC.

Table 42 above presents the results of the decomposition as percentage change in each of the elements between 2007 and 2060. It shows wide differences in the impact of various factors across the Member States, not only in terms of size, but also in direction.

Total enrolment is increasing in all but eight countries, but the impact is not strong, given the assumption of constant enrolment rate in primary and lower secondary education. The impact is in fact the effect of the changes in labour market participation in the age cohorts relative to the upper secondary and tertiary education, as well as the unavoidable inconsistency in statutory age cohorts (number of students includes all ages, while the young population covers those aged 5-25).

Demographic trends vary quite considerably across countries. Indeed, the ratio of young (5-25) population to the working age (15-64) population is increasing in 11 countries (the highest increase of 11% is projected for Spain), and declining in 17 countries (the highest decrease of over 19% is expected to take place in Slovakia and Poland).

On the contrary, the impact of employment rate is quite unequivocal. The share of workers in total working age population is projected to be growing in all but one (Norway) country and the size of the change reaches over 10% in a few of countries (Slovakia, Poland, Spain, Germany, Czech Republic). Higher employment rates result in a higher GDP and therefore reduced education expenditure as a share of it.

The last component, the ratio between education spending per student and GDP per worker has the weakest impact on the total expenditure, varying from -4% in Latvia to +3.9% in Denmark (the only outlier being Luxembourg with almost 13% decrease). Given that according to the model assumptions, both personal expenditure (wages and salaries, which account for the highest share of total expenditure) and capital investment in the education sector evolve over time in line with the number of students and labour productivity growth, the impact of this component should not differ considerably from zero. However, since the third component of education spending - transfers to households - is not assumed to follow GDP per worker growth and the cost level differs between different education levels and their relative share change over time, the average spending per student does not evolve exactly in line with labour productivity changes.

The last column shows the total change in education expenditure as a share of GDP over the period 2007-2060. It should be borne in mind that each column presents a percentage change in respective components, thus they multiply, rather than add up to the total change presented in the last column.

5.4. Sensitivity tests: two policy-change scenarios

5.4.1. Impact of a higher teacher/students ratio

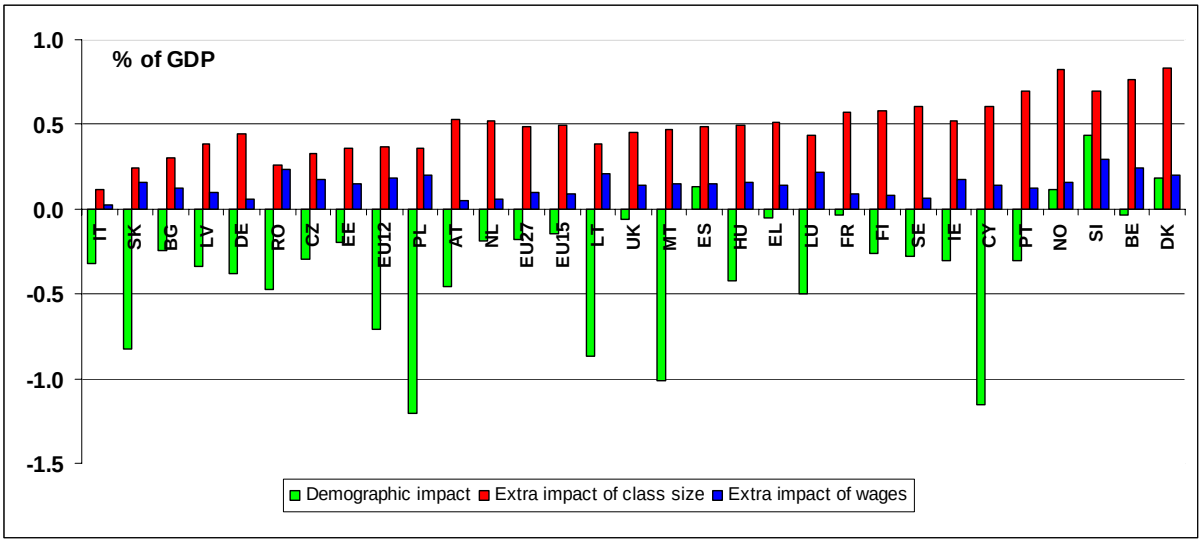
As the baseline scenario does not allow for any changes in the provision of education due to factors different than demographic changes, one needs additional calculations to illustrate the budgetary impact of policy changes aiming at improving the quality of the education systems, such as for example a decrease in the size of the classes. Such development may be driven by the decision to increase the quality of education, but also – at least in the short term and for some countries - due to the systemic inertia which does not allow the number of staff to adjust immediately to the changing number of students, in line with demographic and social changes. Given that the number of staff is highly sensitive to the changes in the public policy towards education sector, no reliable data exists on the trends in this indicator over long enough time periods. Therefore, instead of relying on past trends to be extrapolated, the budgetary impact of a stylised increase of 20% in the teacher/students ratio (e.g. a reduction of the average size of classes from 30 to 24 students) spread linearly over the first 15 years of the projection period (2008-2022) is being assessed. All other elements of the projection methodology remain the same as in the baseline scenario.

As expected, an increase by 20% in the teacher/students ratio is projected to push up spending on staff compensation by the same 20%. The impact in % of GDP is then driven by the share of spending on staff compensation in total education expenditure. Instead of an almost universal decrease in public spending observed in the baseline scenario, the scenario on higher teacher/students ratio results in somewhat different outcome across Member States. Compared with the results of the baseline scenario, eight countries (Poland, Slovakia, Cyprus, Malta, Lithuania, Italy, Romania and Luxembourg) - instead of 21 - continue to see their expenditure falling over time. The results vary from -0.8% of GDP decrease (Poland) to +1.1% of GDP increase (Slovenia). In relative terms, the variation ranges from -19% (Poland

and Slovakia) to +22% of the initial level (Slovenia). On average, expenditure is expected to rise by 0.30% in the EU27.

The specific additional budgetary impact of the policy measures can be assessed by comparing these results with the baseline scenario (Graph 83). The gap between this scenario and the baseline one is significant (although obviously proportional to the initial expenditure level illustrated by the baseline scenario[89]), suggesting a strong impact of a fairly minor change in the education provision policy over relatively short period of time. The assumed increase (or the lower reduction) in the number of teachers results in an average (EU27) extra budgetary costs of 0.5 p.p. of GDP, while for individual countries this figure varies between 0.12 p.p. (Italy) and over 0.8 p.p. of GDP (Denmark, Norway).

Graph 83 – Impact of the factors illustrated by the alternative scenarios between 2007 and 2060 (in % points)



Note: Countries are ordered according to the size of combined effect of two policy-driven changes.

Source: Commission services, EPC.

5.4.2. Impact of a higher compensation in the education sector

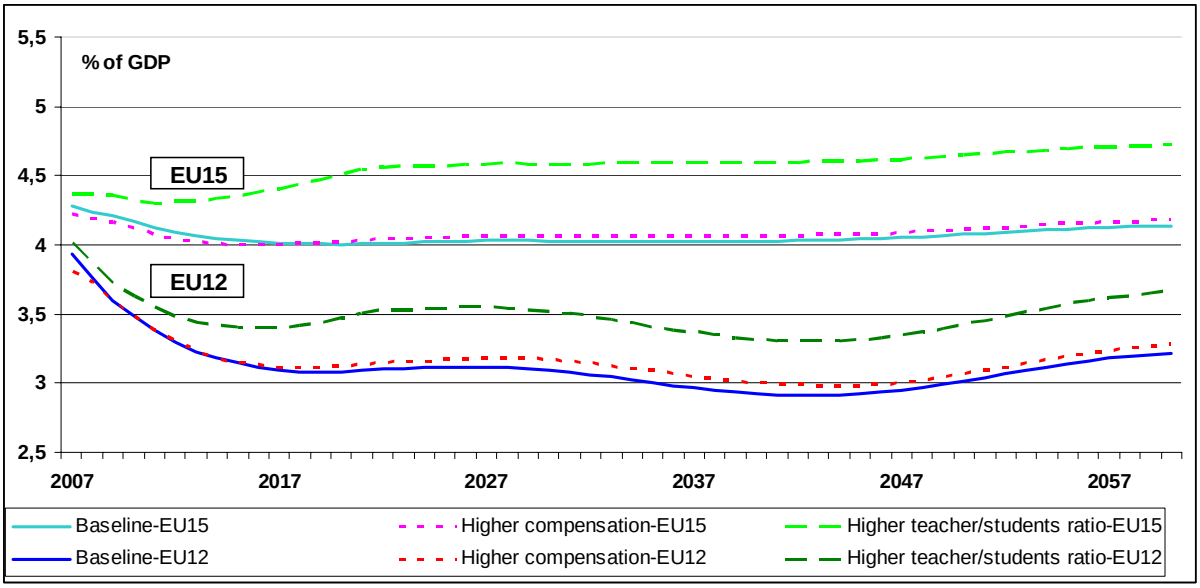
This sensitivity test is supposed to assess the budgetary impact of an increase in the relative wages and salaries of the staff employed in the education sector compared to the overall economy. Such development can be considered as one of the possible outcomes of an attempt to improve the quality of the education system by attracting most qualified people. It may also serve to illustrate the consequences of wage claims in the public education sector that goes beyond trends in the rest of the economy. Given that the analysis of past trends in wages in the education sector as compared to the overall economy does not provide a clear pattern to be reflected in all or most Member States of the EU, extrapolation of past trends does not seem to be a feasible solution. Instead, this sensitivity test analyses a stylised pattern of wages increasing 20% faster than labour productivity (which is assumed to drive wages in the overall economy) over the first 15 years of the projection period (2008-2022). All other elements of the projection methodology remain the same as in the baseline scenario.

[89] The gap is higher for the countries with high total education expenditure than for those which spend on education lower % of their GDP.

The impact of a stronger increase in wages and salaries appears quite limited. Indeed, the results of the discussed scenario do not differ considerably from the baseline scenario, the extra budgetary impact varying from less than 0.1% of GDP (Italy, Austria, the Netherlands, Germany, Sweden, Finland, France) to almost 0.3% (Slovenia, Belgium, Romania) and amounting to 0.10% on average (see Graph 83 above). Consequently, the scenario projects an absolute decrease in public spending on education over the period 2007-2060 in 20 and an increase in 8 countries, the strongest fall being observed in Cyprus and Poland (over 1.0% of GDP) and the strongest increase in Slovenia (over 0.7% of GDP) with the average change (EU27) being a decrease of 0.08% of GDP.

Graph 84 below presents at EU level, the evolution of education spending in the baseline scenario and in the two sensitivity test scenarios that push up expenditures. Different demographic trends are clearly visible in the results of EU15 and EU12. New Member States, already now spending significantly over 0.3% of GDP less than the EU15 countries are additionally expected to see their expenditure fall more sharply. As a result of diverging trends, the gap between two groups of countries is projected to almost triple.

Graph 84 – Evolution of education spending in EU15 and EU12 according to three alternative scenarios (in % of GDP)



Source: Commission services, EPC.

5.5. Increasing tertiary level attainment: "Lisbon target scenario"

Contrary to the two sensitivity scenarios aimed at measuring the impact of a specific unitary policy shock, the main objective of the "Lisbon target scenario" is to measure the budgetary effect of the changes in enrolment rates necessary to reach the policy objectives set in the *Commission's Communication on an updated strategic framework for European cooperation in education and training* released in December 2008[90]. The document proposes a series of indicators and benchmarks to be attained by the national education systems, being either the

[90] "An updated strategic framework for European cooperation in education and training", Communication from the Commission, COM(2008) 865, 16 December 2008.

updated version of the indicators developed in the context of the previous "Education and Training 2010" work programme, or newly established indicators.

The budgetary implications of achieving most of those benchmarks cannot be measured in the framework of the present budgetary projections exercise because of either their qualitative character or the difficulty of incorporating them in the stylised education projection model. Therefore, given the relatively basic nature of the education model, only two benchmarks can be incorporated into the projection framework. The first one is a target level for tertiary level attainment: *"the share of 30-34 year olds with high educational attainment should be at least 45%"*, while the second one deals with early school leavers and states that *"not more than 10% of the population aged 18-24 should have only lower-secondary education and not be in education and training"*. According to the Commission's Communication, both targets should be achieved by all Member States by 2020.

5.5.1. Tertiary level attainment

The target established in the Commission's Communication concerns the average education attainment in the overall population. It states that by 2020 at least 45% of adult population (age 30-34)[91] should have obtained high education diploma. Given that the current attainment rate varies between 13 and 46%[92] (although it exceeds the target level in only two countries: Finland and Cyprus), most countries need a higher number of graduates to complete tertiary education over the next decade. An increase in the number of graduates may be reached in two ways: through an increase in graduation rate[93] (or, in other words, a reduction in drop-out rate) or through an increase in enrolment rate leading to a higher overall number of students. Although it is very difficult to predict future changes in the quality of education and evolution of criteria for graduation, a simple methodology has been used allowing to project the budgetary impact of an increase in the number of graduates driven by parallel (and equally significant) improvement in the efficiency of education spending and increase in the number of students.

The methodology projects the future graduation rates based on the values observed in the recent past. Using constant graduation rates, enrolment rates and demographic projections, the number of tertiary education graduates and projected attainment rate over the whole projection period is obtained under a *ceteris paribus* condition. This value is then compared to the target level (45% for the age group 30-34). If it is lower, the process of convergence towards the target requires an increase in the number of graduates. This increase is supposed to result from both an increase in enrolment rates (thus the number of students) and from an (additional) increase in graduation rates (conventionally driven by an improvement in education system efficiency). Given that no indication is available on the relative importance of the two effects, an equal contribution has been assumed. In practical terms, the extra amount of graduates needed to achieve the target has been divided equally into two groups:

[91] The age cohort 30-34 year olds has been chosen because this cohort is considered old enough for having completed tertiary education in the case of all countries while, at the same time, it is considered a good framework for measuring the impact of recent and planned policy initiatives in relation to higher education.

[92] The current attainment rates used in the exercise are taken from Labour Force Survey (2008) and as such may differ from the national estimates.

[93] Graduation rate is the ratio of number of graduates from a given level of education to the number of students of this level over a given period of time. Although its increase is generally associated with an improvement in education system efficiency, it does not necessary have to be a sign of positive developments. In fact, it can be a result of an improvement in the quality of education leading to a higher number of students meeting the criteria for obtaining a university degree, but also of a loosening of those criteria leading to more students obtaining diplomas without improving their knowledge and skills.

(1) the current students who otherwise (without policy change) would not have graduated, but will do so because of the improvement in the education system efficiency and (2) the new graduates coming from an extra contingent of students enrolled. The former serves as a base for calculating "adjusted" graduation rates, while the latter is used to recalculate enrolment rates over the whole convergence period (2007-2020). Using new graduation and enrolment rates, the "adjusted" number of students is then used to calculate additional public expenditure necessary to reach the target levels of attainment.

Given that the growth in enrolment in tertiary education implies also a proportional increase in the earlier levels of education (the 'extra' students entering the universities must have been in the upper-secondary education), an extra effect on upper secondary graduation and enrolment rates is added to the already calculated impact of tertiary education[94].

5.5.2. Early school leavers

The second target set up in the Commission's Communication states that not more than 10% of the population aged 18-24 should have only lower-secondary education and not be in education and training. In practical terms[95], it can be translated into a requirement that at least 90% of young population in the respective age cohorts should be enrolled in the upper-secondary education. While its impact could be projected separately, already a glimpse at the results of the previous simulation allows concluding that an increase in upper secondary education enrolment due to the process of meeting the tertiary attainment target more than fulfils the 90% enrolment target in all the EU Member States. The two targets are therefore complementary, while the tertiary attainment target is a more ambitious and costly one.

5.5.3. Projection results

Table 43 below presents the results of the "Lisbon target scenario" in comparison to the baseline scenario. The scenario has not been run for three countries: Cyprus, Finland and Luxembourg. Cyprus and Finland have been excluded as their current tertiary education attainment rate is already higher than the target set to be reached by 2020. Luxembourg has been excluded because tertiary education institutions do not exist in this country (individuals pursue university education abroad) and it is not possible to estimate public expenditure on this level of education (the same is the case for baseline scenario).

As expected, reaching quite ambitious targets set in the Commission's Communication may result more costly for the countries whose current attainment rates are relatively low. Overall, the additional increase in education spending, compared to the baseline scenario, ranges from less than 0.02 (Denmark, Lithuania, Spain, Greece) to 0.5 (Austria) % of GDP. Although relatively small in absolute terms, the impact of the analysed policy measure changes considerably the overall picture of education expenditure projections. Out of 24 countries, which could expect an overall reduction in expenditure according to the no-policy change scenario (reflecting pure demographic effects), only 17 Member States can still count on savings from education expenditure if the impact of achieving tertiary attainment targets is accounted for. In the EU, an average decrease of 0.2% of GDP in the baseline scenario over the period 2007-2060 is replaced by an almost unchanged spending in education in the "Lisbon target scenario".

[94] This effect is estimated by using a coefficient (similar in the way it is calculated, although proportionally lower than the one used to adjust tertiary enrolment) also for upper secondary education.

[95] The simplified structure of the model does not allow to project the number of the people in training outside the main education path.

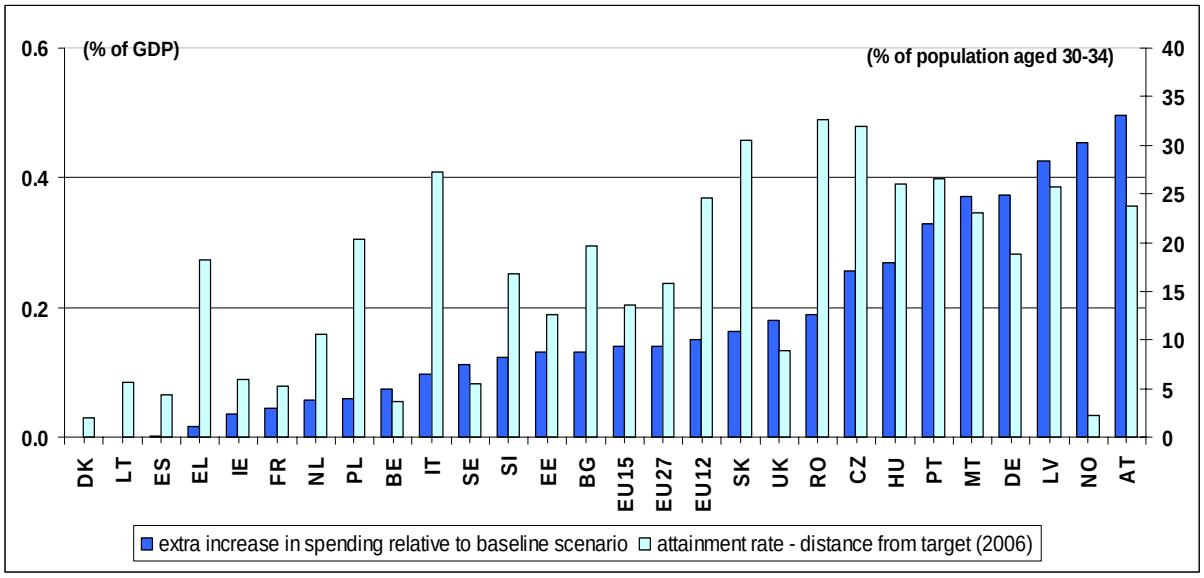
Table 43 - Results of the scenario on increased tertiary attainment rate (public education expenditure as % of GDP)

	2007	2020	2060	*Change 2007-2060*	*Difference from baseline in 2060*
BE	5.6	5.3	5.6	*0.04*	*0.08*
BG	3.5	3.2	3.4	*-0.12*	*0.13*
CZ	3.8	3.5	3.8	*-0.04*	*0.26*
DK	7.1	7.4	7.2	*0.18*	*0.00*
DE	4.2	3.9	4.2	*-0.01*	*0.37*
EE	3.8	3.5	3.8	*-0.06*	*0.13*
IE	4.6	4.5	4.3	*-0.27*	*0.04*
EL	3.8	3.4	3.8	*-0.03*	*0.02*
ES	3.5	3.5	3.6	*0.13*	*0.00*
FR	4.7	4.8	4.7	*0.01*	*0.04*
IT	4.1	3.8	3.9	*-0.23*	*0.10*
LV	4.0	3.7	4.1	*0.09*	*0.43*
LT	4.0	2.8	3.1	*-0.87*	*0.00*
HU	4.6	4.2	4.5	*-0.16*	*0.27*
MT	5.4	4.8	4.8	*-0.64*	*0.37*
NL	4.7	4.5	4.5	*-0.13*	*0.06*
AT	5.2	5.1	5.3	*0.04*	*0.50*
PL	4.7	3.6	3.5	*-1.15*	*0.06*
PT	5.0	5.0	5.0	*0.03*	*0.33*
RO	3.1	2.7	2.8	*-0.29*	*0.19*
SI	5.2	5.1	5.8	*0.56*	*0.12*
SK	3.5	2.7	2.8	*-0.66*	*0.16*
SE	6.1	5.7	5.9	*-0.17*	*0.11*
UK	4.0	4.1	4.1	*0.12*	*0.18*
NO	8.2	8.3	8.8	*0.57*	*0.45*
EU27	4.4	4.2	4.4	*-0.04*	*0.14*
EU15	4.4	4.3	4.4	*0.00*	*0.14*
EU12	4.2	3.5	3.6	*-0.56*	*0.15*
EA	4.4	4.2	4.4	0.0	0.13

Source: Commission services, EPC.

Graph 85 below shows the extra spending required to reach the attainment rate target against the initial distance from the target. The dark bars (and left hand side scale) show the extra budgetary impact of meeting the attainment target. The light bars (and right hand side scale) show the gap between the 45% target and the actual attainment rate in 2006. The visible feature is relatively weak correlation between the two variables, due to the obvious fact that the relation between spending and attainment rate is a very indirect one, with a number of other factors (demographic changes, number of students, spending per student) playing an important role as a transmission channel.

Graph 85 – Extra increase in spending due to meeting the tertiary attainment ratetarget as compared to the initial distance from the target



Source: Commission services, EPC.

When analysing the results of the "Lisbon target scenario", it should be borne in mind that only half of the expected growth in the number of graduates is assumed to result from an increase in enrolment rate, resulting in direct budgetary costs. The other half is driven by an improvement in the efficiency of education spending. Moreover, cross country effects (significant number of students studying abroad lowering demand for education services at home) and overall migratory effects (migratory outflows of people with tertiary education to other Member States where they become part of the labour force), which can be quite considerable, especially in the new Member States, are not taken into account while measuring the current attainment rate and the remaining gap from the target. This drawback may in fact lead to an underestimation (in the "outflow countries") or an overestimation (in the "inflow countries") of education expenditures and of the number of people with tertiary education. Finally, no improvement in labour productivity is projected as an effect of increase in tertiary attainment rate (which would probably be the case in the real world), the impact of the policy change being limited to the budgetary sphere.

6. UNEMPLOYMENT BENEFIT EXPENDITURE

Projections on unemployment benefit expenditure were prepared to give a comprehensive assessment of the impact of ageing on public finances and to guarantee consistency with the macroeconomic scenario. The projections assess whether and by how much unemployment benefit expenditure would be affected by future changes in unemployment in Member States, which stem from the macroeconomic and labour market assumptions. The projection methodology was developed in the previous two projection exercises (2003 and 2006).

6.1. Main features of the projection methodology

The decomposition of total unemployment benefit expenditure illustrates the drivers of changes in unemployment benefit expenditure in the future (see the annex for details). The only driver of unemployment benefit expenditure is the future unemployment rate, under the assumption that there are no policy changes and replacement rates, duration of benefits, entitlement conditions, eligibility criteria, take-up rates and tax structure remain constant.

Furthermore, as for the pension projections, wages are assumed to grow at the same rate as labour productivity, so the share of wages in the income distribution remains constant over time. With this methodology, average expenditure per head grows at the same rate as GDP per worker.

The basic approach applied to run projections for unemployment benefit expenditure (as percentage of GDP) is as follows. The starting point is the estimation of average per-capita unemployment insurance expenditure in the base year, which is then combined with the projections of unemployed persons.

6.2. Projections of unemployment benefit expenditure

Table 45 shows expenditure on unemployment benefits in the period 2005-2006 and the unemployment rate projection.

The driver of the evolution of unemployment benefit expenditure is the assumption on employment and unemployment. The unemployment rates stabilize after 2020, in line with the agreed assumptions.[96]

In order to reflect changes in the number of unemployed and employed the average unemployment benefit is multiplied with the ratio of unemployed and employed over time.

[96] The change in the unemployment rate is non-zero for some countries after 2020 because the unemployment rates for the age-group 15-71 is shown here, while the stabilisation of the unemployment rate is assumed to remain unchanged after 2020 for the age-group 15-64, since the NAIRU estimates (used in the medium-term) are based on the latter age-group.

Table 44 - Different kinds of unemployment benefit expenditure, % of GDP, 2006

	EU27	EA	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	NO
Social protection benefits:																														
unemployment (1)+(2)	**1.4**	**1.7**	**3.4**	**0.3**	**0.6**	**2.0**	**1.7**	**0.1**	**1.3**	**1.1**	**2.6**	**2.0**	**0.5**	**1.1**	**0.4**	**0.2**	**1.0**	**0.7**	**0.6**	**1.4**	**1.6**	**0.6**	**1.3**	**0.4**	**0.7**	**0.5**	**2.2**	**1.6**	**0.6**	**0.4**
(1) Cash benefits	1.3	1.6	3.4	0.3	0.5	1.9	1.6	0.1	1.1	0.4	2.2	2.0	0.5	1.1	0.3	0.2	1.0	0.6	0.5	1.4	1.2	0.6	1.3	0.3	0.6	0.5	1.9	1.4	0.5	0.3
Periodic cash benefits	1.1	1.3	3.4	0.2	0.2	1.9	1.3	0.1	0.9	0.3	1.6	1.7	0.5	0.4	0.3	0.2	0.9	0.5	0.5	1.4	1.1	0.6	1.3	0.3	0.5	0.3	1.9	1.4	0.2	0.3
Full unemployment benefits	0.9	1.1	1.8	0.2	0.2	1.0	1.1	0.1	0.8	0.3	1.4	1.4	0.3	0.4	0.3	0.1	0.4	0.3	0.4	1.4	0.7	0.2	1.1	0.3	0.3	0.1	1.4	1.0	0.2	0.3
Partial unemployment	0.0	0.0	0.3	:	:	:	0.0	:	:	0.0	0.0	0.0	0.1	:	:	:	0.0	:	:	0.0	0.0	:	0.0	:	0.0	:	0.0	0.0	0.0	:
Placement services and job search assistance	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	:	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1
Early retirement benefit for labour market reasons	0.1	0.1	0.4	:	0.0	:	0.0	:	:	0.0	0.0	0.1	0.1	:	:	0.0	0.2	0.1	0.1	0.0	0.1	0.2	0.0	:	0.2	0.2	0.4	0.0	0.0	0.0
Periodic benefit vocational training	0.1	0.1	0.1	0.0	0.0	1.0	0.2	0.0	0.2	0.0	0.0	0.1	0.0	:	:	0.0	0.0	:	0.0	0.0	0.2	0.1	0.1	:	0.0	0.0	0.1	0.4	0.0	:
Other periodic cash benefits	0.0	0.0	0.7	0.0	:	:	0.0	:	:	:	0.1	:	0.0	:	:	:	0.3	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	:	:	0.0	:
Lump sum cash benefits	0.2	0.2	0.0	0.1	0.3	:	0.3	0.0	0.1	0.1	0.6	0.3	0.0	0.7	0.0	:	0.0	0.1	:	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.3	:
Lump sum benefit vocational training	0.0	0.0	:	0.0	:	:	0.1	:	0.0	:	:	:	0.0	:	:	:	0.0	:	:	0.0	:	:	0.0	:	:	:	:	:	0.0	:
Lump sum benefit redundancy compensation	0.2	0.1	0.0	0.1	0.2	:	0.0	0.0	0.1	0.0	0.6	0.3	0.0	0.7	:	:	0.0	0.1	:	0.0	:	:	0.0	0.0	:	0.2	0.0	0.0	0.3	:
Other lump sum cash benefits	0.0	0.1	:	0.0	0.2	:	0.2	0.0	:	0.0	0.1	0.0	0.0	0.0	0.0	:	0.0	:	:	0.0	0.1	0.0	0.0	:	0.1	:	:	:	0.0	:
(2) Benefits in kind	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.7	0.3	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.4	0.0	0.0	0.1	0.1	0.0	0.2	0.3	0.1	0.1
Mobility and resettlement benefits	0.0	0.0	0.0	0.0	:	:	0.1	:	:	0.1	0.0	:	0.0	:	:	:	0.0	:	:	0.0	0.1	0.0	0.0	0.0	:	0.0	0.0	0.0	0.0	0.0
Vocational training	0.1	0.1	0.0	0.0	0.0	:	0.0	0.0	0.1	0.5	0.3	:	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0
Other benefits in kind	0.0	0.0	:	:	0.0	:	0.0	:	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	:	0.0	0.0	0.1	:	0.0	:	0.0	:	:	0.0	0.0	:

Source: Eurostat, ESSPROSS database.

Table 45 - Total unemployment benefit expenditure and unemployment rate projection

	Unemployment benefit expenditure		Unemployment rate projection		
	as % of GDP	per unemployed in relation to GDP per worker	in %		
	average 2005-06		2007	2060	p.p. change 2007-2060
BE	2.20	13.5	7.5	6.1	-1.4
BG	0.20	1.9	7.0	4.6	-2.3
CZ	0.20	2.5	5.3	4.3	-1.0
DK	1.15	25.1	3.8	3.2	-0.6
DE	1.20	10.0	8.6	6.0	-2.7
EE	0.10	1.4	4.7	3.4	-1.3
IE	0.75	16.4	4.6	4.9	0.3
EL	0.35	3.3	8.4	6.1	-2.3
ES	1.40	14.4	8.3	6.1	-2.2
FR	1.50	14.1	8.0	6.1	-1.8
IT	0.40	5.1	6.1	5.6	-0.5
CY	0.40	7.2	4.3	3.3	-1.0
LV	0.30	3.6	6.0	4.8	-1.2
LT	0.10	1.4	4.3	3.3	-1.0
LU	0.45	9.2	4.2	4.6	0.4
HU	0.30	3.8	7.4	6.1	-1.3
MT	0.40	5.3	6.2	6.1	-0.1
NL	1.50	33.3	3.2	3.0	-0.2
AT	0.75	14.3	4.4	4.1	-0.3
PL	0.20	1.1	9.7	5.7	-4.0
PT	1.15	13.5	8.2	5.8	-2.4
RO	0.25	3.2	6.5	5.5	-1.0
SI	0.30	4.5	4.9	4.5	-0.3
SK	0.15	0.8	11.1	5.9	-5.2
FI	1.45	16.4	6.9	5.6	-1.3
SE	1.10	14.1	6.1	5.8	-0.3
UK	0.20	3.7	5.4	5.3	-0.1
NO	0.40	9.6	2.5	4.1	1.6
EA12	1.15	12.1	7.4	5.7	-1.7
EA	1.15	12.1	7.4	5.7	-1.7
EU27	0.95	10.0	7.2	5.5	-1.6
EU15	0.95	10.9	7.0	5.6	-1.4
NMS10	0.22	1.6	8.2	5.3	-2.9
EU25	0.95	10.0	7.2	5.5	-1.7

Source: Eurostat, ESSPROSS database, Commission services.

Table 46 - Projected unemployment benefit expenditure, % of GDP, 2007-2060, baseline scenario

	2007	2020	2040	2060	p.p. change 2007-60
BE	1.9	1.5	1.5	1.5	-0.4
BG	0.1	0.1	0.1	0.1	0.0
CZ	0.1	0.1	0.1	0.1	0.0
DK	1.0	0.8	0.8	0.8	-0.2
DE	0.9	0.6	0.6	0.6	-0.3
EE	0.1	0.0	0.0	0.0	0.0
IE	0.8	0.9	0.8	0.8	0.1
EL	0.3	0.2	0.2	0.2	-0.1
ES	1.3	0.9	0.9	0.9	-0.4
FR	1.2	0.9	0.9	0.9	-0.3
IT	0.4	0.3	0.3	0.3	0.0
CY	0.3	0.3	0.2	0.2	-0.1
LV	0.2	0.2	0.2	0.2	0.0
LT	0.1	0.0	0.0	0.0	0.0
LU	0.4	0.4	0.4	0.4	0.0
HU	0.3	0.2	0.2	0.2	-0.1
MT	0.4	0.3	0.3	0.3	0.0
NL	1.1	1.0	1.0	1.0	-0.1
AT	0.7	0.6	0.6	0.6	0.0
PL	0.1	0.1	0.1	0.1	-0.1
PT	1.2	0.9	0.8	0.8	-0.4
RO	0.2	0.2	0.2	0.2	0.0
SI	0.2	0.2	0.2	0.2	0.0
SK	0.1	0.1	0.1	0.1	-0.1
FI	1.2	1.0	1.0	1.0	-0.2
SE	0.9	0.9	0.9	0.9	-0.1
UK	0.2	0.2	0.2	0.2	0.0
NO	0.2	0.4	0.4	0.4	0.2
EA12	1.0	0.7	0.7	0.7	-0.2
EA	1.0	0.7	0.7	0.7	-0.2
EU27	0.8	0.6	0.6	0.6	-0.2
EU15	0.8	0.7	0.6	0.6	-0.2
EU10	0.1	0.1	0.1	0.1	-0.1
EU25	0.8	0.6	0.6	0.6	-0.2

Source: Commission services, EPC.

Table 46 shows the projection of unemployment benefits expenditure in percentage of GDP. In the EU27, expenditure in unemployment benefits is projected to fall from 0.8% of GDP in 2007 to 0.6% of GDP in 2060.[97] Most of the reduction in unemployment expenditure takes place over the period 2008 to 2015. The reduction is mainly driven by the assumptions that unemployment rates in all countries with unemployment rates above the EU15 average would converge to the EU15 average by 2020. Indeed, after 2020, very small changes are projected.

In most countries, a small reduction in unemployment benefit expenditure, below 0.1 p.p., is projected. A larger reduction of 0.3 to 0.4 p.p. of GDP is projected in Belgium, Germany, Spain, France and Portugal. In Ireland, Luxemburg and Norway, unemployment benefit expenditure would increase marginally by less than 0.2 p.p., which stems from the increase in the unemployment rate estimated up to 2009 and the faster growth in the number of unemployed relative to the employed over this period. These countries' structural unemployment rates are below the medium-term estimate of the EU15 average in 2009 and therefore remain constant throughout the projection period. Hence, no further reduction in unemployment rates is assumed.

Projections for unemployment benefit expenditure in the alternative scenarios are provided in Annex 4.

[97] Making the projection for the age-group 15 to 64 shows a very similar reduction in unemployment benefit expenditure over the period 2007-2060.

7. THE TOTAL COST OF AGEING AND THE POTENTIAL IMPACT OF THE CURRENT ECONOMIC CRISIS

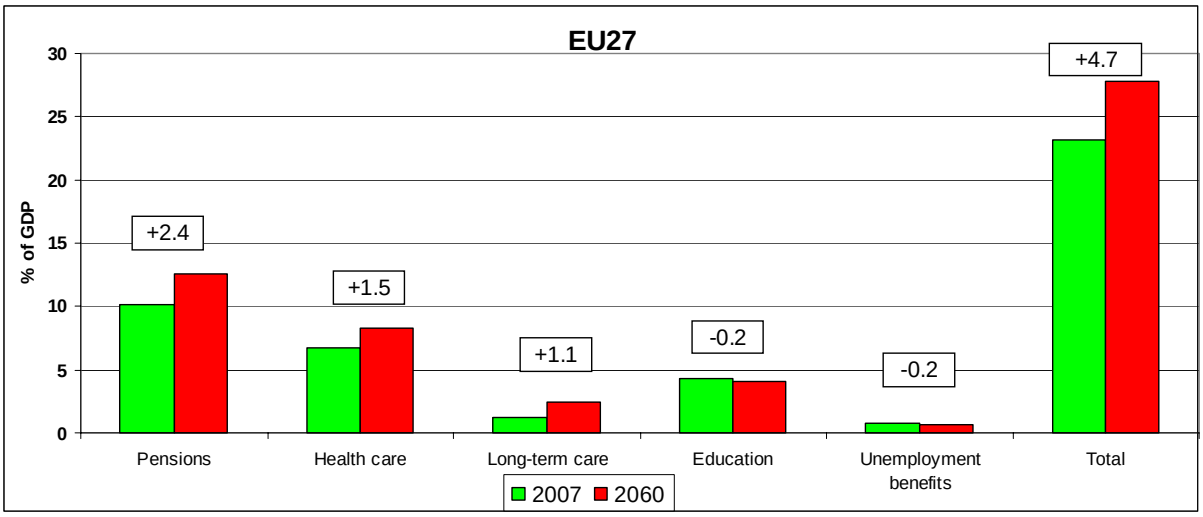
In this section the different expenditure items are summarized so as to provide an overview of the total impact on government expenditure of the demographic trends. It also looks at the sensitivity of all the budgetary items with respect to changes in key demographic and macro-economic variables. Finally, it considers the potential long-term economic and budgetary impact of the current financial and economic crisis.

7.1. The impact of an ageing population on public spending

7.1.1. The total impact of population ageing on public expenditure

Graph 86 presents the increase in public age-related expenditure (pensions, health care, long-term care, education and unemployment benefits) between 2007 and 2060. In the EU as a whole and in the euro-area, the cost of ageing is 4 ¾% and 5 ¼% of GDP, respectively, in the period to 2060. The largest increase relates to public pension expenditure, rising by 2 ½ p.p. and 2 ¾ p.p. of GDP in the EU and the euro area, respectively. Health care and long-term care spending is rising by about 1 ½ and 1 p.p. of GDP, respectively, in the EU and the euro area. Finally, education and unemployment benefits are projected to be reduced by ¼ p.p. of GDP (see also Table 1 for more details).

Graph 86 – The Cost of Ageing in EU27, % point change of GDP



Source: Commission services, EPC.

The EU aggregates however mask considerable variety between Member States. There are large differences of the budgetary impact of ageing across countries and notably the largest difference between countries regards changes in pension expenditure to 2060 – ranging from a very limited increase in Estonia and Latvia (and even a decrease in Poland) to an increase of more than 10% of GDP in Greece, Cyprus, Luxembourg, Malta and Slovenia.

The large difference between Member States reflects primarily the diversity in public pension arrangements, their degree of maturity and the effects of pension reforms enacted so far. A reduction in public pension spending is projected in Estonia, Italy, Latvia, Poland, Sweden, due to significant reforms that have been implemented in the past. By contrast very strong

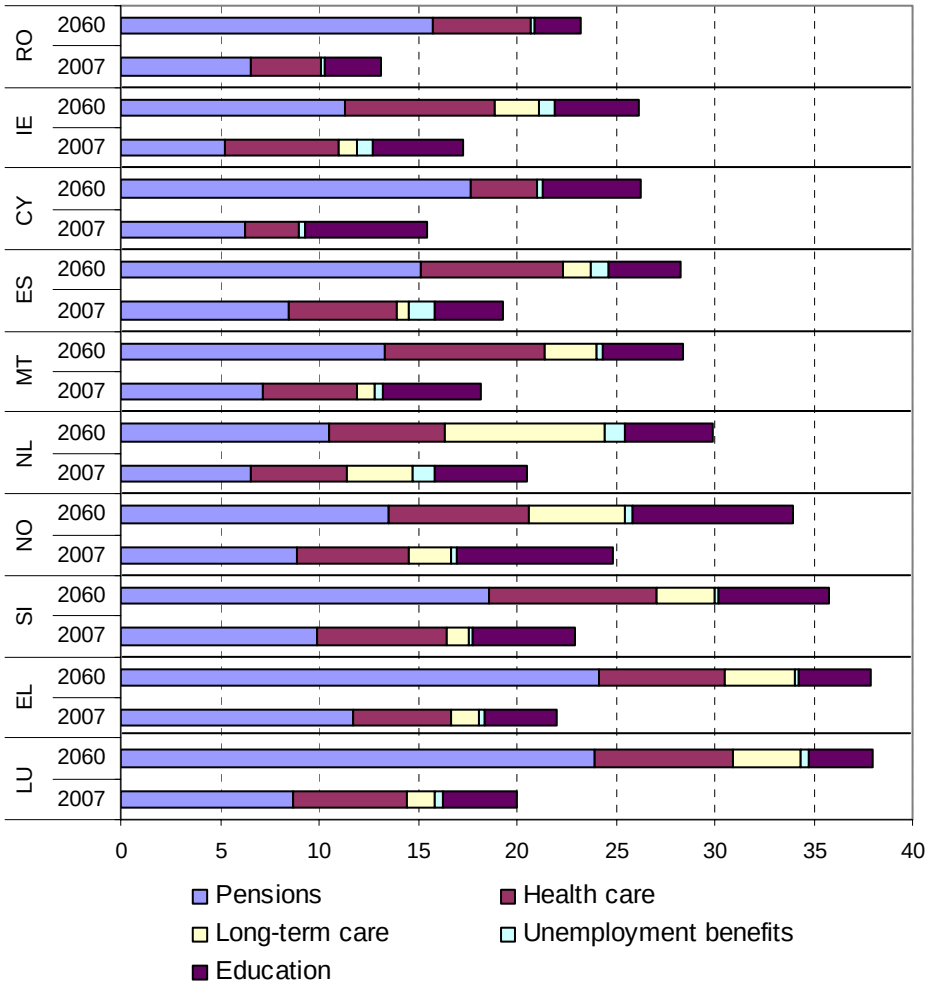
increases of 7 p.p. of GDP or more is projected in Greece, Cyprus, Luxembourg, Romania and Slovenia.

Differences in other age-related expenditure items projections are smaller; the projected increase in health care expenditure ranges from + ½ p.p. of GDP in Cyprus, to +3 ½ p.p. in Malta; for long-term care it ranges from a zero p.p. increase in Cyprus, to a +3 ½ p.p. in Sweden. For education, the difference in the projected change is smaller; -1 p.p. of GDP in Poland and Cyprus and + ½ p.p. in Slovenia. For unemployment benefits, the spread is even smaller, ranging from – -½ p.p. in Belgium, Spain, Portugal to + ¼ p.p. in Ireland.

In terms of the different Member States situation, the following points can be made:

- The increase in public ageing-related spending is likely to be very significant in nine EU Member States (Luxembourg, Greece, Slovenia, Cyprus, Malta, Romania, Spain, the Netherlands and Ireland), with a projected increase of 7 p.p. of GDP or more although for some countries the large increase will be from a fairly low level. These countries have so far made only limited progress in reforming their pension systems or are experiencing maturing pension systems.

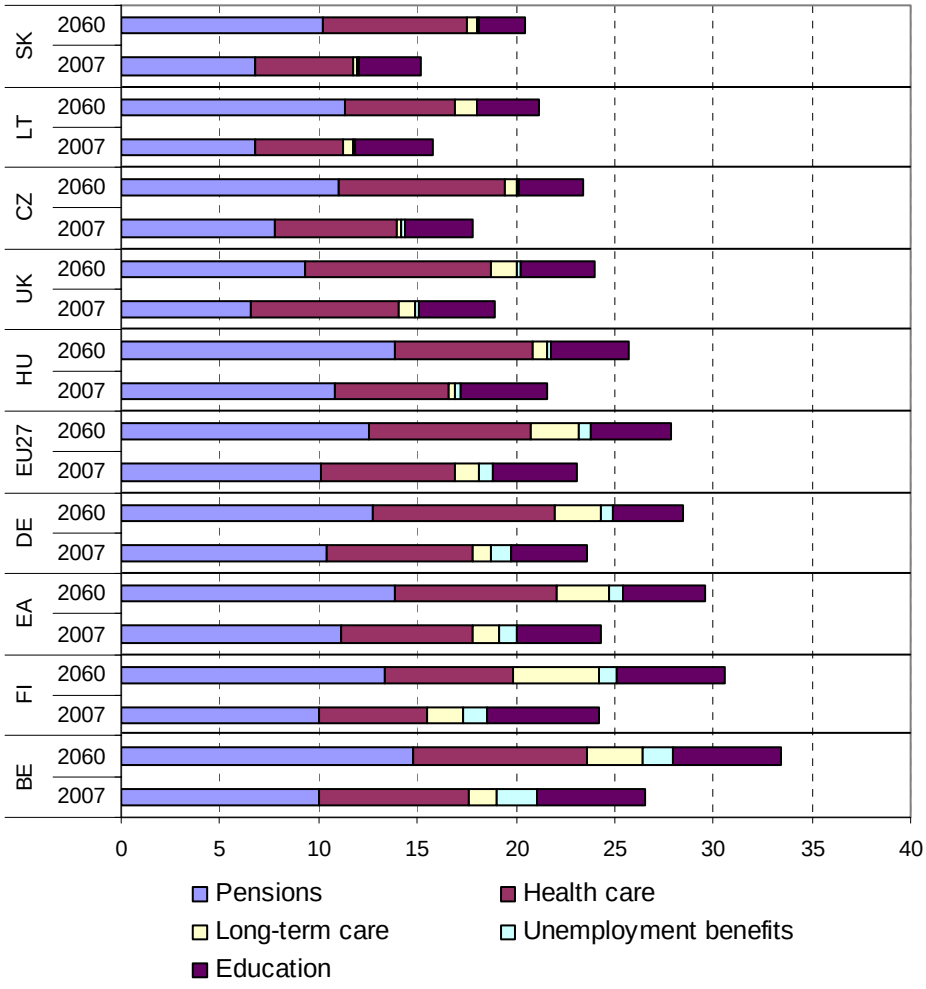
Graph 87 – Member States with high ageing costs, % of GDP



Source: Commission services, EPC.

- For a second group of countries – Belgium, Finland, the Czech Republic, Lithuania, Slovakia, the UK, Germany[98] and Hungary - the cost of ageing is more limited, but still very high, ranging from 4 p.p. to 7 p.p. of GDP. Several of these countries have taken significant steps in reforming public expenditure systems that contribute to limit the increase in future expenditure.

Graph 88 – Member States with medium ageing costs, % of GDP

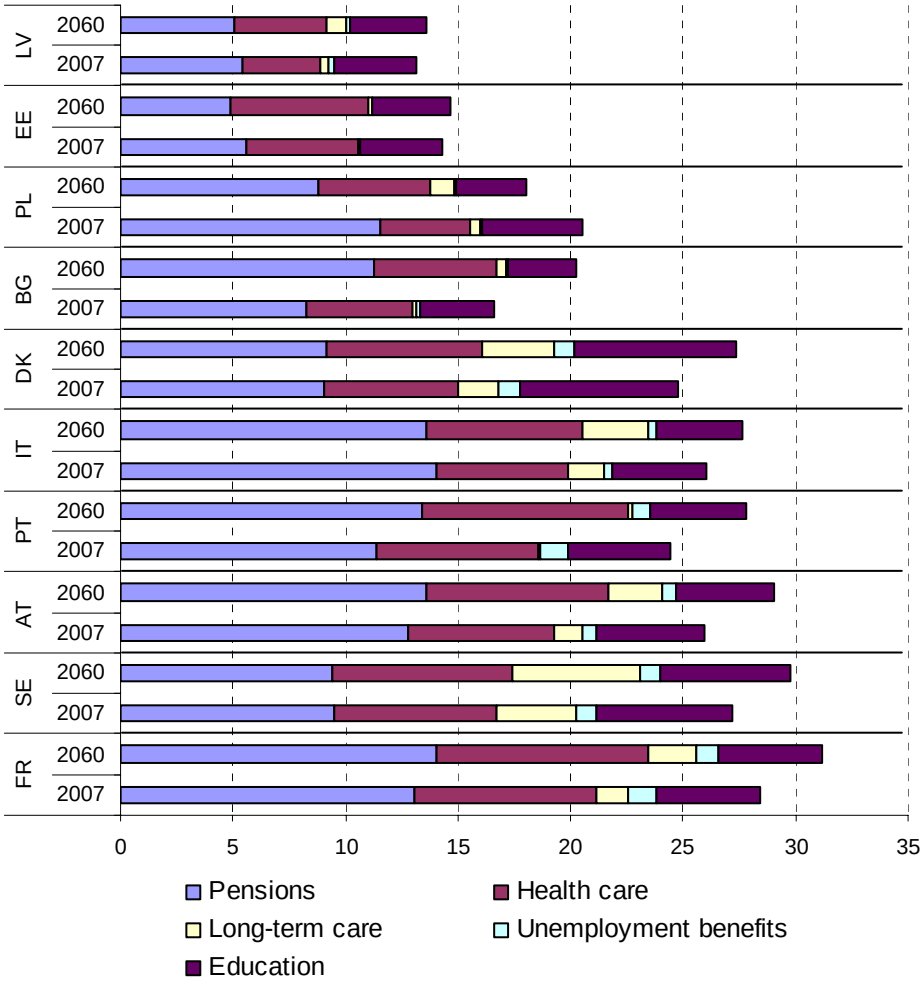


Source: Commission services, EPC.

- Finally, the increase is more moderate, 4% p.p. of GDP or less, in Bulgaria, Sweden, Portugal, Austria, France, Denmark, Italy, Latvia, Estonia and Poland. Most of these countries have implemented substantial pension reforms, in several cases also involving a partial switch to private pension schemes (Bulgaria, Estonia, Latvia, Poland and Sweden).

[98] The projection result for public spending on long term care based in the methodology agreed by the EPC does not reflect current legislation in Germany where benefit levels are indexed to prices only. The agreed methodology used in the AWG reference scenario assumes an increase in line with GDP per worker. A scenario which reflects current rules projects an increase in total age related public spending significantly below 4 p.p.

Graph 89 – Member States with low ageing costs, % of GDP



Source: Commission services, EPC.

7.2. Uncertainty with long-term projections

7.2.1. Sensitivity of changes to demographic and macro-economic variables

Progress made in the EU both concerning fiscal consolidation and structural reforms, notably pension reforms, suggest that sustainable public finances may be within reach for a number of countries. However, this optimistic outlook rests on the assumption that age-related expenditure evolves as projected by the Commission and the AWG/EPC. Long-term budgetary projections are sensitive to a number of necessary underlying assumptions. Given the uncertainties surrounding the assumptions, it is important to test the robustness of the results.

In order to provide a comprehensive impact on government expenditure of changing certain assumptions, the budgetary projections were re-run under the alternative scenarios. Table 47 shows the deviation from the baseline projection of the change in age-related expenditure up to 2060 under the five alternative scenarios.

Table 47 – Sensitivity of the projection results

Total cost of ageing, change 2007-60, p.p. of GDP						
		Difference from Baseline (scenario - baseline)				
Country	Baseline	Higher productivity	Higher employment	Higher empl older workers	Higher life expectancy	Zero migration
BE	6.9	-0.9	-0.6	-0.5	1.1	3.3
BG	3.7	-0.2	-0.3	0.1	1.0	0.5
CZ	5.5	-0.2	0.3	1.0	1.1	2.5
DK	2.6	0.0	-0.5	-0.2	1.1	1.4
DE	4.8	0.1	-0.3	-0.1	1.0	3.5
EE	0.4	-0.1	0.0	0.0	1.0	0.5
IE	8.9	0.0	-0.4	-0.2	1.0	2.4
EL	15.9	-2.0	-0.4	-0.4	0.7	5.0
ES	9.0	-0.9	-0.5	-0.1	1.1	4.3
FR	2.7	-0.7	-0.5	-0.5	1.2	1.4
IT	1.6	-0.5	-0.2	0.0	0.6	3.6
CY	10.8	-0.7	-0.3	-0.1	1.1	10.3
LV	0.4	-0.2	-0.1	-0.1	0.7	0.3
LT	5.4	0.0	-0.2	-0.2	1.0	-0.2
LU	18.0	-0.1	-0.3	-0.2	1.0	14.6
HU	4.1	-0.3	-0.2	-0.2	1.7	2.6
MT	10.2	-0.7	-0.2	-0.2	1.3	3.8
NL	9.4	0.0	-0.7	-0.3	0.4	1.4
AT	3.1	-1.1	-0.5	-0.6	1.1	7.5
PL	-2.4	-0.4	-0.1	-0.1	1.1	0.8
PT	3.4	-0.7	-0.4	-0.2	1.5	4.5
RO	10.1	0.0	-0.3	-0.5	1.2	0.9
SI	12.8	-0.5	-1.1	-0.7	0.9	3.2
SK	5.2	-0.1	-0.1	-0.1	1.0	0.9
FI	6.3	-0.4	-0.5	-0.2	1.3	1.1
SE	2.6	-0.1	-0.4	-0.3	0.6	1.5
UK	5.1	0.0	-0.2	-0.1	1.4	4.5
NO	9.0	-1.2	-1.7	:	0.4	0.6
EU27	4.7	-0.4	-0.3	-0.2	1.1	3.1
EA	5.2	-0.5	-0.4	-0.3	1.0	3.1
EA12	5.2	-0.5	-0.4	-0.3	1.0	3.1
EU15	4.8	-0.4	-0.4	-0.3	1.1	3.3
EU10	2.1	-0.3	-0.1	0.1	1.2	1.3
EU25	4.7	-0.4	-0.3	-0.2	1.1	3.1

Source: Commission services, EPC.

The sensitivity tests do not have a uniform impact on the EU Member States. For instance, the impact of changes in life expectancy on pension expenditure is affected by the design of the pension schemes. However, the relative position of countries in terms the projected increase in age-related expenditure appears to be relatively robust, with the exception of the zero migration scenario. Hence, the uncertainty mainly concerns the exact size of the long-term sustainability challenge.

7.3. The potential long-term impact of the current economic crisis

Drastically changed economic developments and prospects

Worse macro-economic developments – and prospects - than expected last year

The financial and economic crisis that started taking hold in 2008 has led to an unusually sharp and rapid deterioration in economic activity. The current slowdown has gradually transformed into a world recession, particularly affecting the US and also the economies of most EU countries. New risks have emerged and have made many economists fear that it may still weigh on economic performance for some time to come, and that a recovery will only be in sight after a protracted period of time. This has prompted the question of the extent to which the worsened short-term outlook would have implications also over the medium- and longer-term.

There is a risk that the recovery will be characterised by a protracted period of weak potential GDP growth due to:

- Wide-ranging lack of confidence, which could lead to postpone household consumption and efficient and profitable investments by firms;

- Real economy effects of balance sheet adjustment in the financial sector; downsizing of banks' assets including writing off "impaired" or "toxic" assets, is likely to push up the cost of capital even in the presence of large recapitalisation packages;

- Pervasive credit constraints and higher borrowing costs in the non-financial sector in light of the restructuring of banks; generally in the EU, deleveraging needs for households are lower than in the US, but firms are more heavily indebted than in the US. A persistent credit squeeze was one of the key factors of the long Japanese slump recorded in the 1990s and 2000s;

- A persistent impact on the EU's growth potential might occur if there is a shift in the attitude to risk and a higher cost of capital;

- Slower growth in (total factor) productivity in the short and medium terms, induced by the reduction in ICT investment and knowledge-based investment such as R&D. this postponement of key innovation-prone investments may have a lasting effect on productivity and growth;

- Permanent destruction in human capital caused by a surge in long-term unemployment induced by a protracted recession. This permanent negative effect in terms of "know-how" or professional knowledge is often called "hysteresis" effect;

- The collapse of world trade poses risks for a higher degree of protectionism. Given the global nature of the recession, an eventual revival of growth would require a rebalancing of growth from high-leverage countries to low-leverage countries. Failing to achieve such a rebalancing would have an adverse impact on EU growth, especially for export-oriented countries.

The AWG/EPC baseline macro-economic projections are based on the Commission's forecast made in Spring 2008 (up to 2009). Unfortunately, the current slowdown has led the Commission and other prominent policy makers to substantially revise their short-term forecast downwards. The much bleaker outlook currently prevailing among economists have also led to a downward revision of the estimated potential GDP growth rates, e.g. as calculated using the EU commonly agreed production function method (See Annex 5). The AWG/EPC baseline scenario does not incorporate this sharp deterioration of economic activity in Europe. Factoring in these much deteriorated macroeconomic prospects would imply a downward revision of the EU GDP over the first 5-10 years of the projections, although it would only have limited effects over the remainder of the period up to 2060, at least to the extent that long-run growth potential is only temporarily affected. In order to simulate the order of magnitude of the risks over the long-term related to the ongoing economic crisis, alternative simulation scenario need to be devised to complement the baseline scenario of the AWG. In view of the large uncertainty regarding the length of the slump in economic activity, two types of shocks may be considered: (i) a temporary shock; and, (ii) a permanent shock.

7.3.1. Defining additional macro-economic scenarios

Two temporary shock scenarios is considered, a ***'lost decade'*** and a ***'rebound' scenario*** which use the latest available estimates for the growth potential and respects the main AWG assumptions, but postpone the attainment of them, to take account of the deterioration in the economic environment. These scenarios respects the spirit of the AWG baseline by primarily considering potential growth - driven by the supply side, i.e. by the medium-term factors - rather than actual growth, affected by business cycles which are impossible to project over the AWG horizon up to 2060. The ***'lost decade'*** and ***'rebound' scenarios*** are based on the following assumptions:

- In the short and medium term, the projections are based upon current Commission projections (Interim forecast of January 2009) up to 2010, extended until 2013 with the EPC Output Gap Working Group method that extrapolates the trends for the components of potential GDP. Those figures are much lower than the AWG baseline projection for 2007-2013; the annual potential GDP growth is revised downward by around -0.9 p.p. in the EU27 in both scenarios.

The potential growth components will then gradually converge to reach the growth rate projected in the AWG baseline. Specifically,

- in the 'lost decade' scenario, labour productivity is assumed to reach the AWG baseline growth rate in 2020. Labour input (total hours worked) is assumed to reach the baseline growth rate in 2020.
- in the 'rebound' scenario, labour productivity is assumed to reach the AWG baseline level in 2020. Labour input (total hours worked) is assumed to reach the baseline level in 2020.

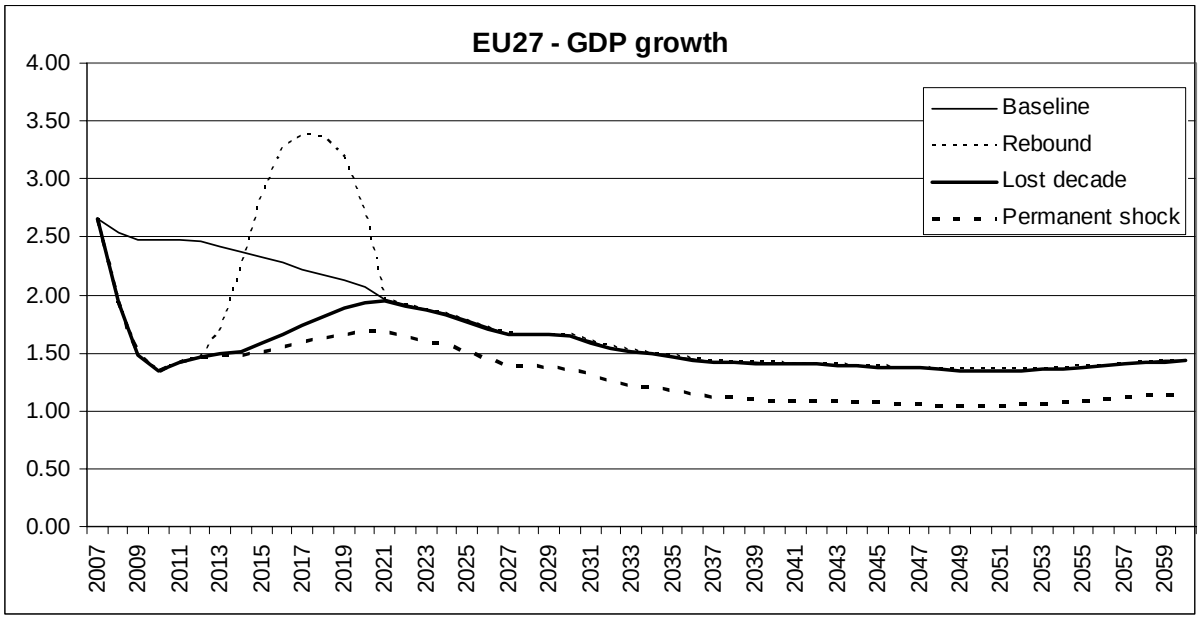
The 'permanent shock' scenario reflects a permanent deterioration in EU economies' growth potential

Given that the potential scale of the current economic crisis is surrounded by a very considerable degree of uncertainty, the impact of a permanently worse situation of the growth potential can also be analyzed. The 'permanent shock' scenario draws upon the sensitivity scenarios embedded in the long-term projection exercise.

As for the temporary shock scenarios above, it respects the spirit of the AWG baseline by considering potential growth - driven by the supply side (medium-term factors) - rather than actual growth, affected by cyclical factors which are impossible to project over the AWG horizon up to 2060. The 'permanent shock scenario' is based on the following assumptions:

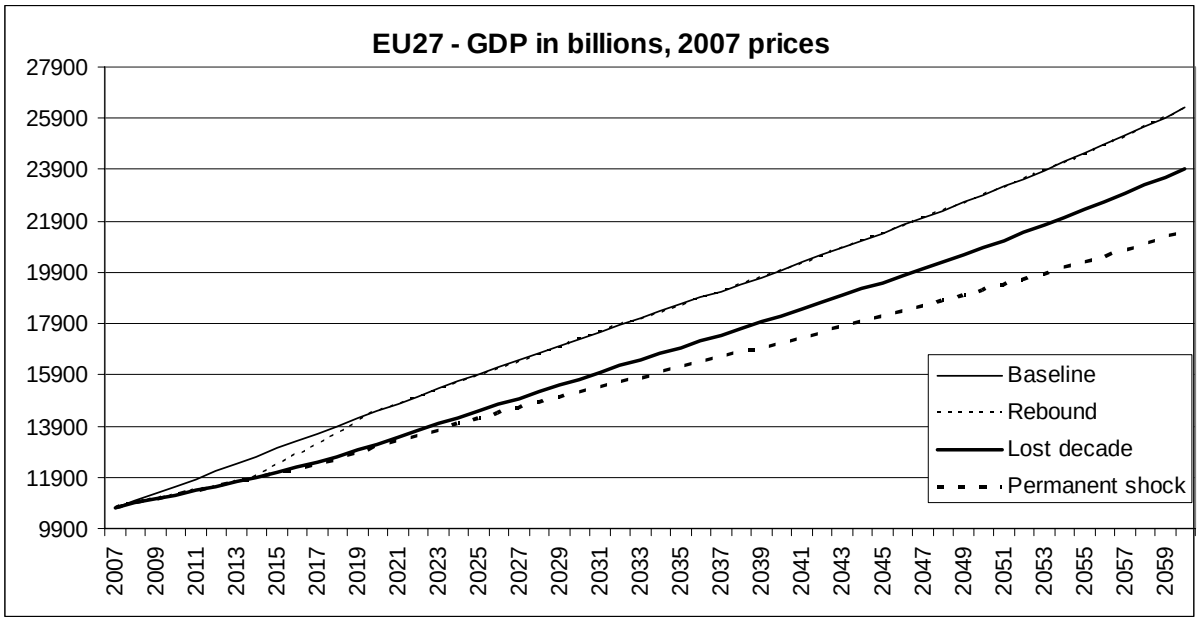
- It incorporates the Commission projections (Interim forecast of January 2009) up to 2013.
- From 2014 to 2020, labour productivity growth and labour input growth (total hours worked) will reach the: (i) the labour input growth rate assuming that the unemployment rate is permanently 1 p.p. higher than in the AWG baseline from 2020 onwards; (ii) the labour productivity growth rate is 0.25 p.p. lower from 2020.

Graph 90 – Potential GDP growth under different shocks



Source: Commission services, EPC.

Graph 91 – Potential GDP under different shocks



Source: Commission services, EPC.

The 'lost decade scenario' implies a reduction in the per-capita GDP level in 2060 compared with the baseline, which mirrors the lower expected potential growth in the decade up to 2020. This period is 'lost' in terms of accumulated wealth creation. The loss in GDP per capita in the EU27 is around 8% in 2020 and this loss is carried over the rest of the projection period, since the growth projection remains broadly unchanged between 2020 and 2060. In the 'rebound' scenario, the GDP per capita by 2060 is the same as in the AWG baseline (the deterioration relative to the baseline up to 2014 is offset by the improvement between 2015 and 2020).

Finally, a more marked reduction in the GDP per capita level is observed in the 'permanent shock' scenario, where GDP per capita is 10% lower than in the AWG baseline in 2020, 14% lower in 2040 and 18% lower in 2060, reflecting lower growth throughout the projection period.

Table 48 – GDP per capita developments in EU27, difference from the AWG baseline

EU27, GDP per capita, diff. from baseline (in %)			
	2020	2040	2060
Rebound	0	0	0
Lost decade	-8	-8	-8
Permanent shock	-10	-14	-18

Source: Commission services, EPC.

7.3.2. Estimating the budgetary impact of the financial and economic crisis

Based on the three scenarios above, it is possible to estimate the budgetary impact of those shocks as compared to the AWG baseline.

- For public pension expenditure, the sensitivity tests of the projections to a change in the structural unemployment rate and to the productivity growth rate is used to calculate an elasticity of public pension with respect to changes in output.[99]

BOX: Estimating the impact on pension spending of changes in macro-economic variables

In this report, the potential budgetary impact of varying underlying assumptions (productivity, employment) on pension spending, were carried out by the Commission using the sensitivity scenarios on the labour productivity growth rate and the structural unemployment rate and not by the Member States using the national pension models.

The elasticity of public pension expenditure with respect to changes in GDP is calculated as follows:

$$\varepsilon_t^{alt.scenario} = \frac{\left(\frac{P_t^{alt.scenario} - P_t^{baseline}}{P_t^{baseline}} \right)}{\left(\frac{GDP_t^{alt.scenario} - GDP_t^{baseline}}{GDP_t^{baseline}} \right)} \qquad (1)$$

where: *P*: pension expenditure (level)
GDP: GDP (level)
alt.scenario: the higher labour productivity scenario and the higher employment rate scenario, respectively

This elasticity is time-varying so as to capture potential changes in the relationship between GDP growth and pension expenditure over time that pension reforms might have induced.

Once the elasticity is calculated, the alternative 'crisis' scenario is imposed as the *'alt.scenario'*, and the change in pension expenditure vis-à-vis the baseline is solved for. It should be recalled that the alternative scenarios for pension expenditure carried out in the projection exercise relate to specific shocks (the 0.25 p.p. higher labour productivity growth rate and 1 p.p. lower structural unemployment rate scenarios). For shocks of a different size, the calculated elasticity above can be used as a proxy of the effect a shock on pension expenditure. However, it should be noted that the elasticity with respect to a shock of a different size might be different.

- For the other age-related government expenditure items, the projections were re-run with the respective alternative macro-economic scenarios.

It should be recalled that the budgetary impact of an economic crisis in the short-term may be larger than indicated by the analysis in this chapter. In particular, it is assumed that the budgetary items respond fairly strongly to changes in GDP (there is in general a non-zero elasticity with respect to changes in GDP). However, in the (very) short-term some government expenditures might be (nearly) inelastic to GDP changes (e.g. health-care expenditure may grow at its trend increase for one or a few years on current policies even if GDP does not grow at trend rates, or even falls, depending on institutional setup in the

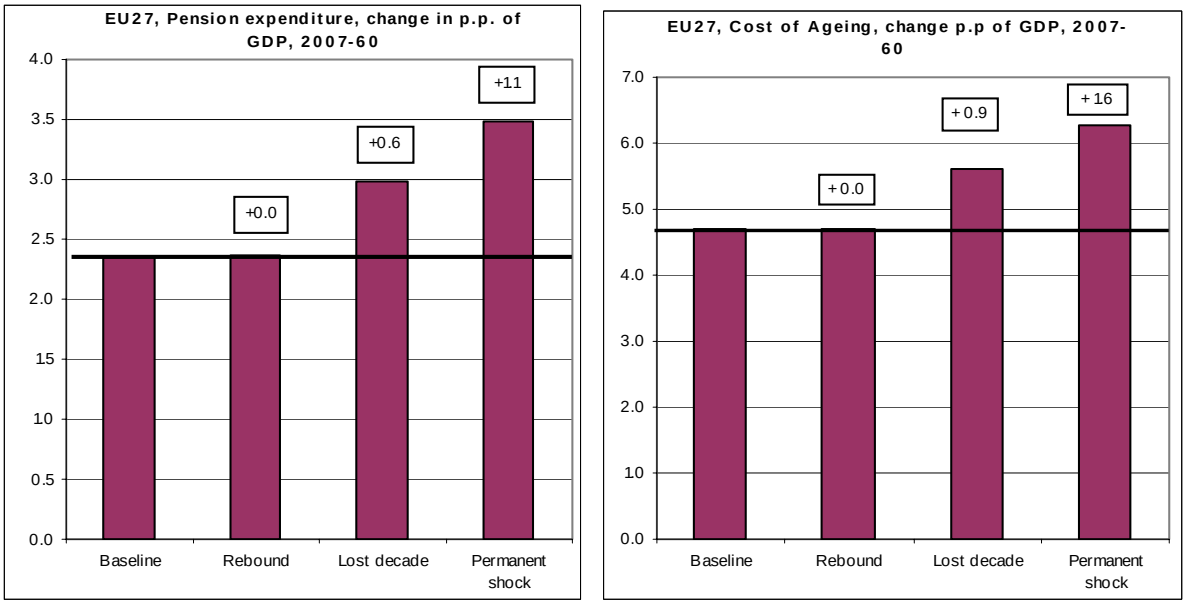
[99] The sensitivity tests are inverted as follows. The labour productivity growth rate is assumed to be 0.25 p.p. lower than in the AWG baseline by 2020, implemented linearly over the period 2010-2020. The structural unemployment rate is assumed to be 1 p.p. higher than in the AWG baseline by 2020, implemented linearly over the period 2010-2020.

different countries). Hence, there may be an upside risk to public expenditure in relation to GDP in times of a sharp slowdown of economic growth.

On the other hand, a sharp slowdown, or even a drop of GDP may also bring about a corrective fiscal policy response. In previous recessions or crisis', some countries have introduced far-reaching 'crisis measures', for instance consisting of broad cuts in public expenditure across the board, thus mitigating possible trends increases in public spending.

In terms of budgetary impact, the nature of the shock determines its magnitude. All of the shocks, being negative, lead to higher age-related expenditure as a share of GDP. When considering the entire projection period up to 2060, the permanent shock to potential growth has a stronger adverse impact on the public expenditure ratio than the temporary shock – the lost decade scenario - and the rebound scenario is neutral in terms of budgetary impact up to 2060.

Graph 92 – The potential budgetary impact of the crisis



Source: Commission services, EPC.

There are however different dynamics of the budgetary impact depending on whether the shock is temporary or permanent. The 'lost decade' scenario reveals that the public pension spending ratio increases faster in the first ten years of the projection period, and then slowly converges to the AWG baseline. Between 2007 and 2020, public pension expenditure in the EU would increase by 0.7 p.p. of GDP more relative to the AWG baseline. Over the whole period up to 2060, public pension expenditure would increase by 0.6 p.p. of GDP more relative to the AWG baseline, but this effect is expected to fade somewhat before 2060.

Considering the full budgetary impact of ageing, i.e. including also government expenditure on health-care, long-term care, education and unemployment benefits, the 'lost decade' scenario reveals that the age-related spending ratio would increase by 0.9 p.p. of GDP more relative to the AWG baseline between 2007 and 2020. Overall, age-related expenditure would increase by 0.9 p.p. of GDP more relative to the AWG baseline over the period 2007-2060 in the 'lost decade' scenario, but a convergence towards the levels of the baseline scenario is expected by the end of the projection period.

The permanent shock, by contrast, shows a constant widening of the public expenditure ratio compared with the baseline. This reflects the fact that a permanently lower labour productivity growth rate leads to age-related government expenditure rising faster than GDP. Between 2007 and 2020, public pension expenditure would increase by 0.8 p.p. of GDP more relative to the AWG baseline. Over the entire projection period however, the public pension spending-to-GDP ratio would be 1.1 p.p. of GDP higher in the 'permanent shock' scenario compared with the AWG baseline.

The total increase in age-related expenditure between 2007 and 2020 would be 1.1 p.p. of GDP higher than in the AWG baseline. Over the entire projection period however, the age-related public spending-to-GDP ratio would be 1.6 p.p. of GDP higher in the 'permanent shock' scenario compared with the AWG baseline. Annex 5 provides more details by Member State on the potential economic and budgetary impact of the economic crisis.

This illustrates that a permanent shock assumed to occur to the key determinants of potential growth (employment and labour productivity growth), over the very long-term, has a stronger effect on future GDP and per capita income levels than even a very protracted period of sluggish growth. The estimations show that the budgetary impact is stronger in the case of a permanent shock than in the case of a temporary shock, even if the latter is stretched over an entire decade. Moreover, the risk of sluggish growth and higher age-related government spending in the 'lost decade' scenario up to 2020 can be offset if timely, targeted and well coordinated policies would not only bring Europe out of the slump, but would also lead to a rebound of growth such that the temporary shock is also reverted, as illustrated in the 'rebound' scenario. Hence, getting the policy response right in a coordinated manner would limit the loss of wealth creation in Europe and would also lead to less expenditure than would otherwise be the case.

Table 49 - Age-related government expenditure under the AWG baseline and difference to the alternative scenarios, p.p. change of GDP

Age-related expenditure-to-GDP ratio, p.p. of GDP								
	Change 2007-2020				Change 2007-2060			
Country	Baseline (% of GDP)	Rebound - Baseline	Lost decade - Baseline	Permanent shock - Baseline	Baseline (% of GDP)	Rebound - Baseline	Lost decade - Baseline	Permanent shock - Baseline
BE	1.7	0.0	1.5	2.1	6.9	0.1	2.0	3.6
BG	-0.1	0.0	-0.6	-0.5	3.7	0.0	-1.2	-0.8
CZ	-0.7	0.0	0.4	0.5	5.5	0.0	0.6	0.9
DK	2.6	0.0	0.3	0.7	2.6	0.0	0.2	0.6
DE	0.0	0.0	0.1	0.3	4.8	0.0	0.2	0.3
EE	0.2	0.0	0.3	0.3	0.4	0.0	0.2	0.3
IE	1.4	0.0	1.4	1.5	8.9	0.0	2.2	2.2
EL	1.9	0.0	1.5	1.9	15.9	-0.1	1.3	3.9
ES	1.4	0.0	1.3	1.6	9.0	0.0	1.8	3.2
FR	0.9	0.0	1.4	1.9	2.7	0.0	1.2	2.4
IT	0.3	0.0	1.1	1.4	1.6	0.0	0.5	1.1
CY	1.3	0.1	1.9	2.3	10.8	0.0	1.1	2.0
LV	-0.7	0.0	1.0	1.1	0.4	0.0	0.7	1.0
LT	-0.7	0.0	0.4	0.4	5.4	0.0	0.5	0.6
LU	1.2	0.0	1.2	1.4	18.0	0.0	0.5	0.6
HU	-0.3	0.0	1.6	1.9	4.1	0.0	0.7	1.2
MT	2.3	0.0	1.0	1.2	10.2	0.0	0.8	1.8
NL	2.1	0.0	0.4	0.9	9.4	0.0	0.5	1.1
AT	0.3	0.0	0.8	1.3	3.1	0.0	0.8	2.4
PL	-2.7	0.0	1.0	1.1	-2.4	0.0	0.6	1.1
PT	0.8	0.0	1.0	1.4	3.4	0.0	1.2	2.3
RO	2.0	0.0	-0.2	-0.1	10.1	0.0	-0.3	-0.2
SI	1.9	0.0	-0.2	-0.2	12.8	0.0	-0.2	-0.3
SK	-0.7	0.0	0.5	0.6	5.2	0.0	0.6	0.7
FI	3.0	0.0	1.0	1.4	6.3	0.0	0.7	1.5
SE	-0.3	0.0	1.4	1.7	2.6	0.0	1.6	2.0
UK	0.8	0.0	0.5	0.6	5.1	0.0	0.8	0.9
NO	3.0	0.0	0.1	0.3	9.0	0.0	0.2	0.5
EU27	0.5	*0.0*	*0.9*	*1.1*	4.7	*0.0*	*0.9*	*1.6*
EA	0.7	*0.0*	*0.9*	*1.2*	5.2	*0.0*	*0.9*	*1.8*
EA12	0.7	0.0	0.9	1.3	5.2	0.0	0.9	1.8
EU15	0.7	0.0	0.9	1.2	4.8	0.0	0.9	1.6
EU10	-1.4	0.0	0.8	0.9	2.1	0.0	0.7	1.1
EU25	0.5	0.0	0.9	1.2	4.7	0.0	0.9	1.6

Source: Commission services, EPC.

8. ANNEX 1: Pensions

8.1. Overview of pension system in the Member States

	Public pensions	Occupational pension schemes (private sector schemes)	Individual (private) pension schemes (private sector schemes)
BE	*Minimum guarantee pensions:* Means-tested minimum pensions through social assistance (GRAPA-IGO). *Earnings-related social security pensions:* Separate schemes for private and public sector employees, self-employed; schemes cover old-age and survivors' pensions, and disability pensions in the case of civil servants (which are included in public (social security) pensions in this report). These schemes include minimum pensions based on career conditions. The wage earner scheme includes the minimum claim per working year. Disability pension schemes for private sector employees and self-employed. Prepension (early retirement) through an unemployment benefit and a supplement from the employer.	Legal framework has been established: the Law on additional pensions of 28 April 2003, centred on sectoral pension scheme, improving the access to them and giving more guarantees to workers. Pensions: 1.1% of GDP in 2007.	Voluntary private schemes exist only to a minor extent.
BG	*Minimum guarantee pensions:* Social pension for old age. Disability pensions. *Earnings-related social security pensions:* One PAYG pension scheme covering all employees and self-employed. Minimal pension for periods of insurance and old age (stipulated in the annual Law on the PSI Budget). Social insurance contributions of civil servants, military and police - at the expense of the state. Self-insured persons pay the whole contributions amount at their own expense. Social insurance contributions of judges and magistrates - at the expense of the Budget of the Judicial Power. Teachers Pension Fund. Survivors' pensions (stipulated in the Social Insurance Code (SIC)). *Non-contributory pensions:* Special merits pensions	Supplementary voluntary pension funds under occupational schemes (3rd pillar). Legal framework established in 2006. Funded DC scheme.	Supplementary mandatory private schemes (2nd pillar) - Universal and Professional Pension Funds. Individual pension savings plans (2.6 million contributors end of 2007). Statutory private schemes transferred from the social security pension scheme, mandatory for persons born after 1.1.1960. The transferred contribution rate is 5%. Funded DC schemes. - Professional Pension Funds - Professional early retirement pensions for a limited period for people working under the conditions of 1st and 2nd labour category (labour under risk). Supplementary voluntary private schemes (3rd pillar).

CZ	*Minimum guarantee pensions:* No special scheme, it is embedded in the pension formula (flat-rate component). *Earnings-related social security pensions:* One scheme covering the whole population, covering old-age, disability and survivors' pensions.	Do not exist.	Voluntary private pension scheme at an early accumulation stage; low replacement rate (contribution 2.1% of wage; covers about half labour force.
DK	*Minimum guarantee pensions:* Universal flat-rate pensions for every citizen 65+ (subject to the time lived in Denmark), means-tested supplements, tax-financed. Disability pensions to those below 65. *Earnings-related social security pensions:* Voluntary early retirement pensions (requires 30 years of contributions; pension benefit dependent on age, not on contributions). Civil servants' pensions for central and local government employees (in coming years these schemes are replaced by ordinary labour market (occupational) pensions.	Labour market (occupational) pensions (private sector covering 90% of the employees), Labour market supplementary pensions (ATP). Special pension savings plan (SP). Labour market supplementary pensions for recipients of disability pension (SAP) Employees' capital fund (LD). All these schemes are fully funded.	Individual pension savings plans (1.1 million contributors).
DE	*Minimum guarantee pensions:* No special scheme but disabled and older people without sufficient income are entitled to means-tested benefits (social assistance). *Earnings-related social security pensions:* General scheme covering private and public sector employees, the scheme covers old-age, disability, early retirement and widow's pensions; specific schemes for life-time civil servants as well as farmers and miners.	Occupational pension provision existing; benefits account for 1.4% of GDP; supported by SSC exemptions up to 4% of SSC ceiling, equal to 2520€ in 2007, and by tax exemption up to 4320€. In 2007, about 64% of the employees contribute to occupational schemes.	Individual funded pensions of growing importance since the 2001 reform (supported by tax exemptions and direct allowances; contribution rate 4% of wages since 2008. Currently, about 12 mill. so-called Riester-contracts exist.
EE	*Minimum guarantee pensions:* National pension equal to the base amount of the pension ins. scheme, available to those not qualifying for insurance scheme. And have lived at least 5 years in Estonia *Earnings-related social security pensions:* One scheme covering the whole population; covering old-age, disability and survivors' pensions; benefits are flat-rate + a length-of-service supplement for careers before 1999, as of 1999 benefits are earnings-related.	Do not exist.	Statutory private schemes for the switched part of the social security pension scheme, mandatory for persons born 1983 or later and voluntary for old persons; in 2005, over 50% of workers had joined the funded scheme. The switched contribution rate 4% + an additional 2% contribution paid by the insured person.
EL	*Minimum guarantee pensions:* Means-tested minimum pensions (non-contributory) for uninsured people aged 65+. *Earnings-related social security pensions:* A great number of separate pension insurance and auxiliary funds for different sectors and occupational groups; schemes cover old-age, early retirement, disability and survivors' pensions; benefit levels differ across schemes.	Do not exist (legal framework has been established but no scheme was operational yet in 2004).	Voluntary private pension schemes cover about 5% of the population.
ES	*Minimum guarantee pensions:*	Voluntary enterprise pension schemes for	Voluntary private schemes (funded DC

	Means-tested minimum pension scheme (non-contributory).[1] Means-tested minimum pension (contributory). *Earnings-related social security pensions:* One main social insurance scheme, covering the private sector employees, self-employed and the regional and local public administrations, providing earnings-related old-age, disability and survivors' pensions. Public sector employees' (contributory) pension scheme (CPE) for the civil servants of the central public administration and the military, providing mainly flat-rate old-age, disability and survivors' pensions, though 5 different levels of pensions according to the career level. [1]This is a minimum income for the elderly and the disabled that have not contributed before. It includes old-age pensions (65+) and disability pensions (-64). The part of old-age is 57% of total non contributory pensions. It amounts to 0,1% of GDP in 2007. Total non contributory pensions amount to 2,119 million euro in 2007; 2,137 million euro in 2008	private sector employees (funded DC schemes and collective insurance DB). Mandatory supplementary pension scheme for public sector employees of the central administration (funded DC scheme). Schemes are of some importance.	schemes).
FR	*Minimum guarantee pensions:* Means-tested minimum pension scheme. *Earnings-related social security pensions:* A great number of separate pension insurance schemes for different sectors and occupational groups providing earnings-related pensions, additionally mandatory 'second tier' supplementary funds that complement the pension provision; schemes cover old-age, early retirement and survivors' pensions; benefit levels across insurance schemes were aligned in the 2004 reform. Disability pensions (benefits) covered by the health insurance scheme.	Voluntary occupational pension schemes for private sector employees (PERE and PERCO) introduced by 2003 reform covering 250 thousands people for a total amount of contributions of 769 million € in 2006. Also an old occupational pension scheme (art. 82 and 83, and art. 39 of CGI) covering roughly 2.7 million of people for a total amount of contributions of 59 billion € in 2006. Self-employed occupational pension scheme (Madelin law n° 94 and law n°97) covering 1 million of people for a total amount of contributions of 15 billions € in 2006.	Voluntary Individual pension scheme (PERP) introduced by 2003 reform is now covering 1.8 million of people for a total amount of contributions of 2.3 billion € in 2006. Voluntary individual pension schemes for civil servants (PREFON, COREM, …) covering 816 thousands of people for a total amount of contributions of 11 billion € in 2006.
IE	*Minimum guarantee pensions:* Means-tested minimum flat-rate pensions and age-related benefits (old-age, widows, disability, carers and blind persons and pre-retirement allowances) through non-contributory social assistance scheme. *Contributory social insurance pensions:* Contributory social insurance scheme provides flat-rate pensions and age-related benefits (old-age, transition, and widow(er)'s pensions, carers, invalidity and disability benefits). *Public service (occupational) pensions:* Public service occupational pension scheme.	Voluntary occupational schemes for private sector employees. 31.6% of current pensioners receive also occupational pensions, amounting to 24.2% of total pension income. Pension coverage for workers aged between 20 and 69 was 54% in the first quarter of 2008.	Voluntary individual schemes also play a role in the Irish pension system. Incentives to encourage private pension provision are in place.
IT	*Minimum guarantee income to the elderly:*	Occupational, supplementary pension schemes	Voluntary private pension schemes are of

	Means-tested old age allowance (5,143 euro per year, in 2008) and social assistance additional lump sums: provided to the elderly with a personal income (including social security pensions) below certain limits and up to them. In 2008, income limits are 5,311 euro per year, in the age bracket 65-69, and 7,540 in the age bracket 70+. For married people, the amount of social assistance benefits, determined as above, is provided as long as the total income of the couple falls below 11,071 euro per year, in the age bracket 65-69, and 12,683 in the age bracket 70+ and, in any case, up to these income limits. *Social security pension system:* One main social security pension scheme covering the whole population, providing old-age, early retirement, disability and survivors' pensions. It is composed of three schemes: DB (earnings-related), Mixed and NDC (contributions-based). *DB and Mixed pension schemes*: Old DB scheme fully applied to workers with at least 18 years of contributions at the end of 1995. Transition scheme (mixed regime: partly DB and partly NDC, according to the pro rata rule) for workers with less than 18 years of contribution in 1995; Means-tested topping-up to a minimum pension (5,761 euro per year, in 2008) is foreseen, subject to the fulfilment of the general eligibility requirements. *NDC pension scheme*: Fully applied to persons entering the labour market as of 1996. Means-tested topping-up to a minimum pension, foreseen under DB and Mixed schemes, is no longer provided. Pensions awarded to workers with an age below 65 must be at least 1,2 times the old age allowance.	exist. They are funded and never mandatory. The 2004 reform (law 243/2004) and its 2005-implementation (law decree 252/2005) increased the provisions for occupational pensions through the possibility to transform TFR (end-of-service allowance) into an occupational pension scheme. Contributors and contributions have increased significantly. Current pension expenditure is 0.1% as a share of GDP.	limited importance.
CY	*Minimum guarantee pensions:* Through Social (means-tested) Pension scheme and special allowances to pensioners. *Earnings-related social security pensions:* One general social insurance scheme covering all employees and self-employed persons, providing old-age, disability and survivors' pensions. Government Employees Pension Scheme (paid from the Government budget) and other public sector (local gov.) employees pension schemes.	Voluntary Provident Funds (providing defined-contribution lump-sum benefits), covering about 103.000 employees.	
LV	*Minimum guarantee pensions:* Through the state social security benefit, if the person's insurance record <10years. *Earnings-related social security pensions:* The minimum of the earnings-related pension system is paid with a length-of-service supplement to the amount of the state social security benefit, if the contribution record exceeds 10 years. One social insurance old-age pension scheme, which is a defined-benefit scheme for those, retired before 1996 and a notional defined contribution scheme for those retired	Do not exist.	Statutory private schemes for the switched part of the social security pension scheme (mandatory for persons under the age of 30 on 1st July 2001, voluntary to persons aged 30-49. The contribution rate to be raised from 2 to 10% of wages between 2001 and 2011. Voluntary private schemes.

	as of 1996, providing old-age pensions. Also survivors' pensions are based on NDC contributions (except for those retired before 1996). Separate provisions for disability pensions, though under the general social security system. Specific public sector service pensions (selected professions) paid from the state budget.		
LT	*Minimum guarantee pensions:* Through a social assistance pension (also to young disabled persons and orphans). *Earnings-related social security pensions:* One social insurance pension scheme covering all employees and the self-employed, providing old-age, disability and survivors' pensions, and early retirement pensions as of 2004. Special state (old-age, disability and survivors') pensions paid from the state budget to specific groups: scientists, judges, officers and military personnel. *Non-contributry pensions:* State pensions for meritorious persons and casualties: state pensions of the first and second degree of the Republic of Lithuania (State budget); state pensions of deprived persons (State budget).	Do not exist.	Voluntary switch of a part of the Social Insurance pension to a private fund (started in 2004 with a contribution rate of 2.5% of wages, which will increase to 5.5% by 2007).
LU	*Minimum guarantee pensions:* Through means-tested minimum income provision (RMG) *Earnings-related social security pensions:* A general social insurance pension scheme for private sector workers, providing old-age, disability and survivors' pensions. A special pension scheme for public sector employees (10% of pensioners).	Exists for some sectors such as banking and for large foreign companies.	
HU	*Minimum guarantee pensions:* Through means-tested social assistance. *Earnings-related social security pensions:* One social security pension scheme covering all employees and the self-employed, providing old-age, early retirement, disability and survivors' pensions.	Do not exist.	Statutory private schemes for the switched part of the social security pension scheme (mandatory for new entrants to the labour market as of 1998, voluntary to workers already in the labour market). The contribution rate is 8% of wages. The scheme covers 60% of all workers. Voluntary private pension schemes cover 30% of all workers.
MT	*Minimum guarantee pensions:* Means-tested minimum pensions through social assistance (non-contributory) scheme to persons not qualified for the contributory scheme. *Earnings-related social security pensions:* One social security (contributory) pension scheme covering all employees and the self-employed, providing old-age, disability and survivors' pensions (apart from	Exists only to a minor extent.	Exists only to a minor extent.

	unemployment, sickness and work injury benefits).		
NL	*Minimum guarantee pensions:* Social assistance to those not qualifying (not lived in the Netherlands for 50 years) to contributory flat-rate scheme. *Contributory social insurance pensions:* General flat-rate old-age pensions (AOW) to all citizens. Separate disability benefits (WAO) and survivors' pensions (ANW); flat-rate or earnings-related benefits.	A high number of funds (industry-wide, company-specific and professional group specific) for the provision of occupational old-age pensions and early retirement schemes (VUT), covering over 90% of employees.	Exists to some degree.
AT	*Minimum guarantee pensions:* Means-tested minimum pensions through social assistance scheme ("Ausgleichszulagen"). *Earnings-related social security pensions:* Harmonised social security pension schemes covering all employees (incl. civil servants) and the self-employed (gradually harmonised as of 2005), providing old-age, disability and survivors' pensions.	The 2002 reform increased occupational pension provision through the obligation to transform the earlier severance pay into a supplementary occupational scheme (with a contribution rate of 1.53% of wages).	Exists only to a minor extent but the introduction of tax-favoured private scheme (Zukunftsvorsorge) will increase their importance.
PL	*Minimum guarantee pensions:* Means-tested minimum pensions financed from the state budget, topping-up benefits paid out from mandatory pension schemes. *Earnings-related social security pensions:* One social insurance pension scheme (ZUS), covering all employees and the self-employed (except farmers), which is a defined-benefit scheme to those born before 1949 and a notional defined contribution scheme to those born after 1948, providing old-age pensions. Separate schemes for disability and survivors' pensions under the social sec. system. A separate scheme for farmers (KRUS), providing old-age, disability and survivors' pensions. Specific public sector service pensions (armed forces, police, judges etc.) paid from the state budget. Pre-retirement benefits paid out from the state budget.	Exists only to a very minor extent, with a very low coverage (2% of employees).	Statutory private schemes for the switched part of the social security pension scheme as of 1999 (mandatory for new entrants; voluntary switch already closed). Contribution rate is 7.3% of wages.
PT	*Minimum guarantee pensions:* Means-tested minimum pensions through social assistance scheme. It includes all types of minimum pensions; non-contributive/social pensions and contributive scheme (the pension amount depends on the contributive career length). *Earnings-related social security pensions:* A general social security pension scheme covering all employees and the self-employed in the private sector and public sector employees since January 2006 providing old-age, disability and survivors' pensions (apart from short-term benefits). A separate pension scheme (CGA) for other public sector employees.	Exists mainly for banking, insurance and telecommunication sectors as a substitute for the general social security scheme. Also exists as complementary schemes for other DB and DC pensions.	Exists only to a very minor extent.
RO	*Minimum guarantee pensions:*	Exists only to a very minor extent, with a very	**Statutory private schemes** for the

	Does not exist in this form, only through Minimum Guarantee Income Scheme (social assistance for extreme poverty,adressed to poor people and not special related to elderly people) *Earnings-related social security pensions:* Starting 2001, a single scheme covering all employees and self-employed, providing **old-age**, early retirement, disability and survivors' pensions	low coverage (Lawyers Insurance Office, less than 0,1% of total employees).	switched part of the social security pension scheme (mandatory for employees of 15-35 years old, voluntary for those of 35-45 years old. Starting May 2008, the contribution rate is gradually increasing from 2% up to 6% in 2016 from gross earnings. Coverage-about 65% of employees in September 2008 **Voluntary private schemes** -individual supplementary pensions.Started in 2007, up to 15% of monthly revenues can be directed to this scheme (at this moment of very minor importance, about 2% of employees entered this scheme until September 2008)
SI	*Minimum guarantee pensions:* National, means-tested pensions. *Earnings-related social security pensions:* One social security pension scheme covering all employees and the self-employed, providing old-age, disability and survivors' pensions. Flat-rate pensions to farmers, military personnel of the Yugoslav army and for retirees from other republics of the former SFRY.	Mandatory supplementary insurance for some high-risk professions (about 26000 workers, minor importance), voluntary collective supplementary pensions (covering half the employees).	Voluntary individual supplementary pensions (of minor importance in 2003).
SK	*Minimum guarantee pensions:* No special minimum pension scheme, minimum subsistence for old people and widows provided through means-tested social assistance paid out from the state budget. *Earnings-related social security pensions:* One PAYG DB social security pension scheme covering all employees and the self-employed, providing old-age, disability and survivors' pensions. First pillar of the pension scheme.	Do not exist.	Statutory private funded DC scheme for the switched part of the social security pension scheme as of 2005. At the beginning it was compulsory for new entrants and voluntary for current employees. As of 2008, this scheme is voluntary for new entrants. Contribution rate is 9% of wages. Second pillar of the pension scheme. Voluntary pension funded DC scheme introduced in 1996. Third pillar of the pension scheme.
FI	*Minimum guarantee pensions:* National pension scheme provides means-tested (against other pensions) minimum pensions to all citizens, a full national pension after 40 years of living in Finland. Also means-tested housing allowances for pensioners. *Earnings-related social security pensions:* Several but harmonised social security pension schemes for different sectors of	Supplementary occupational pensions, accounting for about 2 % of total pension benefits.	Voluntary individual private pension insurance, accounting for about 1% of total pension benefits but the insured people account for about 15% of working-age population. Contributions are roughly 4 % of total social security pension contributions.

	employees and the self-employed, covering all gainfully employed, providing old-age, early retirement, disability and survivors' pensions.		
SE	*Minimum guarantee pensions:* National pension scheme provides means-tested (against other pensions) minimum pensions to all citizens, a full national pension after 40 years of living in SE. Also means-tested housing allowances for pensioners (BTP). *Earnings-related social security pensions:* The PAYG general social security (NDC) pension scheme covering all employees and the self-employed, providing old-age pensions. The old earnings-related ATP scheme works in parallel during the phasing-out period. Separate disability and survivors' pension schemes. The former formally counted as health insurance. The widow's pension (part of survivors' pensions) is being phased out.	Supplementary occupational old-age pensions for all sectors, covering 80-90% of employees.	Statutory private schemes (premium pension) for the funded part of the social security pension scheme; contribution rate is 2.5% of wages. (Note: Reported as social security pension in the AWG pension report 2006.)
UK	*Minimum guaranteed and contributory social insurance pensions:* Flat-rate (contributory) state basic (old-age) pensions to all citizens and means-tested supplements through pension credits and Council taxes (financed out of taxes). *Earnings-related social security and other public pensions:* State second pension scheme, of which people can opt out of occupational pensions. Public service pensions paid from the state budget. Separate disability and widows' allowance schemes.	A high number of funds for the provision of occupational pensions (about 60% of employees are contributing either to occupational or personal pension schemes).	Personal pension provisions with tax subsidies for persons without access to occupational schemes were introduced in 1998. Stakeholder pension provision with tax subsidies without access to company (occupational) pension schemes was introduced in 2001.
NO	*Minimum guarantee pensions:* Minimum income guarantee. *Earnings-related social security pensions:* Earnings-based benefit. Disability pensions. Voluntary early retirement pensions.	Central government occupational pension scheme financed by employee contributions and transfers from State budget. Supplement to social security old age pension. Local government occupational pension schemes are funded systems. Supplement to social security old age pension. Mandatory private sector occupational schemes are funded defined contribution systems. Supplement to social security old age pension.	Yes.

8.2. Coverage of the pension projection in the Member States

	Schemes covered in the 2009 projections *(*E-r = earnings-related)*	**Schemes <u>not</u> covered**
BE	***Social security pensions: old age and early pensions*** Old age pension: w64 (65 by 2009)/m65. E-r old-age 60+ and widows, public sector. E-r old-age 60+ and widows, private sector. E-r old-age 60+ and widows, self-employed. Prepension (early retirement embedded in the unemployment scheme): 60+, private sector. Prepension (heavy jobs): 58+, private sector. Prepension for labour market reasons: 52-55, private sector. Means-tested minimum benefit: guaranteed income for elderly persons (assistance scheme) 64+ (65+ by 2009). ***Social security pensions: other*** Disability pensions -64, private sector. Disability pensions -64, self-employed.	Prepensions include only the part paid from unemployment benefit scheme, not the complement paid by the employer. ***Occupational pension schemes:*** (pensions 1.1% of GDP in 2007). ***Private pensions:*** (non-mandatory).
BG	Old Age Pensions: Old Age and Periods of Insurance Pensions (including farmers, COOP, military officials) - 63m; 59.5w for 2008. Social pension for old age - 70m; 70w. Survivors pensions according to relationship with the deceased: Widows - 58+m, 55.5+w; Child; Widows aged 50/60; Non-working Widows – all ages; Disabled Children; Non-working Parents - 63m, 55.5w; Parents; Other Survivor; Orphans up to 26. Disability Pensions: Disability (including farmers, COOP, military officials); Disability due to Work Injury and Professional Disease (including farmers, COOP, military officials) - persons at working age. Supplementary mandatory insurance - universal pension schemes providing supplementary life-long old-age pension.	Teachers Pension Fund of the social security scheme. Professional Pension Funds of the private mandatory scheme. Supplementary voluntary pension funds. Supplementary voluntary pension funds under occupational schemes.
CZ	***Social security pensions: old age and early pensions*** Minimum and e-r old-age pensions, 62+ (65+ as of 2030), all sectors. Proportional old-age pensions, 65+, all sectors. Widows and disability pensions, 55+. Early pensions (with permanent reductions). ***Social security pensions: other*** Widows and disability pensions -54. Orphans pensions.	
DK	***Social security pensions: old age and early pensions*** Public flat-rate old-age pensions and means-tested supplements, all citizens 65+. Civil servants old-age pensions 65+, central and local government. Voluntary early retirement schemes, all wage earners. ***Social security pensions: other*** Disability and survivors' pensions, -64. ***Occupational pensions*** Labour market pensions: Labour market supplementary pensions (ATP), Labour market supplementary pensions (SP) ***Private pensions*** Individual pension savings plans	***Occupational pensions*** Labour market pensions: Labour market supplementary pensions for recipients of disability pension (SAP) *Social security pensions: other* Survivors' pensions
DE	***Social security pensions: old age and early pensions*** E-r old-age, widows and disability schemes, all ages. General scheme and life-time civil servants. Early pensions for long-time workers.	***Social security:*** Minimum benefits to elderly (social assistance); 0.1% of GDP. Farmers and miners pensions (0.5% of

	Early pensions for severely handicapped. ***Social security pensions: other*** (covered above; not shown separately).	GDP). ***Occupational pensions:*** Of growing importance, pension expenditure 1.4% of GDP in 2007. Currently 64% of the employees contribute to occupational schemes. ***Individual funded pensions:*** Schemes at a building stage, only contributions to the schemes.
EE	***Social security pensions: old age and early pensions*** Minimum flat-rate pensions, all citizens. E-r old-age pensions; length-of-service component to 60+w and 63+m in 2007, 63+ for both sexes as of 2016, all sectors (Pension Ins. Fund). Early pensions (possible to retire 3 years before the statutory retirement age), all sectors. ***Social security pensions: other*** Disability and widows' pensions, all ages, all sectors (Pension Insurance Fund). ***Private mandatory pensions*** Mandatory funded pensions, mandatory for young persons born 1983.	
EL	***Social security pensions: old age and early pensions*** Minimum pensions (State budget and EKAS (Pensioners Social solidarity Fund)). Old-age flat-rate pensions, uninsured people aged 65+ (OGA). Old-age pensions, other self-employed (OAEE). E-r old-age and supplementary old-age pensions, private sector (IKA and merged funds). E-r old-age pensions, public sector (civil servants, army, public power corporation). E-r supplementary pensions, public sector (auxiliary funds). Disability pensions, all ages. Widows pensions, all ages. Early pensions, fund-specific age. ***Social security pensions: other*** Orphans pensions.	Occupational and Individual Private pension schemes.
ES	***Social security pensions: old age and early pensions*** E-r old-age and early retirement pensions for private sector employees, the self-employed, regional and local government. Means-tested minimum pension (contributory) Flat-rate old-age and early retirement pensions for central government employees and the military, including war pensions. ***Social security pensions: other*** Disability (-64) and survivors' pensions (all ages) for private sector employees, self-employed, regional, local and central government and the military. Means-tested minimum pension (contributory). Private (supplementary and voluntary) pension schemes: occupational and individual.	Means-tested minimum pension scheme (non-contributory).[1] [1]This is a minimum income for the elderly and the disabled that have not contributed before. It includes old-age pensions (65+) and disability pensions (-64). The part of old-age is 57% of total non contributory pensions. It amounts to 0,1% of GDP in 2007. Total non contributory pensions amount to 2,119 million euro in 2007; 2,137 million euro in 2008 (0,19% GDP). Indexation by Annual Budget Law (2% in 2009).
FR	Social security pensions: old age and early pensions. Minimum old-age and widows' pensions (State budget). E-r old-age pensions, 60+, private sector (CNAVTS, national pension fund for salaried workers). E-r old-age pensions, 60+, agricultural workers (MSA, mutual agricultural solidarity fund). Mandatory supplementary funded old-age pensions, all workers in the private sector (ARRCO, association of suppl. pension schemes for non-executive employees). Mandatory supplementary funded old-age pensions, executive workers, private sector (AGIRC, general association of pension	Small anticipatory pension schemes: The new disability scheme (within health insurance), established in 2004.

	institutions for executives). E-r old-age pensions, 60+, public sector (Civil and military pension code, CNRACL, local government and hospitals), specific funds for public sector enterprise workers). E-r old-age pensions, self-employed (CANCAVA (craftsmen), ORGANIC (tradesmen), CNBF (lawyers), CNAVPL (independent professions)). Disability and widows pensions, 60+, all sectors (FSV). Anticipated old-age and early retirement pension (UNEDIC).	
IE	***Social security pensions: old age and early pensions*** Minimum flat-rate old-age **non-contributory** pensions, 66+[1] (also includes widow(er)s non-contributory pensions, blind persons, lone parents, 66+), all sectors.[2] Carers non-contributory, 66+, all sectors.[2] Flat-rate **contributory** 66+ and transition pensions, 65+(also includes invalidity) [1], private sector, self-employed and some public servants.[3] Widow(er)s contributory pensions, 66+, all sectors. Carers contributory, 65+, private sector, self-employed and some public servants.[3] ***Social security pensions: others*** Widow(er)s non-contributory pensions, 65-, all sectors.[2] Blind persons, carers, non-contributory, 65-, all sectors.[2] Pre-retirement allowance, 55-65, all sectors.[2] Disability pensions, 65-, and invalidity pensions 64-, private sector, self-employed, some public servants.[3] Carers, contributory, 64-, private sector, self-employed, some public servants.[3] Widow(ers) contributory pension, 65-, all sectors. ***Public service (occupational) pensions*** Pensions, lump sums and spouses, Civil service, defence, police, education, health and local authorities, non- commercial state bodies. [1] Includes dependent adults of all ages. [2] While individuals from all sectors of the economy are eligible to apply for these pensions, some sectors may not be eligible to receive them due to the means-tested nature of the schemes. [3] Public servants hired on or after 6 April 1995 pay the standard full-rate social insurance contribution, thereby (in general) becoming entitled on retirement to a contributory social security pension, along with a public service occupational pension which is "integrated". They also qualify for a range of other social welfare benefits. By contrast, most public servants hired before 6 April 1995 pay a lower "modified" social insurance contribution and as such, do not qualify for a contributory social security pension (they do normally qualify for a public service occupational pension on retirement) but may qualify for some other social welfare benefits.	***Occupational pensions:*** Private sector schemes and public sector commercial bodies
IT	***Social security pensions and social assistance benefits:*** Old-age, disability and survivors' pensions, w60+/m65+, all sectors, all social security schemes (DB, Mixed, NDC)). Early retirement, disability and survivors' pensions, w-59/m-64, all sectors, all social security schemes (DB, Mixed, NDC)- Old age allowances and social assistance additional lump sums (State budget).	***Occupational pensions:*** They are not part of the public pension system definition to be utilised for the analysis of the sustainability of public finances insofar as: i) they are never mandatory; ii) they provide a supplement of pension which corresponds to a minor fraction of that provided by the public pension system. No risk is taken by the State on investment returns.
CY	***Social security pensions: old age and early pensions*** General Social Insurance scheme covering e-r old-age and widows' pensions. Early old-age pensions, 58-64. Invalidity and disablement pensions, -62. Government Employees Pension scheme covering old-age, widows' and disability pensions.	***Social security pensions: old age and early pensions*** Social (minimum) pension scheme and special allowances to pensioners ***Occupational pensions:*** Voluntary provident Funds.

LV	***Social security pensions: old age and early pensions*** Old-age minimum guaranteed pension, 62+. E-r old-age DB pensions, granted -1995, all sectors. E-r old-age NDC pensions, 62+, granted 1996+, all sectors. Special service pensions (early pensions), selected professions, public sector. Disability pensions, granted -1995 and not transformed to old-age pensions, all sectors. Survivors' pensions (for widows during the transition period). ***Social security pensions: other*** Disability pensions, -62, all sectors. Survivors' pensions -24. Special service, public sector. ***Private mandatory pensions*** Individual funded old-age pension, mandatory for persons born 1971+.	
LT	***Social security pensions: old age and early pensions*** Social assistance pensions, w60+/m62.5+ ; (State budget) Old-age, disability and widows pensions, w60+/m62.5+, all sectors (Soc insurance scheme) Officials and military personnel disability and widows pensions, w60+/m62.5+, public sector (State budget) Special public service (state) pensions for selected professions (scientists, judges) (State budget); state pensions of the first and second degree of the Republic of Lithuania (State budget); state pensions of deprived persons (State budget); Early retirement unemployment benefit (Unemployment fund), changed into early retirement pension as of mid 2004 (Social insurance scheme as of mid 2004). Officials and military personnel pensions for service (State budget); length of service pensions, compensation for extraordinary working conditions (Soc. insurance. scheme); ***Social security pensions: other*** Social assistance pensions (disability and widows pensions), -w59/-m62.4 (State budget) Disability and widows pensions, -w59/-m62.4, all sectors (Soc. Insurance scheme) *State pensions : other* Officials and military personnel disability and widows pensions, -w59/-m62.4, public sector (State budget) ***Private mandatory pensions*** Individual funded old-age pension, voluntary, all sectors	
LU	***Social security pensions: old age and early pensions*** E-r old-age, early retirement and disability pensions, 65+, private sector & self-employed (RGAP (general pension insurance scheme). E-r old-age, early retirement and disability pensions, 65+, public sector (RSP, special pension scheme), state budget. ***Social security pensions: other*** Disability (-64 years) and survivors' pensions, all sectors.	Minimum benefits (RMG, social assistance).
HU	***Social security pensions: old age and early pensions*** Social allowances equivalent to pensions to persons 62+. E-r old-age and anticipatory old-age pensions, all sectors. Survivor's pensions, 62+, all sectors. Disability pensions, 62+, all sectors. ***Social security pensions: other*** Disability pensions, -61, all sectors. Survivor's pensions, -61, all sectors. Pension-like regular social allowances, -61.	

	Private mandatory pensions Individual funded pensions, mandatory to persons entering the labour market.	
MT	***Social security pensions: old age and early pensions*** Two-thirds pension scheme (incorporating two-thirds retirement pension, national minimum pension, increased national minimum pension, increased retirement pension, decreased national minimum pension), currently w60+/m61+, 62+ in 2012, 63+ in 2018, 64+ in 2022 and 65+ in 2026. ***Social security pensions: other*** Pensions other than those listed above, notably disability and survivors' pensions and some pensions, which will be phased out over a transition period, to specific groups of pensioners.	
NL	***Social security pensions: old age and early pensions*** Public flat-rate old-age pensions, 65+, all citizens (AOW). Widows pensions, w55+, all sectors (ANW). ***Social security pensions: other*** Disability benefits, all sectors (WAO). ***Occupational pensions*** Occupational old-age pensions, 65+, all sectors. Occupational early retirement pensions, all sectors (VUT).	
AT	***Social security pensions: old age and early pensions*** E-r old-age and early retirement pensions, w60+/m65+, private sector (ASVG, gen. soc. ins. Scheme, also including farmers and self-employed). E-r old-age and early retirement pensions, w60+/m65+, public sector (civil service). ***Social security pensions: other*** Survivors' pensions, all ages, all sectors. Disability pensions, all ages, all sectors.	***Social security pensions: old age and early pensions:*** Minimum pensions (Ausgleichszulagen), financed by general tax revenues (in 2007 approximately 0.3% of GDP). ***Other pension related expenditures:*** Some pension expenditures not directly linked to pension benefits (as for rehabilitation, administrative costs, etc.) are not included in the projections. These other pension expenditures make up for approximately 0.9% of GDP.
PL	***Social security pensions: old age and early pensions:*** **General pension scheme:** Persons born before 1949 E-r DB old-age, w60+/m65+ and early retirement pensions w55-59/m55-64, and to those people who earned fully their pension rights before the end of 2008, private and public sector, self-employed (ZUS, Social ins. institute) Persons born after 1948 E-r NDC old-age (with the exception of the transitional group), private and public sector, self-employed (ZUS, Social insurance fund) Pre-retirement benefits and allowances (State budget) Farmers E-r DB old-age and early retirement pensions w55-59/m55-64, (KRUS, Farmers social ins. scheme) Security provision systems: old-age pensions (State budget) ***Social security pensions: other*** General pension scheme: disability, survivors' pensions and other benefits Other systems : disability and survivors' pensions ***Private mandatory pensions*** Individual funded old-age pensions, mandatory to persons born 1969+ and voluntary to those born 1949-68 joining the scheme by the end of 1999	***Social security pensions: old age and early pensions:*** Minimum means-tested pensions. ***Occupational pensions:*** (of minor importance).

PT	***Social security pensions: old age and early pensions:*** Social pensions (minimum, means-tested and non-contributory), old-age, 65+, disability pensions, 65+. General Contributory (social insurance) scheme (employees and self-employed of the private sector and public employees since 2006): old-age and early pensions; disability pensions, 65+. Includes supplements to ensure minimum pensions value. RESSAA (Spec. soc. sec. scheme for agriculture workers): e-r old-age, 65+, disability pensions, 65+. CGA (Pension scheme of civil servants hired until December 2005): old-age and early pensions, disability pensions, all ages. Includes supplements to ensure minimum pensions value. ***Social security pensions: other*** Social pensions (means-tested non-contributory): disability pensions, -64, survivors' pensions, all ages. General contributory scheme & RESSAA: disability pensions, -64, survivors' pensions, all ages. CGA scheme: survivors' pensions, all ages. ***Occupational pensions:*** 1st pillar schemes for some sectors (banking and insurance for example) and complementary schemes for other DB and DC pensions.	***Private pensions:*** Individual (non-mandatory) private pension schemes (of minor importance).
RO	***Social security pensions: old age and early pensions*** Old age pensions. E-r old-age (w58-60+/m63-65+). Disability and widows pensions, all ages, all sectors. ***Social security pensions: other*** Pensions for farmers. Pensions for the military ***Private mandatory pensions***	***Occupational pensions*** –of minor importance ***Private non - mandatory pensions***: Voluntary pension funded scheme introduced in 2007as third pillar of the pension scheme.
SI	***Social security pensions: old age and early pensions*** Old age pensions. E-r old-age (w58-63+/m58-65+). Disability and widows pensions, all ages, all sectors. Special compulsory pensions to workers in high-risk occupations, private and public sector. ***Private non - mandatory pensions (including mandatory pensions to workers in high risk occupations)*** Collective (semi – mandatory) and individual supplementary pensions.	National (state) pensions (State budget). Flat-rate pensions for farmers. Pensions (supplements) for the military personnel of the Yugoslav army and retirees from other republics of former SFRY. ***Occupational pensions :*** Collective supplementary pensions.
SK	***Social security pensions: old age and early pensions*** E-r old-age, w53-57+/m60+ (w62+ 2024 and m62+ 2008), disability and widows pensions, all sectors (Social insurance scheme). ***Social security pensions: other*** Disability and widows pensions, orphans. Pensions. ***Private mandatory pensions:*** Individual funded old-age pension, voluntary to persons entering labour market 2008+ (assumed entry rate 95%).	Voluntary pension funded DC scheme introduced in 1996. Third pillar of the pension scheme.
FI	***Social security pensions: old age and early pensions*** National (minimum) pension (Nat. pension insurance), 65+. E-r old-age, 63+, early pensions, private sector and the self-employed: (TyEL, private sector employees), (YEL, self-employed), (MYEL, farmers), and the public sector: (VaEL (central government employees), KuEL (municipal sector employees), KiEL (church empl.).	***Occupational pensions:*** Collective mandatory and voluntary supplementary schemes.

	Unemployment pensions, 60-62, to be phased out by 2014. ***Social security pensions: other*** National (minimum) disability and survivors' pensions, -64. E-r disability and survivors pensions, -62, all sectors (early pensions change into old- age pensions at the age of 63 and then included in the above category).	
SE	***Social security pensions: old age and early pensions:*** Minimum pensions and housing supplement for pensioners (State budget). E-r NDC old-age and anticipated pensions, flexible age, all sectors (Social insurance scheme). ***Social security pensions: other*** Disability pensions, 19-64, and survivors benefits, all ages. ***Occupational pensions:*** Occupational (supplementary) pensions, private and public sector employees (old and new schemes). Individual mandatory funded old-age pensions, premium pensions.	
UK	***Social security (and other public) pensions: old age and early pensions:*** Basic state (minimum) pensions + their additions (winter fuel allowance), State Pension Age and above, all citizens (National insurance scheme). Pension credits and Council tax benefits, 60+, all citizens (State budget). State second pension (S2P)/ State earnings-related pensions (SERPS), State Pension Age, all sectors (National insurance scheme). Widow's benefits are covered for individuals above State Pension Age. E-r old-age p.ensions, 60+, public sector employees (State budget) ***Social security pensions: other***	***Public pensions:*** Disability benefits to people below State Pension Age. Above State Pension Age all individuals are covered by social security pensions. ***Occupational pensions:*** Supplementary old-age pensions, private sector; important part of the pension system.
NO	***Social security pensions: old age and early pensions*** Minimum income guarantee. Earnings-based benefit. ***Social security pensions: other*** Disability pensions.	Central government occupational pension scheme financed by employee contributions and transfers from State budget. Supplement to social security old age pension. Local government occupational pension schemes are funded systems. Supplement to social security old age pension. Mandatory private sector occupational schemes are funded defined contribution systems. Supplement to social security old age pension. Labour market supplementary pensions for recipients of anticipatory pension. Voluntary early retirement pensions.

8.3. Indexation rules in the MS

	Legislated indexation rule	Indexation rule used in the projection
BE		
Minimum guarantee pensions:		
	CPI indexation and a partial indexation to living standards within a total budget corresponding to the necessary budget required for a 1% increase of all social assistance benefits	CPI indexation + 1% indexation to living standards
Old-age pensions:		
	Wage earners: CPI indexation and a partial indexation to living standards within a total budget corresponding to the necessary budget required for an increase (of all replacement benefits in the scheme) of: + 1.25% indexation of the wage ceilings + 1.25% indexation of the minimum claim per year + 1% indexation of lump-sum benefits + 0.5% indexation of the earning-related benefits; Self-employed:CPI indexation and a partial indexation to living standards within a total budget corresponding to the necessary budget required for an increase (of all replacement benefits in the scheme) of: + 1.25% indexation of the wage ceilings + 1% indexation of lump-sum benefits + 0.5% indexation of the earning-related benefits; Civil servants: CPI and a real wage indexation.	Wage earners : CPI indexation, + 1.25% indexation of the wage ceiling + 1.25% indexation of the minimum claim per year + 1% indexation of the minimum pension + 0.5% indexation of the wage earning-related pension; Self-employed: CPI indexation, + 1.25% indexation of the wage ceiling + 1% indexation of the minimum pension + 0.5% indexation of the earning-related pension; Civil servants: CPI indexation, + real wage indexation minus 0.5% wage drift
Widow's/Survivor's pensions:		
	As Old-age pensions	As Old-age pensions
Early retirement pensions		
	CPI indexation and a partial indexation to living standards within a total budget corresponding to the necessary budget required for an increase (of all replacement benefits in the wage earners scheme) of: + 1.25% indexation of the wage ceilings + 1.25% indexation of the minimum claim per year + 1% indexation of lump-sum benefits + 0.5% indexation of the earning-related benefits	CPI indexation, + 1.25% indexation of the wage ceiling + 1% indexation of the lump-sum benefit + 0.5% indexation of the earning-related benefit
Disability pensions		
	Wage earners: CPI indexation and a partial indexation to living standards within a total budget corresponding to the necessary budget required for an increase (of all replacement benefits in the scheme) of: + 1.25% indexation of the wage ceilings + 1.25% indexation of the minimum claim per year + 1% indexation of lump-sum benefits + 0.5% indexation of the earning-related benefits; Self-employed:CPI indexation and a partial indexation to living standards within a total budget corresponding to the necessary budget required for an increase (of all replacement benefits in the scheme) of: + 1.25% indexation of the wage ceilings + 1% indexation of lump-sum benefits + 0.5% indexation of the earning-related benefits;	Wage earners: CPI indexation, + 1.25% indexation of the wage ceiling + 1% indexation of the lump-sum benefit + 0.5% indexation of the earning-related benefit; Self-employed: CPI indexation, + 1% indexation of the lump-sum benefit

BG		
Minimum guarantee pensions:		
	They are indexed by the same percentage as for all other types of pensions, through the so called 'golden Swiss rule' – 50% of CPI annual growth and 50% of insurance income growth for the previous calendar year.	Indexation of pensions follows the so called 'golden Swiss rule' – 50% of CPI annual growth and 50% of insurance income growth for the previous calendar year
Old-age pensions:		
	Indexation of pensions follows the so called 'golden Swiss rule' – 50% of CPI annual growth and 50% of insurance income growth for the previous calendar year	As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions (for pensions granted before end 2010). After end 2010 new pensions will be transferred to the mandatory private scheme (PPF) where the indexation rules are stipulated in the pension contract and/or the PPF Rules.	As legislated (for pensions granted before end 2010). Pensions granted after end 2010 are not covered by the projection (see the left column), and no projection indexation is applied to them.
Disability pensions		
	As Old-age pensions	As legislated
CZ		
Minimum guarantee pensions:		
	There is no rule on the indexation. Government increases the minimum pension in order to maintain its relative level.	Average wage growth.
Old-age pensions:		
	An inflation growth (CPI) plus at least a third of the growth in real average wage. If the inflation rate exceeds 5%, there is special adjustment of pension benefits added.	An inflation growth (CPI) plus at least a third of the growth in real average wage.
Widow's/Survivor's pensions:		
	As Old-age pensions	As Old-age pensions
Early retirement pensions		
	As Old-age pensions	As Old-age pensions
Disability pensions		
	As Old-age pensions	As Old-age pensions
DK		
Minimum guarantee pensions:		
	Indexed to the nominal wage growth according to the Rate Adjustment Percentage Act.	As legislated
Old-age pensions:		
	Indexed to the nominal wage growth according to the Rate Adjustment Percentage Act.	As legislated
Widow's/Survivor's pensions:		
	Indexed to the nominal wage growth of civil servants	Not included in the model
Early retirement pensions		
	As Old-age pensions	As legislated

Disability pensions		
	As Old-age pensions	As legislated
DE		
Minimum guarantee pensions:		
	In general, social assistance is indexed in line with pensions. In addition, every 5 years poverty line is re-examined on the basis of a sample survey of households income and expenditure (EVS).	Not included in the model
Old-age pensions:		
		As legislated
	The indexation of pensions (more precisely, the pension point value) depends on the increase of gross wages (in this case given by the AWG), changes in the contribution rate and the sustainability factor, which evolves with the change in the contributors/pensioner ratio.	
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
EE		
Minimum guarantee pensions:		
	As Old-age pensions	As legislated
Old-age pensions:		
		As legislated
	Up to 2008 the pension index was based on social tax increase (close to wage growth) and on CPI with equal weights (50% and 50%). The indexation system in place currently is a sum of 80% of social tax increase and 20% of the annual increase in CPI.	
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
EL		
Minimum guarantee pensions:		
	No legislated indexation rule	Inflation+0.5%
Old-age pensions:		
	No legislated indexation rule	Inflation+0.5%
Widow's/Survivor's pensions:		
	No legislated indexation rule	Inflation+0.5%
Early retirement pensions		
	No legislated indexation rule	Inflation+0.5%
Disability pensions		
	No legislated indexation rule	Inflation+0.5%
ES		
Minimum (contributory-means tested) pension:		
	Target inflation. If actual inflation is above, the difference is paid to all existing pensioners (threshold included in all type of pensions). If actual inflation is below, the government can make the corresponding adjustment.	Considering effective recent policy and political commitments, in the pension projection an annual 6% average increase is projected in the medium term, and afterwards a convergence to price indexation (after 2035 CPI indexation).
Old-age pensions:		

	Target inflation. If actual inflation is above, the difference is paid to all existing pensioners. If actual inflation is below, the government can make the corresponding adjustment.	As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
FR		
Minimum guarantee pensions:		
	indexed on CPI	As legislated
Old-age pensions:		
	indexed on CPI	As legislated
Widow's/Survivor's pensions:		
	indexed on CPI	As legislated
Early retirement pensions		
	indexed on CPI	As legislated
Disability pensions		
	indexed on CPI	As legislated
IE		
Minimum flat-rate old-age non-contributory pensions, 66+ [1] (also includes widow(er)s non-contributory pensions, blind persons, lone parents, 66+), all sectors [2] Carers non-contributory, 66+, all sectors [2]		
	No formal indexation criteria exist in the Irish social welfare system - social welfare increases are decided upon each year as part of the budgetary cycle.	For the purpose of the pension projection exercise, the State Pension Contributory rate is indexed to nominal earnings with all other rates rising at the same flat rate. However, increases for means-tested pensions are adjusted downwards in line with the current means adjustment mechanism in place for the State Pension Non-Contributory and Widow / Widower's Non-Contributory schemes. As such, the difference between contributory and non-contributory payment rates that applies in 2007 is maintained throughout the projection period. Nominal earnings are calculated using the productivity and inflation assumptions agreed by the AWG.
Flat-rate old-age contributory 66+ and transition pensions 65 (also includes invalidity) [1], private sector, self-employed and some public servants [3]		
	No formal indexation criteria exist in the Irish social welfare system - social welfare increases are decided upon each year as part of the budgetary cycle.	For the purpose of the pension projection exercise, the State Pension Contributory rate is indexed to nominal earnings with all other rates rising at the same flat rate. Nominal earnings are calculated using the productivity and inflation assumptions agreed by the AWG.
Widow(er)s contributory pensions, 66+, all sectors		
	As flat-rate contributory pensions	As flat-rate contributory pensions
Carers contributory , 65+, private sector, self-employed and some public servants [3]		
	As flat-rate contributory pensions	As flat-rate contributory pensions
Widow(er)s non-contributory pensions, 65-, all sectors [2]		
	As flat-rate contributory pensions	As minimum flat-rate non-contributory pensions

Blind persons, carers, non-contributory, 65-, all sectors [2]

As flat-rate contributory pensions	As minimum flat-rate non-contributory pensions

Pre-retirement allowance, 55-65, all sectors [2]

As flat-rate contributory pensions	As minimum flat-rate non-contributory pensions

Disability pensions, 65-, and invalidity pensions 64-, private sector, self-employed, some public servants [3].

As flat-rate contributory pensions	As minimum flat-rate non-contributory pensions

Carers, contributory, 64-, private sector, self-employed, some public servants [3]]

As flat-rate contributory pensions	As flat-rate contributory pensions

Widow(ers) contributory pension, 65-, all sectors

As flat-rate contributory pensions	As flat-rate contributory pensions

Public Service pensions, lump sums and spouses (Civil service, defence, police, education, health and local authorities, non-commercial state bodies).

There is no legislative guarantee in relation to indexation of the occupational pensions of retired public servants in Ireland.	For the purpose of the pension projection exercise, public service occupational pensions are assumed to grow in line with nominal earnings. Nominal earnings are calculated using the productivity and inflation assumptions agreed by the AWG.

[1] Includes dependent adults of all ages.

[2] While individuals from all sectors of the economy are eligible to apply for these pensions, some sectors may not be eligible to receive them due to the means-tested nature of the schemes.

[3] Public servants hired on or after 6 April 1995 pay the standard full-rate social insurance contribution, thereby (in general) becoming entitled on retirement to a contributory social security pension, along with a public service occupational pension which is "integrated". They also qualify for a range of other social welfare benefits. By contrast, most public servants hired before 6 April 1995 pay a lower "modified" social insurance contribution and as such, do not qualify for a contributory social security pension (they do normally qualify for a public service occupational pension on retirement) but may qualify for some other social welfare benefits.

IT

Old age-allowances and social assistence additional lump sums:

i) old-age allowances: CPI indexation; ii) social assistence additional lump sums: fixed in nominal terms	i) old-age allowances: GDP per capita; ii) social assistence additional lump sums: GDP per capita

All social security pension schemes (DB, Mixed, NDC) and typologies of pension (old age, early retirement, disability and survivors'):

Pensions (including minimum) are indexed to CPI. The percentage of indexation is differentiated by pension amount brackets: 100% of the inflation rate for the amount of pension up to three times the minimum, 90% for the amount between three and five times the minimum, and 75% for the part above five times the minimum. Before 1992, partial indixation to real wage was acknowledged to private sector pensioners. Since then pensions (including minimum) have been indexed only to prices.	Pensions are indexed to prices as foreseen by current legislation. Minimum pension utilised in topping-up and indexation calculations is updated according to GDP per worker

Widow's/Survivor's pensions:

As Old-age pensions	As Old-age pensions

Early retirement pensions

	As Old-age pensions	As Old-age pensions
Disability pensions		
	As Old-age pensions	As Old-age pensions
CY		
Minimum guarantee pensions:		
	Average Insurable Earnings	As legislated
Old-age pensions:		
	Basic: Average Insurable Earnings; Supplementary: CPI	As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
LV		
Minimum guarantee pensions:		
	State (social security) benefits (those with less than 10 years insurance records), 67+ : discretionary adjustment. Old-age minimum guaranteed pension, 62+: Since 2002 – indexation to CPI and share of real wage sum growth (since 2004 – 50%).	Old-age minimum guaranteed pension, 62+: Until 2002 - indexation to the CPI. Since 2002 – indexation to the CPI and 50% of a wage sum growth. Indexation to CPI and share of real wage sum growth (since 2004 – 50%).
Old-age pensions:		
	Until 2002 - indexation to the CPI. Since 2002 – indexation to the CPI and share of real wage sum growth (since 2004 – 50%).	As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
LT		
Minimum guarantee pensions:		
	Pensions are adjusted discretionary by Government decision by approving a new amount of the basic pension	In the projection the indexation to productivity growth (real wage growth) was used
Old-age pensions:		
	Social insurance old age pensions are adjusted discretionary by Government decision by approving a new amount of the basic pension and the average insurable income in the country (based on income on which social insurance contributions were paid). During post reform period (1995-2008) pensions were indexed in line with wage growth with a few year exeption). Non earnings related state pensions which depend on special state pension base and earnings related state pensions are raised with discretionary decisions of the Government, while the later pensions are also affected by higher new pensions that have accrued in line with earnings increases.	Social insurance pensions and E-r state pensions - adjustment to productivity growth (real wage growth). Non E-r state pensions - indexation to price index
Widow's/Survivor's pensions:		
	Pensions are adjusted discretionary by Government decisions;	As early retirement pensions indexation
Early retirement pensions		

	Social insurance pensions are adjusted discretionary by Government decisions each year by approving a new amount of the basic pension and the average insurable income in the country (based on income on which social insurance contributions were paid).	In the projection pensions were indexed in line with the productivity growth (real wage growth).
	Official's and military personnel state pensions for service (State budget) are adjusted discretionary by Government decisions and also affected by higher new pensions that have accrued in line with earnings increases.	As early retirement pensions indexation
Disability pensions		
	As early retirement pensions	As early retirement pensions indexation
LU		
Minimum guarantee pensions:		
	As Old-age pensions	Not modelled
Old-age pensions:		
	Whenever prices increase by more than 2.5% - price indexation. Every two years - Real wage indexation (must be confirmed by the government and the parliament).	Whenever prices increase by more than 2.5% - price indexation. Every two years - Real wage indexation
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
HU		
Minimum guarantee pensions:		
	People who have the right to pension are entitled at least to the so called “minimum pension”. It is adjusted discretionary by Government decision. People, who fail to obtain enough rights that would qualify them for a social security pension, get no any guaranteed pension, but might become entitled to a social assistance benefit (old-age allowance). The amount of old-age allowance is determined in percentage of the minimum pension.	Old-age allowance not modelled (in the supplementary calculation the indexation is the same as the old age pension indexation.)
Old-age pensions:		
	50% CPI and 50% average wage growth	As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
MT		
Minimum guarantee pensions:		
	Non-contributory Old Age Pensions are indexed to 2/3 of Cost of Living Allowance (COLA).	Not included in the model
Old-age pensions:		

	Persons born before 1962 have their pension updated on the basis of COLA as well as any increases in wages presently awarded through collective bargaining. Following the implementation of the pension reform, indexed to 70 per cent Nominal Wage growth and 30 per cent inflation rate for persons retiring from 2026 onwards.	
		As legislated
Widow's/Survivor's pensions:		
	Indexation similar to that of the contributory Old-Age pensions.	
		As legislated
Early retirement pensions		
Disability pensions		
	Indexed to COLA	
		As legislated
NL		
Minimum guarantee pensions:		
	The Netherlands features a flat rate system of public pensions (AOW). This functions as a minimum provision. The AOW is indexed to wages.	As legislated
Widow's/Survivor's pensions:		
	Wage indexation	As legislated
Disability pensions		
	Wage indexation	As legislated
Occupational pensions		
	Indexation by pension funds is customary but not mandatory. 70% of the pension funds aim at wage indexation and 30% at price indexation.	It is assumed in the model that 70% of the pension funds aim at wage indexation and 30% at price indexation.
Early retirement occupational pensions		
	Not known	Same assumption as for occupational pensions: 70% to wages and 30% to prices.
AT		
Minimum guarantee pensions:		
	Annual CPI indexation.	No projection.
Old-age pensions:		
	Annual CPI indexation. Occasionally, (September 08) the Parliament can adjust pensions above CPI indexation.	
		As legislated
Widow's/Survivor's pensions:		
	Annual CPI indexation.	As legislated
Early retirement pensions		
	Annual CPI indexation.	As legislated
Disability pensions		
	Annual CPI indexation.	As legislated
PL		
Minimum guarantee pensions:		
	As Old-age pensions	As Old-age pensions
Old-age pensions:		
	Annual CPI (for pensioners' households) indexation + 20% real wage growth	
		Annual CPI + 20% real wage growth
Widow's/Survivor's pensions:		
	As Old-age pensions	As Old-age pensions
Early retirement pensions		
	As Old-age pensions	As Old-age pensions
Disability pensions		
	As Old-age pensions	As Old-age pensions

PT		
Minimum guarantee pensions:		
	Full CPI and a partial GDP growth indexation depending on the average GDP growth of the 2 previous years.	As legislated
Old-age pensions:		
	Full CPI and a partial GDP growth indexation depending on the average GDP growth of the 2 previous years and the size of pension differentiated by reference to a social support index (IAS): pensions under 1.5 IAS; pensions between 1.5 and 6 IAS; and, pensions between 6 and 12 IAS. Pensions above 12 IAS have been frozen.	Full CPI and a partial GDP growth indexation depending on the size of a pension and GDP growth. To have the distribution of pensions by size, in the case of CGA, it was assumed the 2007 distribution: 32% in the first bracket, 60% in the second one and 8% in the highest one; in the case of Social Security it takes the 2005 distribution: 72% in the first bracket, 24% in the second and 4% in the highest one, and assumes a distribution change (with higher pensions) in the next 15 years, keeping it constant afterwards.
Widow's/Survivor's pensions:		
	Widows/Survivors' pensions are established as a percentage of the old-age or disability pensions that originate them and, in the case of Social Security General Regime, the indexation rule is the same: full CPI and a partial GDP growth indexation depending on the size of a pension and GDP growth of the 2 previous years.	Widows/Survivors' pensions are established as a percentage of the old-age or disability pensions that originate them and the indexation rule is the same applied to old age and disability pensions (in both cases of Social Security and CGA).
Early retirement pensions		
	As Old-age pensions	As Old-age pensions
Disability pensions		
	As Old-age pensions	As Old-age pensions
Occupational pensions:		
	There is not a specific rule for indexing occupational pension's benefits but benefit indexation under collective labour agreements is usually mandatory and related to the consumer price index. For the remaining plans pension indexation is not guaranteed and is usually made on a discretionary basis.	For projection purposes, different pension's growth rates were assumed for each one of the three pension plan "systems" modelled: 1st pillar DB plans (CPI), other DB plans and DC plans.
RO		
Minimum guarantee pensions:		
	If seen as part Minimum Guarantee Income Scheme – there are lump sums fixed each year	
		As legislated
Old-age pensions:		
	Indexed in line with average gross wage in the current year, as the value of the base point is established by the Social Insurance Law as percentage of the yearly gross wage in economy	
		As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	
		As legislated

SI		
Minimum guarantee pensions:		
	Minimum guarantee for Old age pension is 35 % of minimal pension base. Minimal pension base is indexed by same rule as pension, but without reduction coefficient which is applied for old pension. *Minimum guarantee for other types of pension* depends also on age and could be slightly higher than Minimum guarantee for Old age pension	As Old-age pensions
Old-age pensions:		
	The old-age net pension is indexed: *1.* yearly by the same growth rate as it is estimated growth rate of average gross wage in the current year. Estimation of the yearly gross wage rate is done in November of the current year. *2.* The estimated growth rate is reduced by the coefficient between total accrual rate for man for 40 years of service in year before the current year and total accrual rate for man for 40 years of service in the two years before the current year. This indexation is applied for all pensions, except for those assigned in the current year.	As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
SK		
Minimum guarantee pensions:		
	No minimum pension. Social assistance benefit indexed roughly to CPI in short run (although no automatic indexation rule does exist).	Nominal wages
Old-age pensions:		
	50%CPI + 50% nominal wage growth	As legislated
Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
FI		
Minimum guarantee pensions:		
	National pensions - full indexation to the CPI. Occasional ad-hoc pension adjustment. The indexation rule pertains in addition to basic old-age pensions also unemployment, disability, widows/survivor pension within the national pension system	The index used in the projection has a weight of 50% to wages and 50 % to prices from 2011 onwards). The indexation rule pertains in addition to basic old-age pensions also unemployment, disability, widows/survivor pension within the national pension system
Old-age pensions:		
	Earnings related pensions - adjustment index has a weight of 80 % on CPI and 20 % on wages. Life expectancy is reflected in addition. The reference wage is calculated by an index, where the weight of wages is 80 per cent and that of prices is 20 per cent.	As legislated

Widow's/Survivor's pensions:		
	As Old-age pensions	As legislated
Early retirement pensions		
	As Old-age pensions	As legislated
Disability pensions		
	As Old-age pensions	As legislated
SE		
Minimum guarantee pensions:		
	CPI indexation. Occasional ad-hod adjustments of the housing supplemenrt for pensioners.	Income indexed.
Old-age pensions:		
	PAYG: Income indexed. Also the automatic balancing mechanism may affect the indexation.	PAYG: Income indexed. The automatic balancing mechanism not activated.
Widow's/Survivor's pensions:		
	Income and CPI indexed	Income indexed
Early retirement pensions		
	As PAYG	Income indexed.
Disability pensions		
	Income and CPI indexed	Income indexed
UK		
Minimum guarantee pensions:		
	Pension Credit - earnings indexation until 2015 then Guarantee Credit (the main element that guarantees minimum income) continues to be indexed with earnings, but the Savings Credit (the element that smoothes withdrawal rates) is indexed with prices.	As legislated
Old-age pensions:		
	Currently - CPI indexation. From 2012 - National Average Earnings indexation.	As legislated
Widow's/Survivor's pensions:		
	BSP and the minimum income guarantee of the Pension credit are indexed in line with earnings.	As legislated
Early retirement pensions		
Disability pensions		
	Does not apply in the case of UK.	Does not apply in the case of UK.
NO		
Minimum guarantee pensions:		
	Wage	Wage
Old-age pensions:		
	Wage	Wage
Widow's/Survivor's pensions:		
	Wage	
Early retirement pensions		
Disability pensions		
	Wage	Wage

8.4. Additional pension projection results

Table 50 - Public pension expenditure (% of GDP)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060 in p.p.
BE	10.0	10.3	11.8	13.9	14.6	14.7	14.7	4.8
BG	8.3	9.1	8.4	8.6	9.5	10.8	11.3	3.0
CZ	7.8	7.1	6.9	7.1	8.4	10.2	11.0	3.3
DK	9.1	9.4	10.6	10.6	10.4	9.6	9.2	0.1
DE	10.4	10.2	10.5	11.5	12.1	12.3	12.8	2.3
EE	5.6	6.4	5.9	5.6	5.4	5.3	4.9	-0.7
IE	5.2	5.5	6.4	7.5	8.7	10.5	11.3	6.1
EL	11.7	11.6	13.2	17.1	21.4	24.0	24.1	12.4
ES	8.4	8.9	9.5	10.8	13.2	15.5	15.1	6.7
FR	13.0	13.5	13.6	14.2	14.4	14.2	14.0	1.0
IT	14.0	14.0	14.1	14.8	15.6	14.7	13.6	-0.4
CY	6.3	6.9	8.9	10.8	12.8	15.5	17.7	11.4
LV	5.4	5.1	5.2	5.9	6.1	5.8	5.1	-0.4
LT	6.8	6.5	6.9	8.2	9.1	10.4	11.4	4.6
LU	8.7	8.6	9.9	14.2	18.4	22.1	23.9	15.2
HU	10.9	11.3	11.0	11.0	12.2	13.2	13.8	3.0
MT	7.2	8.3	9.3	9.3	10.5	12.0	13.4	6.2
NL	6.6	6.5	7.8	9.3	10.3	10.3	10.5	4.0
AT	12.8	12.7	13.0	13.8	13.9	14.0	13.6	0.9
PL	11.6	10.8	9.7	9.4	9.2	9.1	8.8	-2.8
PT	11.4	11.9	12.4	12.6	12.5	13.3	13.4	2.1
RO	6.6	8.4	8.8	10.4	12.6	14.8	15.8	9.2
SI	9.9	10.1	11.1	13.3	16.1	18.2	18.6	8.8
SK	6.8	6.6	6.3	7.3	8.3	9.4	10.2	3.4
FI	10.0	10.7	12.6	13.9	13.6	13.3	13.4	3.3
SE	9.5	9.6	9.4	9.5	9.4	9.0	9.4	-0.1
UK	6.6	6.7	6.9	7.6	8.0	8.1	9.3	2.7
NO	8.90	9.57	11.46	12.70	13.39	13.33	13.58	4.7
EU27	10.2	10.2	10.5	11.4	12.1	12.4	12.6	2.4
EA	11.1	11.2	11.6	12.6	13.6	14.0	13.9	2.8
EA12	11.1	11.2	11.6	12.7	13.6	14.0	13.9	2.8
EU15	10.2	10.3	10.7	11.6	12.3	12.5	12.7	2.4
EU10	9.7	9.3	8.8	9.0	9.6	10.4	10.7	1.0
EU25	10.2	10.3	10.6	11.4	12.1	12.4	12.5	2.3

Source: Commission services, EPC.

Table 51 - Number of pensioners in public pension schemes (in 1000)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060	Change 2007 - 2060 (in %)
BE	2548	2646	3126	3655	3992	4180	4303	1755	69
BG	2234	2209	2160	2205	2346	2412	2271	37	2
CZ	2729	2754	3015	3119	3375	3619	3637	908	33
DK	1334	1400	1607	1585	1584	1500	1428	94	7
DE	19822	20236	21502	23861	24929	24251	23456	3634	18
EE	367	369	362	380	394	414	413	46	12
IE	759	813	1023	1270	1541	1863	2013	1254	165
EL	2635	2658	2871	3262	3804	4158	4192	1557	59
ES	8075	8438	9775	12080	15017	17002	16805	8730	108
FR	14048	14885	17075	19382	20908	21595	21973	7925	56
IT	15807	15780	16819	19299	21335	21304	20802	4995	32
CY	118	138	201	279	347	439	520	402	341
LV	576	551	519	573	602	645	640	64	11
LT	912	916	974	1065	1108	1166	1157	244	27
LU	146	160	226	320	417	504	551	405	277
HU	3049	2996	3050	3087	3242	3285	3252	202	7
MT	68	80	97	105	107	110	117	48	71
NL	3302	3447	4201	4903	5301	5158	5158	1856	56
AT									
PL	9968	9336	9415	9941	10599	11325	11275	1307	13
PT									
RO	5710	5469	5271	5652	6307	6736	6445	735	13
SI	519	540	610	688	754	769	730	211	41
SK	1189	1184	1287	1475	1633	1751	1754	566	48
FI	1331	1395	1609	1742	1735	1724	1748	417	31
SE	2167	2284	2716	3117	3400	3552	3807	1640	76
UK									
NO	939	1016	1286	1504	1683	1783	1909	970	103

Source: Commission services, EPC.

Table 52 - Number of contributors to public pension schemes (in 1000)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060	Change 2007 - 2060 (in %)
BE	4406	4541	4817	4785	4783	4786	4780	374	8
BG	2864	2974	2837	2622	2389	2121	1857	-1006	-35
CZ	4878	5052	5045	4814	4546	4178	3873	-1005	-21
DK	2822	2842	2798	2779	2774	2838	2844	22	1
DE	31816	32415	33499	31201	29158	27549	25681	-6135	-19
EE	659	676	631	593	562	511	470	-189	-29
IE	2715	2926	3392	3667	3789	3717	3775	1059	39
EL	4608	4726	4856	4691	4443	4210	4107	-500	-11
ES	21510	22967	25326	25769	24544	22630	21911	402	2
FR	25399	25778	26637	26719	26969	27182	27525	2127	8
IT	23550	24220	25404	25304	23835	22687	21922	-1628	-7
CY	392	433	509	551	591	603	607	215	55
LV	1202	1235	1113	997	916	787	707	-496	-41
LT	1467	1501	1477	1330	1212	1076	940	-527	-36
LU	342	371	447	468	491	517	536	194	57
HU	3987	4056	4129	3923	3615	3286	3036	-951	-24
MT	159	160	169	172	170	159	146	-13	-8
NL	10981	11343	12015	12464	12725	12463	12259	1278	12
AT	3705	4206	4352	4311	4269	4186	4092	387	10
PL	15333	16544	16373	15196	13828	11939	10518	-4814	-31
PT	4296	4293	4315	4127	3879	3633	3496	-800	-19
RO	6136	6348	6630	6464	6185	5689	5297	-839	-14
SI	878	887	875	806	734	666	620	-258	-29
SK	2386	2468	2662	2501	2260	1964	1715	-671	-28
FI	2376	2435	2427	2355	2331	2295	2233	-142	-6
SE	5569	5679	5693	5761	5801	5923	5849	279	5
UK									
NO									

Source: Commission services, EPC.

Table 53 - Pension system dependency ratio: number of pensioners relative to the number of contributors in public pension schemes (in %)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060 in p.p.
BE	58	58	65	76	83	87	90	32
BG	78	74	76	84	98	114	122	44
CZ	56	55	60	65	74	87	94	38
DK	47	49	57	57	57	53	50	3
DE	62	62	64	76	85	88	91	29
EE	56	55	57	64	70	81	88	32
IE	28	28	30	35	41	50	53	25
EL	57	56	59	70	86	99	102	45
ES	38	37	39	47	61	75	77	39
FR	55	58	64	73	78	79	80	25
IT	67	65	66	76	90	94	95	28
CY	30	32	40	51	59	73	86	56
LV	48	45	47	57	66	82	91	43
LT	62	61	66	80	91	108	123	61
LU	43	43	51	68	85	97	103	60
HU	76	74	74	79	90	100	107	31
MT	43	50	58	61	63	69	80	37
NL	30	30	35	39	42	41	42	12
AT								
PL	65	56	58	65	77	95	107	42
PT								
RO	93	86	80	87	102	118	122	29
SI	59	61	70	85	103	115	118	59
SK	50	48	48	59	72	89	102	52
FI	56	57	66	74	74	75	78	22
SE	39	40	48	54	59	60	65	26
UK								
NO								

Source: Commission services, EPC.

Table 54 - Pension contributions to public pension schemes as a share of GDP (in %)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060 in p.p.
BE								
BG	5.0	7.6	7.5	7.4	7.3	7.3	7.4	2.4
CZ	8.3	8.3	8.3	8.3	8.3	8.3	8.3	0.0
DK								
DE	7.2	7.1	6.9	7.8	8.3	8.4	8.6	1.4
EE	6.1	6.1	5.9	5.7	5.6	5.6	5.6	-0.5
IE	4.6	4.6	4.5	4.5	4.5	4.5	4.5	-0.1
EL	8.5	8.8	9.1	9.4	8.3	8.3	8.5	0.0
ES	10.7	10.7	10.7	10.7	10.6	10.5	10.4	-0.3
FR	12.6	12.6	12.7	12.7	12.7	12.7	12.7	0.0
IT	10.4	10.6	10.6	10.6	10.5	10.6	10.6	0.2
CY	4.2	4.3	4.5	4.5	4.6	4.6	4.7	0.5
LV	6.8	6.2	6.0	5.8	5.8	5.7	5.8	-1.0
LT	6.6	6.6	6.5	6.4	6.4	6.3	6.4	-0.2
LU	9.6	9.6	9.8	9.9	9.8	9.8	9.9	0.3
HU	8.6	8.9	8.6	8.6	8.7	8.6	8.6	0.0
MT	5.9	5.8	6.0	6.0	6.0	5.9	5.8	-0.1
NL								
AT	9.0	9.0	9.0	9.0	9.1	9.1	9.1	0.1
PL	6.9	5.6	5.4	5.1	5.1	5.0	5.1	-1.8
PT	9.9	10.3	9.7	9.0	8.7	8.6	8.5	-1.3
RO	6.7	6.3	6.2	6.4	6.6	6.9	7.2	0.5
SI	8.7	8.2	8.5	8.6	8.6	8.6	8.5	-0.2
SK	4.6	4.7	4.6	4.5	4.4	4.3	4.2	-0.4
FI	9.3	9.6	10.5	11.3	11.4	11.4	11.5	2.2
SE	6.3	6.2	6.1	6.1	6.0	6.0	6.0	-0.3
UK								
NO								

Source: Commission services, EPC.

Table 55 - Social security pension contributions relative to public pensions (in %)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060 in p.p.
BE								
BG	60.6	83.8	89.0	86.5	77.5	68.1	65.5	4.9
CZ	107.1	117.8	121.4	116.4	98.5	81.7	75.4	-31.8
DK								
DE	68.6	69.3	65.5	67.5	68.4	68.4	67.1	-1.5
EE	108.7	95.2	99.9	102.5	104.1	106.3	113.3	4.6
IE	87.6	83.5	70.9	60.0	51.8	42.8	39.6	-47.9
EL	72.8	75.9	69.2	55.0	38.7	34.6	35.1	-37.7
ES	127.0	119.7	112.9	99.3	80.5	68.0	68.6	-58.4
FR	97.0	93.9	92.7	89.1	87.7	89.0	90.1	-6.9
IT	74.3	75.4	75.2	71.6	67.5	71.7	78.1	3.8
CY	66.7	62.7	50.7	42.1	35.8	29.7	26.5	-40.2
LV	125.8	121.8	116.7	98.9	93.9	99.1	113.9	-11.9
LT	97.5	101.9	94.1	78.4	70.5	61.3	56.2	-41.3
LU	110.1	111.6	99.1	69.7	53.4	44.5	41.4	-68.8
HU	79.3	79.0	78.5	78.4	71.1	65.1	62.1	-17.2
MT	82.2	69.7	65.1	64.7	57.1	49.4	43.2	-38.9
NL								
AT	70.3	70.8	69.2	65.5	65.0	64.9	66.8	-3.5
PL	59.5	51.6	55.9	54.5	55.3	55.3	57.7	-1.8
PT	86.8	86.7	78.1	71.5	69.6	64.2	63.6	-23.2
RO	102.0	75.4	70.6	61.1	52.2	46.2	45.3	-56.7
SI	88.8	81.0	76.8	64.9	53.4	47.1	45.8	-43.0
SK	68.1	71.4	73.4	61.3	53.5	46.1	41.5	-26.6
FI	92.8	89.4	83.2	81.0	83.9	86.1	86.1	-6.7
SE	66.0	64.5	65.2	64.3	64.3	66.7	64.1	-1.9
UK								
NO								

Source: Commission services, EPC.

Table 56 - Assets in public pension schemes as a share of GDP (in %)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060 in p.p.
BE	4.7	5.7	20.8	15.5				
CZ	0.4	3.4	17.1	32.6	45.0	42.3	24.2	23.8
DE	0.6	1.3	0.5	0.2	0.2	0.2	0.2	-0.5
EE	2.5	1.0	:	0.2	1.3	3.3	6.8	4.3
IE	10.8	12.9	20.9	29.0	31.5	25.1	9.1	-1.7
ES	4.4							
FR	1.8	2.1	3.9	2.8	1.5	0.0		
IT								
CY	36.9	38.2	32.3	9.9	-24.1	-79.4	-166.5	-203.4
LV	3.9	5.2	8.4	5.0	-1.8	-7.1	-9.0	-13.0
LU	21.8	28.0	46.0	39.3	-14.4	-116.0	-258.4	-280.2
PL	0.3	0.4	0.4	0.4	0.5	0.6	0.8	0.5
PT	4.5	6.6	12.3	12.9	9.1	:	:	:
SI	6.9	6.7	6.6	7.7	9.7	12.1	14.7	7.8
FI	67.9	68.0	75.9	73.8	68.1	65.2	62.7	-5.2
SE	29.3	30.4	30.0	31.0	31.5	35.4	40.5	11.2

Source: Commission services, EPC.

Table 57 - Assets in public, occupational and private pension schemes as a share of GDP (in %)

	2007	2010	2020	2030	2040	2050	2060	Change 2007 - 2060 in p.p.
BG	2.2	4.2	14.2	26.0	37.2	51.4	69.9	67.7
CZ	5.1	3.4	17.1	32.6	45.0	42.3	24.2	19.1
DK	138.2	122.2	157.0	194.6	226.0	240.6	250.9	112.7
DE	0.6	1.3	0.5	0.2	0.2	0.2	0.2	-0.5
EE	6.9	9.0	23.8	40.8	57.0	66.2	76.7	69.7
LV	5.7	12.5	39.7	60.9	76.1	80.8	87.0	81.3
LT	1.7	3.5	12.9	24.1	37.3	51.6	64.1	62.4
LU	21.8	28.0	46.0	39.3	-14.4	-116.0	-258.4	-280.2
HU	7.8	10.7	24.4	39.0	52.8	65.4	74.3	66.5
PL	9.7	13.5	27.5	40.6	55.9	69.1	75.2	65.5
PT	17.8	20.8	28.9	30.5	26.9	19.0	20.7	2.9
RO		1.1	11.5	28.2	47.0	62.7	63.3	
SI	10.4	12.0	18.8	25.7	32.3	38.0	41.9	31.5
SK	2.5	5.5	16.5	28.4	41.7	53.4	61.2	58.7
FI	67.9	68.0	75.9	73.8	68.1	65.2	62.7	-5.2
SE	52.8	59.8	74.1	82.8	83.4	84.7	85.1	32.3
UK	6.6	6.7	6.9	7.6	8.0	8.1	9.3	2.7

Source: Commission services, EPC.

Table 58 - Decomposition of the public pension to GDP ratio by country in different sub periods

BE	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.8	2.0	0.8	0.1	0.0	4.8
Dependency contribution	1.8	2.7	1.7	0.6	0.7	7.4
Coverage contribution	0.1	-0.5	-0.4	0.1	-0.2	-0.9
Employment contribution	-0.5	0.1	-0.1	0.0	0.0	-0.5
Benefit ratio contribution	0.5	-0.1	-0.5	-0.5	-0.5	-1.0

BG	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.1	0.2	0.9	1.3	0.5	3.0
Dependency contribution	2.0	1.3	1.7	2.5	1.6	9.1
Coverage contribution	-1.1	-0.4	-0.1	-0.6	-0.8	-3.0
Employment contribution	-0.6	0.2	0.1	0.0	-0.2	-0.5
Benefit ratio contribution	0.1	-0.8	-0.7	-0.4	0.0	-1.8

CZ	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	-0.9	0.3	1.3	1.7	0.9	3.3
Dependency contribution	3.6	1.0	1.4	2.3	1.2	9.5
Coverage contribution	-1.8	-0.5	-0.2	-0.6	-0.3	-3.5
Employment contribution	-0.5	0.1	0.0	-0.1	0.0	-0.5
Benefit ratio contribution	-1.4	-0.3	0.2	0.3	0.0	-1.2

DK	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.6	-0.1	-0.2	-0.8	-0.4	0.1
Dependency contribution	3.3	1.9	1.3	-0.3	0.3	6.5
Coverage contribution	-1.1	-1.7	-1.0	-0.4	-0.7	-4.9
Employment contribution	0.0	0.0	-0.1	0.0	0.0	-0.1
Benefit ratio contribution	-0.4	0.0	-0.2	-0.1	0.1	-0.5

DE	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.0	1.1	0.5	0.2	0.5	2.3
Dependency contribution	1.8	3.1	2.1	0.4	0.6	7.9
Coverage contribution	-0.5	-0.8	-0.5	-0.1	-0.1	-1.9
Employment contribution	-0.7	0.0	-0.1	0.1	0.0	-0.8
Benefit ratio contribution	-0.5	-0.9	-0.8	-0.1	0.0	-2.2

EE	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.3	-0.3	-0.2	-0.1	-0.4	-0.7
Dependency contribution	0.9	1.0	0.7	1.1	0.9	4.6
Coverage contribution	-0.5	-0.4	-0.2	-0.2	-0.4	-1.6
Employment contribution	-0.3	0.1	0.0	0.0	-0.1	-0.2
Benefit ratio contribution	0.1	-0.9	-0.7	-0.9	-0.8	-3.1

IE	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.6	0.8	1.0	1.6	0.6	4.6
Dependency contribution	1.0	1.0	1.3	2.0	0.6	5.9
Coverage contribution	-0.4	-0.3	-0.3	-0.4	-0.1	-1.5
Employment contribution	-0.2	0.0	0.0	0.0	0.0	-0.2
Benefit ratio contribution	0.3	0.1	0.1	0.1	0.0	0.7

EL	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.5	3.9	4.4	2.6	0.1	12.4
Dependency contribution	2.1	2.4	4.4	3.8	0.1	12.7
Coverage contribution	-0.9	-0.1	-0.1	-0.1	0.8	-0.4
Employment contribution	-0.7	0.2	0.0	-0.2	0.1	-0.6
Benefit ratio contribution	1.0	1.3	0.2	-0.8	-0.9	0.8

ES	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.1	1.3	2.4	2.2	-0.3	6.7
Dependency contribution	1.1	2.3	3.7	3.4	0.1	10.7
Coverage contribution	-0.3	-0.1	-0.2	-0.3	0.1	-0.9
Employment contribution	-0.7	-0.1	-0.1	-0.1	0.1	-0.9
Benefit ratio contribution	1.0	-0.7	-0.7	-0.7	-0.7	-1.7

FR	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.6	0.6	0.2	-0.2	-0.2	1.0
Dependency contribution	3.7	2.5	1.8	0.2	0.2	8.4
Coverage contribution	-1.0	-0.6	-0.6	0.1	-0.1	-2.2
Employment contribution	-0.3	0.0	-0.2	0.0	0.0	-0.5
Benefit ratio contribution	-1.4	-1.1	-0.7	-0.5	-0.2	-4.0

IT	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.1	0.7	0.8	-0.8	-1.1	-0.4
Dependency contribution	2.4	2.7	3.9	1.5	0.0	10.4
Coverage contribution	-1.4	-0.2	-1.0	-0.7	0.1	-3.2
Employment contribution	-0.9	-0.2	-0.1	0.0	0.1	-1.1
Benefit ratio contribution	0.3	-1.3	-1.6	-1.5	-1.3	-5.5

CY	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	2.6	1.9	2.1	2.7	2.2	11.4
Dependency contribution	1.7	2.0	1.3	2.9	2.8	10.8
Coverage contribution	0.9	0.3	0.3	0.2	0.0	1.6
Employment contribution	-0.5	0.0	0.1	0.0	0.0	-0.5
Benefit ratio contribution	0.5	-0.4	0.3	-0.2	-0.5	-0.3

LV	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	-0.3	0.7	0.3	-0.3	-0.7	-0.4
Dependency contribution	0.7	1.2	1.0	1.5	1.4	5.7
Coverage contribution	-0.7	-0.1	-0.2	-0.1	-0.5	-1.6
Employment contribution	-0.2	0.1	0.0	0.1	-0.2	-0.2
Benefit ratio contribution	-0.1	-0.4	-0.6	-1.6	-1.3	-3.9

LT	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.1	1.3	0.9	1.3	1.0	4.6
Dependency contribution	0.9	2.3	1.9	1.7	2.8	9.6
Coverage contribution	0.0	-0.7	-0.6	-0.1	-1.0	-2.4
Employment contribution	-0.3	0.2	0.1	0.1	-0.1	0.0
Benefit ratio contribution	-0.3	-0.3	-0.4	-0.4	-0.5	-1.8

LU	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.2	4.3	4.3	3.7	1.8	15.2
Dependency contribution	1.4	2.8	2.6	0.8	0.8	8.4
Coverage contribution	1.3	0.7	1.0	1.9	0.4	5.2
Employment contribution	0.0	0.0	-0.1	0.1	0.1	0.0
Benefit ratio contribution	-1.4	0.6	0.7	0.8	0.6	1.2

HU	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.2	0.0	1.2	1.0	0.6	3.0
Dependency contribution	3.1	1.3	1.9	3.1	1.7	11.3
Coverage contribution	-2.1	-0.7	-0.5	-1.4	-0.7	-5.4
Employment contribution	-0.9	0.1	0.3	-0.1	0.0	-0.7
Benefit ratio contribution	0.5	-0.7	-0.3	-0.3	-0.3	-1.1

MT	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	2.1	0.1	1.2	1.4	1.4	6.2
Dependency contribution	4.3	2.2	0.6	2.0	2.2	11.3
Coverage contribution	-0.8	-1.0	-0.2	-0.8	-0.4	-3.1
Employment contribution	-0.5	-0.3	0.1	0.0	0.0	-0.7
Benefit ratio contribution	-0.6	-0.6	0.6	0.3	-0.3	-0.5

NL	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.2	1.5	1.1	-0.1	0.3	4.0
Dependency contribution	2.7	2.3	1.6	-0.3	0.4	6.6
Coverage contribution	-0.7	-0.5	-0.3	0.0	0.0	-1.5
Employment contribution	-0.1	0.0	-0.2	0.1	0.0	-0.2
Benefit ratio contribution	-0.5	-0.1	0.0	0.1	0.0	-0.6

AT	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.3	0.8	0.2	0.0	-0.4	0.9
Dependency contribution	2.0	3.8	2.8	0.7	0.7	9.9
Coverage contribution	-0.5	-1.8	-1.2	0.4	0.5	-2.6
Employment contribution	-0.2	-0.1	-0.3	0.1	0.0	-0.5
Benefit ratio contribution	-0.9	-0.6	-0.9	-1.1	-1.4	-5.0

PL	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	-1.8	-0.3	-0.2	-0.1	-0.3	-2.8
Dependency contribution	4.1	2.9	1.3	3.0	2.0	13.4
Coverage contribution	-3.5	-1.4	-0.1	-0.7	-0.6	-6.3
Employment contribution	-0.9	-0.2	0.3	0.0	-0.1	-1.0
Benefit ratio contribution	-0.8	-1.3	-1.6	-1.9	-1.5	-7.1

PT	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.0	0.2	-0.1	0.8	0.1	2.1
Dependency contribution	2.2	2.3	2.6	2.3	0.4	9.8
Coverage contribution	-0.4	-0.4	-0.6	-0.5	0.2	-1.7
Employment contribution	-0.6	0.0	0.0	0.0	0.0	-0.6
Benefit ratio contribution	0.0	-1.4	-1.7	-0.7	-0.7	-4.5

RO	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	2.3	1.6	2.1	2.3	1.0	9.2
Dependency contribution	1.6	1.6	3.5	4.0	3.0	13.6
Coverage contribution	-1.5	-0.3	-0.8	-0.9	-1.4	-4.9
Employment contribution	-0.2	0.4	0.3	0.1	-0.2	0.3
Benefit ratio contribution	2.8	0.1	-0.3	-0.5	-0.3	1.7

SI	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	1.2	2.2	2.9	2.1	0.4	8.8
Dependency contribution	3.6	3.3	2.8	3.2	0.9	13.7
Coverage contribution	-1.1	-0.8	-0.2	-0.8	-0.5	-3.5
Employment contribution	-0.3	0.3	0.2	-0.2	-0.1	-0.1
Benefit ratio contribution	-0.6	-0.3	0.1	0.1	0.1	-0.7

SK	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	-0.5	1.0	1.0	1.1	0.8	3.4
Dependency contribution	2.7	2.2	1.7	3.0	2.1	11.7
Coverage contribution	-1.6	-0.7	-0.2	-0.8	-0.6	-3.9
Employment contribution	-0.7	0.0	0.2	0.0	-0.1	-0.6
Benefit ratio contribution	-0.3	-0.4	-0.6	-0.7	-0.5	-2.4

FI	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	2.6	1.3	-0.3	-0.4	0.1	3.3
Dependency contribution	4.7	2.4	0.4	0.5	0.8	8.7
Coverage contribution	-1.6	-0.8	-0.3	-0.2	-0.2	-3.1
Employment contribution	-0.5	0.0	0.0	-0.1	0.0	-0.6
Benefit ratio contribution	0.6	-0.1	-0.4	-0.5	-0.4	-0.9

SE	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	-0.1	0.1	-0.1	-0.3	0.3	-0.1
Dependency contribution	2.5	1.0	0.8	0.3	1.0	5.6
Coverage contribution	-0.3	0.2	-0.1	0.1	-0.2	-0.4
Employment contribution	-0.4	0.0	0.0	0.0	0.0	-0.4
Benefit ratio contribution	-1.5	-1.1	-0.8	-0.6	-0.4	-4.3

UK	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	0.3	0.7	0.4	0.0	1.2	2.7
Dependency contribution	1.2	1.1	0.8	0.2	0.9	4.2
Coverage contribution	-0.6	-0.2	-0.2	-0.5	0.1	-1.4
Employment contribution	-0.1	0.0	-0.1	0.0	0.0	-0.3
Benefit ratio contribution	0.0	-0.1	0.0	0.4	0.3	0.5

NO	2007-20	2020-30	2030-40	2040-50	2050-60	2007-60
% Change in pension to GDP	2.6	1.2	0.7	-0.1	0.3	4.7
Dependency contribution	2.5	2.4	2.1	0.4	0.8	8.2
Coverage contribution	0.0	-0.6	-0.7	0.0	0.1	-1.2
Employment contribution	0.2	0.1	0.0	0.0	0.0	0.3
Benefit ratio contribution	-0.1	-0.5	-0.7	-0.5	-0.5	-2.4

Source: Commission services, EPC.

Note: The dependency contribution measures an impact of the changes in the dependency ratio over the projection period as the ratio of persons aged 65 and over to the population aged 15 to 64. The employment contribution measures changes in the share of the population of working age (15 to 64) relative to the number of the employed, i.e. an inverse employment rate. The coverage contribution of pensions measures changes in the share of pensioners relative to the population aged 65 and over. The benefit contribution captures changes in the average pension relative to average income. See Box DECOMPOSITION for details.

Table 59 - Comparison of the public pension expenditure to GDP between 2006 and 2009 projections in p.p.

	Public pensions		Old-age & Early		Other Pension	
	Change 2007 - 2050	Change 2007 - 2050	Change 2007 - 2050	Change 2007 - 2050	Change 2007 - 2050	Change 2007 - 2050
	2009 projection	2006 projection	2009 projection	2006 projection	2009 projection	2006 projection
BE	4.8	5.1	4.8	5.3	-0.1	-0.2
BG	2.5	:	2.6	:	-0.1	:
CZ	2.4	5.7	2.6	5.7	-0.2	0.0
DK	0.5	3.0	0.2	3.0	0.3	0.1
DE	1.9	2.2	1.9	2.2	:	:
EE	-0.3	-3.3	-0.2	-2.8	-0.1	-0.5
IE	4.0	6.2	4.0	6.1	0.0	0.1
EL	12.3	:	9.2	:	3.1	:
ES	7.0	6.9	6.8	6.5	0.3	0.4
FR	1.2	2.0	1.2	2.0	:	:
IT	0.7	0.4	0.9	0.5	-0.2	-0.1
CY	9.2	12.2	7.5	12.2	1.7	:
LV	0.4	-0.2	0.7	-0.2	-0.3	0.0
LT	3.6	2.0	3.6	1.8	-0.1	0.2
LU	13.4	7.5	12.5	7.8	0.9	-0.4
HU	2.4	6.0	3.1	6.8	-0.7	-0.8
MT	4.8	-0.9	5.4	2.1	-0.7	-3.0
NL	3.7	3.8	4.2	4.4	-0.5	-0.6
AT	1.2	-1.0	1.6	0.1	-0.4	-1.1
PL	-2.5	-5.0	-1.7	-4.1	-0.7	-0.9
PT	2.0	9.1	1.7	7.9	0.3	1.2
RO	8.3	:	8.1	:	0.2	:
SI	8.3	7.3	7.7	7.3	0.6	:
SK	2.6	2.0	1.3	1.2	1.3	0.9
FI	3.2	3.2	4.2	3.9	-1.0	-0.7
SE	-0.5	1.2	0.6	2.5	-1.1	-1.3
UK	1.5	2.0	2.0	2.0	:	:
NO	4.4	:	4.5	:	-0.1	:
EU27	2.2	2.3	2.3	2.4	0.0	-0.1
EA	2.8	2.7	2.7	2.8	0.1	0.0
EA12	2.8	2.7	2.7	2.7	0.1	0.0
EU15	2.2	2.4	2.3	2.5	0.0	-0.1
EU10	0.7	0.6	0.9	1.0	-0.3	-0.5
EU25	2.1	2.3	2.2	2.4	0.0	-0.1

Source: Commission services, EPC.

8.5. Definitions used in the projections

- **Pension expenditures** should cover pensions and equivalent cash benefits granted for a long period (over one year) for old-age, early retirement, disability, survivors (widows and orphans) and other specific purposes which should be considered as equivalents or substitutes for above-mentioned types of pensions, i.e. pensions due to reduced capacity to work or due to labour market reasons. Pensions should include earnings-related pensions, flat-rate and means-tested pensions that aim at providing a social minimum pension, supplements which are a part of the pension and are granted for an indefinite period on the basis of certain criteria but which are not directly linked to the remuneration of costs such as supplements aimed at

supporting the purchase of home or health care services. Pensions and benefits can be paid out from specific schemes or directly from government budgets. In particular, social assistance should be included if it is equivalent to minimum pension. Instead, housing subsidies should be excluded from pensions and considered as other means-tested social transfers.

- Pensions should be recorded as **gross pension expenditure**, i.e. without a deduction of tax and compulsory social security contributions by beneficiaries paid on benefits. In those countries where pensions are not taxable income, the gross pensions are equal to net pensions.

- Pensions should be recorded as **net pensions**, once deducting tax on pension and compulsory social security contributions paid by beneficiaries on pensions from the gross pensions. It was suggested that it should be possible to provide consistent and comparable projections of tax on pension for both public and private pensions for all Member States. Especially, attention ought to be paid to progressivity of the tax system on this source of public revenue.

- **Social security pensions** and **other public pensions** are the schemes that are statutory and that the general government sector administers. Usually, there is a specific social security contribution to the scheme, which is defined as part of total taxes in the national accounting system but the scheme can also be financed, either partially or fully, by general taxes and thus, ultimately, the government bears the financial cost and risk attached to the scheme. The pensions provided by the social security schemes can be either earnings-related, flat-rate or means-tested. Cash benefits equivalent to pensions, notably social assistance to older persons, should be included in this category. As to the statutory funded part of the old-age pension schemes that are attached to notional defined contribution schemes in some countries, this should be excluded from social security schemes and included in the private sector schemes in accordance with the Eurostat decision[100].

- **Occupational pensions** are pensions provided by schemes that, rather than being statutory by law, link the access of an individual to such a scheme to an employment relationship between her/him and the scheme provider and that are based on contractual agreements between employers and employees either at the company level or their organisations at the union level. The schemes are run by private sector pension funds, insurance companies or the sponsoring companies themselves (in balance sheets).

- For the most part, **private individual pension** schemes are non-mandatory but they can be also mandatory.[101] Consequently, the insured persons have the ownership of pension assets. This means that the owner enjoys the rewards and bears the risks regarding the value of the assets. The insurance contract specifies a schedule of contribution in exchange of which benefits will be paid when the members reach a specific retirement age. The scheme provider administers the scheme by managing the pension assets through a separate account on behalf of its members. The access to such a scheme does not require an employment relationship, even though in some cases the contribution may be set on the basis of the wage.

- **Mandatory private pension** schemes are close to social security schemes. The transactions are between the individual and the insurance provider and they are not recorded as government revenues or government expenditure and, therefore, do not have an impact on

[100] Classification of funded pension schemes in case of government responsibility and guarantee, Eurostat 30/2004, 2 March 2004.
[101] See definitions of mandatory and non-mandatory pension funds below.

government surplus or deficit. The pension expenditure projections should cover the individual schemes that switch a part either voluntarily or statutorily (especially to new entrants to the labour market) from the current social security scheme to private funds. Such schemes have an increasing relevance in the future in a number of countries.

- **Non-mandatory private pension** are based on individual insurance contracts between the individual and the private pension scheme provider, usually an insurance company or a pension fund. The category of individual schemes includes pension schemes for which membership is not required by law and is independent of any employment link (even if members are mostly employed people). However, employers or the state may in some cases contribute to the plan. Such schemes may also be adhered to through membership in an association.

- **Old-age and early pensions** should be considered as a single category of pension due to the fact that in many countries a proper distinction between these two components cannot be made, either because the early retirement is built-in in the old-age pension system, or because the standard retirement age varies between sexes and will increase or become more flexible with time. Early pensions should include in addition to genuine (actuarial) early retirement schemes also other early pensions that are granted to a specified (age) group at an age below the statutory retirement age, primarily on the basis of reduced work capacity or labour market reasons. In addition, disability and widow's pensions paid out to persons over the standard retirement age shall also be included in this category in order to reflect properly the expenditure related to old-age. Pensions of this category shall include both earnings-related pensions and flat-rate or means-tested minimum pensions.

- **Other pensions** should include disability, survivors' and partial pensions paid to persons below the standard retirement age and without any lower age limit. These should include both earnings-related pensions and flat-rate or means-tested minimum pensions of these types.

- **The number of pensioners** reflects the number of the recipients of the specific pension. Each type of pension should be considered separately.

- **The number of pensions** reflects the number of the cases in which a pension was paid off to an individual. Each type of pension should be considered separately.

- **Contributions to pension schemes** paid both by employers and employees as well as self-employed persons provide information on whether or not there is a potential future financial gap in the pension system. If the pension contribution is part of a broader social security contribution rate, an estimate should be provided for the share of the pension contribution, e.g. on the basis of the most recent expenditure structure. In case that the pension is financed by general tax revenues, no estimate should be provided here.

- As in the case of the number of pensioners, **the number of contributors** to each type of pensions should be considered separately, allowing for the fact that the same person may be a contributor to several schemes. Thus, the number of contributors should approach the number of employed persons or active-age population.

- The information on **the total value of assets in pension schemes**, including pre-financing to specific reserves within the government sector, is requested separately for social security schemes, occupational pension schemes and private pension schemes. This information is an important complement to the contribution information when the financial balance of the

pension schemes is assessed. As regards the government sector, a distinction needs to be made between national government bonds and other assets, since the former are netted out in the compilation of gross debt (Maastricht debt), while the latter are not.

9. ANNEX 2: Quantifying the impact of technology on health care expenditure: econometric analysis of past trends and projections

9.1. Introduction

The EC-AWG health care expenditure projections model is a powerful tool for modelling demand side factors such as demographic structure, health status or national income. However, it is of little help in modelling supply side factors, among which technological progress which is found by many researchers to be the main driving force behind the increase in health care expenditure.

Indeed, using standard regression tools, several researchers such as Culyer (1990) and Hitiris and Posnett (1992) found out that there seems to be a strong relationship between health care spending and aggregate income. In addition, it has been recognised that technological growth affects significantly aggregate health care expenditures. Newhouse (1992) seems to be the first one who put this argument even further, claiming that technological progress is the main factor determining an aggregate development of health care spending in industrial countries since the World War II. Recently, Oliveira Martins and de la Maisonneuve (2006) pointed out that since over the last decades health care spending has grown faster than the aggregate income, the effects of technology and relative prices seem to significantly affect the health care expenditure development. The general observation that can be made on the basis of the available literature is that development of health care expenditure is determined by both demographic and non-demographic factors. The demographic factors take into account the size and the structure of a population, whereas the non-demographic factors usually take into consideration mainly aggregate income (GDP), technological factors growth and relative-price movements in the supply of health services.

Aware of the importance of the issue, but also of the limitations posed by the lack of data and commonly agreed assumptions, the European commission (DG ECFIN) and the Ageing Working Group have explored the possibilities of expanding the health care model with a module attempting to assess the future impact of medical technology. A thorough analysis of the literature led to conclude that there are no scientifically reliable forecasts of future developments in the medical technology. Consequently, it was decided that a feasible way to have some tentative projections on the future evolution of spending driven by technological factors would be an extrapolation of past trends, with all the caution required while interpreting and using the results in the future policy debate.

The present annex presents two alternative methods used to estimate the impact of technology on health care spending. The first one, proposed by the OECD (2006b), consists of decomposing the past increase in health care expenditure into three components: age factor, income factor and the remaining residual assumed to proxy technological developments. The second method is based on an econometric analysis of past developments in total and per capita health expenditure performed by the European Commission (DG ECFIN). The parameters resulting from both methods are then inserted in the standard health care expenditure model to project the future developments of health care spending.

The remainder of the annex is organised as follows. Section 2 briefly presents the OECD method to estimate the impact of technology on health care expenditure. It then compares the results of the original OECD projections with those obtained by incorporating the 'technology effect' estimates to the projection methodology developed by the AWG. Section 3 presents a

detailed description of the alternative econometric model performed by the European Commission (DG ECFIN). It summarizes the outcomes of the relevant literature and presents tentative findings on available data and results of econometric specification. Section 4 describes the way to incorporate those parameters in the projection model and presents the resulting estimates of the budgetary impact of medical technology.

9.2. OECD method to project the impact of technology

9.2.1. Methodology

Looking at the recent past, expenditures on health care have increased in terms of their share in GDP. Following the methodology by the OECD (2006b), the dynamics of health care expenditure could be analysed using a decomposition of past trends into the effect of demographic and non-demographic factors. Regarding non-demographic factors, per capita income and technology growth are usually covered. As OECD analysis suggests, the impact of demographic factors seems to be quite weak, while the impact of non-demographic factors has been prevailing over the last decades. Consequently, the assumptions concerning future development of non-demographic factors are crucial for a comprehensive projection of health and long-term care expenditure.

The OECD method suggests that after controlling for demographic and income effects, the health care expenditure residual can be thought of as reflecting technology effects. In order to quantify the effect of technology, the following decomposition of growth in per capita health expenditures is applied:

$$\Delta \log\left(\frac{HE}{N}\right) = \Delta \log(age\ factor) + \varepsilon \cdot \Delta \log\left(\frac{Y}{N}\right) + \Delta \log(NDF) \qquad [1]$$

or expressed as share of expenditure to GDP:

$$\Delta \log\left(\frac{HE}{Y}\right) = \Delta \log(age\ factor) + (\varepsilon - 1) \cdot \Delta \log\left(\frac{Y}{N}\right) + \Delta \log(NDF) \qquad [2]$$

where *HE*, *Y*, *N* and *NDF* correspond to real health care expenditures, real income, population and other non-demographic factors, respectively.

In the first step, using historical data, the term Δlog(NDF) is quantified as a residual. To do that, OECD assumes a unitary income elasticity (parameter ε in equations [1] and [2]) and uses country specific health spending age profiles in order to assess the impact of demographic factors (the Δlog(*age factor*) term. Next, the residual is quantified in each year for each country. Finally, looking at the evolution of this residual, its average country-specific growth rate is calculated, see Table 60.

This approach is applied to each country in the sample. Still, despite the large dispersion of the residual across countries, a sample average of country-specific residual is calculated. In the end, this sample average residual is used to project health expenditures in individual countries.

Applying this method, the OECD estimates that between 1981 and 2002 the growth in per capita health care spending amounted to 3.6%, of which 0.3 percentage point were accounted for by pure demographic effects and 2.3 percentage points by income effects, see Table 60.

Thus, the residual growth was estimated at around 1 per cent per year. In other words, it is assumed that due to technology effects, the per capita health care spending was growing an extra 1% p.a.

In the second step, health care spending is projected, based on the above estimated growth rate of technology. In particular, it is further assumed that its growth rate converges linearly to zero by 2050 in order to assure that health care expenditure and income evolve in parallel over the very long-run in the absence of additional ageing effects.

Furthermore, the OECD method allows for some convergence of health care spending to GDP across countries, through the adjustment of the total growth rate in each year (defined by equation [2]) by a difference between a ratio of health care spending to GDP in a particular country and OECD cross-country average to GDP in 2005.

9.2.2. Results

Table 60 below presents the results of the OECD analysis of past trends in public health spending. The total growth in health care expenditure is decomposed into three separate effects: demographic effect, income effect and the residual, assumed to reflect the impact of technology and other non-demographic factors. Given the high variability of the results across countries, in the future projections of health care expenditure the OECD decided not to use individual estimates, but to replace them with a simple average.

Table 60 - Decomposition of growth in public health spending

	Data availability*	Health spending	Age effect	Income effect**	Residual
Australia	(1981-2001)	3,6	0,4	1,8	1,4
Austria		2,2	0,1	2,1	0,0
Belgium	(1995-2002)	2,9	0,4	1,7	0,6
Canada		2,6	0,4	1,7	0,6
Czech Republic	(1993-2002)	2,7	0,4	2,8	-0,4
Denmark		1,3	0,1	1,7	-0,5
Finland		2,6	0,3	2,1	0,2
France		2,8	0,2	1,6	1,0
Germany		2,2	0,2	1,2	1,0
Greece	(1987-2002)	3,4	0,4	1,3	0,8
Hungary	(1991-2002)	1,5	0,3	2,8	-1,5
Iceland		3,5	0,1	1,5	1,9
Ireland		3,9	0,1	4,9	-1,0
Italy	(1988-2002)	2,1	0,7	1,7	-0,1
Japan	(1981-2001)	3,8	0,4	2,2	1,1
Korea	(1982-2002)	10,1	1,4	6,1	2,4
Luxembourg	(1981-2002)	3,8	0,0	3,9	-0,1
Mexico	(1990-2002)	4,5	0,7	0,5	2,4
Netherlands	(1981-2002)	2,6	0,3	1,9	0,3
New Zealand		2,7	0,2	1,5	1,0
Norway		4,0	0,1	2,5	1,5
Poland	(1990-2002)	3,1	0,5	3,2	-0,6
Portugal		5,9	0,4	2,6	2,8
Slovak Republic	(1997-2002)	2,1	0,5	4,2	-1,5
Spain		3,4	0,3	2,3	0,8
Sweden		1,5	0,1	1,7	-0,4
Switzerland	(1985-2002)	3,8	0,2	0,8	2,9
Turkey	(1984-2002)	11,0	0,3	2,3	8,3
United Kingdom		3,4	0,2	2,3	1,0
United States		4,7	0,1	2,0	2,6
Average		*3,6*	*0,3*	*2,3*	*1,0*

* Countries for which no period is mentioned: 1981-2002

**Assuming an income elasticity of health expenditure equal to 1

Source: OECD (2006), Projecting OECD Health and Long-term Care Expenditures: What are the Main Drivers?, OECD Economics Department Working Paper 477

Table 61 - Results of the OECD projections of health spending

	Health care expenditure as % of GDP	*Pure ageing effect*	*Adjustment for death-related costs and healthy ageing*	*Non-ageing residual effect*	*Total**	Health care expenditure as % of GDP
	2005 (estimates)	*Increase in % of GDP, 2005-2050*				2050
Australia	5,6	*2*	*-1,3*	*1*	*2*	7,5
Austria	4	*1,6*	*-1,1*	*1*	*1,7*	5,8
Belgium	5,5	*1,1*	*-1,1*	*1*	*1*	6,5
Canada	6,2	*2*	*-1,1*	*1*	*2,2*	8,4
Czech Republic	7	*1,7*	*-1,2*	*1*	*1,8*	8,8
Denmark	5,2	*0,6*	*-0,5*	*1*	*1,1*	6,4
Finland	3,4	*1,4*	*-1,2*	*1*	*1,3*	4,7
France	7,1	*1,3*	*-1,2*	*1*	*1,2*	8,3
Germany	7,9	*1,1*	*-0,7*	*1*	*1,6*	9,4
Greece	4,8	*1,1*	*-0,4*	*1*	*1,9*	6,7
Hungary	5,9	*1,9*	*-1,6*	*1*	*1,5*	7,3
Iceland	6,7	*0,5*	*-0,2*	*1*	*1,4*	8,1
Ireland	6,3	*1,3*	*-0,7*	*1*	*1,9*	8,2
Italy	6	*1,4*	*-1,1*	*1*	*1,5*	7,4
Japan	6	*1*	*-0,4*	*1*	*1,8*	7,8
Korea	2,9	*5,1*	*-2,2*	*1*	*4,9*	7,8
Luxembourg	5,1	*1,1*	*-0,8*	*1*	*1,4*	6,4
Mexico	2,9	*4,1*	*-2*	*1*	*3,9*	6,8
Netherlands	5,1	*0,7*	*-0,4*	*1*	*1,5*	6,6
New Zealand	6	*1,2*	*-0,7*	*1*	*1,6*	7,6
Norway	7,4	*0,4*	*-0,4*	*1*	*1*	8,4
Poland	4,6	*3,7*	*-2,4*	*1*	*2,7*	7,2
Portugal	6,7	*1,6*	*-0,9*	*1*	*1,8*	8,6
Slovak Republic	5,1	*3,2*	*-1,9*	*1*	*2,8*	7,9
Spain	5,4	*1,2*	*-0,5*	*1*	*2*	7,4
Sweden	5,6	*0,5*	*-0,5*	*1*	*1*	6,6
Switzerland	6,2	*0,5*	*-0,4*	*1*	*1,2*	7,4
Turkey	5,5	*3,6*	*-2,4*	*1*	*2,6*	8
United Kingdom	6,3	*1,3*	*-1,3*	*1*	*1*	7,3
United States	6,4	*1,3*	*-1,2*	*1*	*1,2*	7,5
Average	*5,6*	*1,6*	*-1,1*	*1*	*1,8*	*7,4*

*Total level increase is not precisely equal to the sum of the three effects because the growth rate of health expenditure was derived from a log-additive equation

Source: OECD (2006), Projecting OECD Health and Long-term Care Expenditures: What are the Main Drivers?, OECD Economics Department Working Paper 477

Table 61 above presents the original results of the OECD projections covering the period from 2000 to 2050. It is technically possible to apply the same assumptions on the 'technology effect' as in the OECD projections to the methodology developed by the European Commission and AWG. In practical terms, such procedure would boil down to add an extra element to the already calculated yearly rate of change resulting from demographic changes[102]. Following the OECD proposal, this extra rate of growth would diminish over time from 1% in the base year to zero by the end of the projection period.

[102] If the scenario is supposed to calculate the 'pure' budgetary effect of technological change, the extra growth rate should be added to the pure demographic scenario. In other cases, it is obviously technically possible to

Applying this additional element to the pure demographic scenario would give the following results for health care expenditures (see Table 62 below).

Table 62 - Results of the OECD assumptions scenario (OECD residual added to EC/AWG methodology) – health care spending as % of GDP

	2007	2010	2020	2030	2040	2050	2060	Change 2007-2060	difference from pure demographic scenario
BE	7,6	7,9	9,0	10,1	11,0	11,6	11,8	4,2	2,7
BG	4,7	4,9	5,4	6,0	6,6	6,9	7,0	2,3	1,6
CZ	6,2	6,5	7,6	8,8	9,8	10,5	11,0	4,8	2,5
DK	5,9	6,2	7,2	8,1	8,7	9,1	9,2	3,3	2,1
DE	7,4	7,8	9,1	10,2	11,4	12,1	12,2	4,8	2,8
EE	4,9	5,2	5,8	6,4	7,1	7,6	8,0	3,0	1,8
IE	5,8	6,1	6,8	7,8	8,8	9,6	10,1	4,3	2,3
EL	5,0	5,2	6,0	6,7	7,5	8,1	8,3	3,4	1,9
ES	5,5	5,8	6,5	7,5	8,6	9,3	9,5	3,9	2,2
FR	8,1	8,5	9,6	10,7	11,6	12,2	12,4	4,2	2,8
IT	5,9	6,1	7,0	7,8	8,7	9,1	9,2	3,3	2,1
CY	2,7	2,8	3,3	3,7	4,1	4,4	4,6	1,9	1,1
LV	3,5	3,6	4,0	4,4	4,9	5,2	5,3	1,9	1,2
LT	4,5	4,7	5,3	5,9	6,6	7,1	7,3	2,9	1,7
LU	5,8	6,0	6,9	7,8	8,5	9,0	9,2	3,4	2,1
HU	5,8	5,9	6,8	7,8	8,7	9,3	9,8	4,0	2,2
MT	4,7	5,1	6,3	7,8	9,2	10,1	11,0	6,3	2,5
NL	4,8	5,1	5,9	6,7	7,3	7,6	7,7	2,9	1,8
AT	6,5	6,8	7,9	8,9	9,9	10,5	10,7	4,2	2,4
PL	4,0	4,2	4,9	5,6	6,2	6,7	6,9	2,9	1,6
PT	7,2	7,5	8,6	9,7	10,8	11,6	12,2	4,9	2,8
RO	3,5	3,6	4,2	4,8	5,4	6,0	6,3	2,8	1,4
SI	6,6	6,9	8,0	9,1	10,2	10,8	11,1	4,5	2,5
SK	5,0	5,2	6,2	7,3	8,3	9,0	9,4	4,4	2,1
FI	5,5	5,8	6,7	7,7	8,4	8,7	8,9	3,4	2,0
SE	7,2	7,5	8,4	9,2	9,9	10,3	10,5	3,3	2,4
UK	7,5	7,8	8,9	10,1	11,2	12,0	12,6	5,1	2,9
NO	5,6	6,0	6,6	7,4	8,0	8,4	8,8	3,1	1,5
EU27	6,7	7,0	8,0	9,0	10,0	10,6	10,9	4,2	2,5
EU15	6,9	7,2	8,2	9,2	10,2	10,9	11,1	4,3	2,5
EU12	4,7	4,9	5,6	6,4	7,1	7,7	8,0	3,4	1,8
EA	6,7	7,0	8,0	9,0	10,0	10,6	10,8	4,0	2,5

Source: Commission services, EPC.

The technological impact, as measured by the residual of the econometric exercise, would affect significantly health care spending over the projection period. Public expenditure is projected to increase on average by 2.5% of GDP (or 30%) more than in the pure demographic scenario, while at the individual countries' level it differs considerably, ranging from 1.1% of GDP in Cyprus to 2.9% of GDP in the UK.

combine this effect with the others, e.g. effect of constant health (in such case total rate of change would be composed of three elements: demographic change, health evolution and technology residual).

9.3. Assessing the impact of medical technology on health care spending – econometric analysis

9.3.1. Econometric model: detailed specification

In order to estimate the expected impact of the technological progress on health care expenditures, a series of standard econometric tools have been applied to the agreed projections framework. Following the literature, widely accepted specification of health care equation was used in order to estimate an annual trend growth rate of per capita health care expenditure for individual countries and pooled data. Health care expenditure developments are estimated using both demographic and non-demographic explanatory factors. This is done for each European country covered by the OECD health care statistics[103]:

$$HCE_t = \alpha_1 + \alpha_2 GDP_t + \alpha_3 OVER65_t + \alpha_4 trend_t + \varepsilon_t . \quad [3]$$

Then the data set is pooled to estimate the following relationship:

$$HCE_{i,t} = \alpha_1 + \alpha_2 GDP_{i,t} + \alpha_3 OVER65_{i,t} + \alpha_4 trend_{i,t} + \varepsilon_{i,t} . \quad [4]$$

where HCE is the logarithm of the real per capita health care expenditure in national currency unit[104]. GDP is the logarithm of the real per capita GDP in national currency unit. Over_65 stands for the ratio of people over 65 to the total population, *trend* is the deterministic trend[105].

Variables like GDP, HCE_TOT and HCE_PUB are easily downloadable via the OECD Health database, but the development of variables characterising technological progress and relative-price movements are usually not available. In particular, reliable data on relative price development for a sufficiently long time period is almost impossible to find. Thus, the impact of technological trend and relative-price development on health expenditure is estimated by using only an aggregate non-demographic factor. The literature proposes that the development of this factor can be proxied by a deterministic trend term[106]. Unfortunately, such a deterministic trend variable captures also development of other trending variables (not only technology growth and relative prices).

Taking into account the recent results provided by the economic literature, we have estimated a single OLS and pooled fixed effect regressions.

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[103] The sample covers 20 OECD members from Europe. Unfortunately, the majority of RAMS (the 12 recently acceded Member States) countries are not OECD members, thus RAMS countries are under represented in the sample. Because of the membership in AWG, Norway was included in the EU15 group.

[104] Equations [1] and [2] were estimated separately for total health care expenditure (HCE_TOT) and public health care expenditure (HCE_PUB). Data have been downloaded from http://www.ecosante.org/index2.php?base=OCDE&langh=ENG&langs=ENG&sessionid=

[105] There are alternative possibilities for a variable which represents demographic factors. Usually the ratio of people over 65 to total population or the dependency ratio is used.

[106] Still, there are some exceptions like Okunade and Murthy (2002) who confirmed a significant and stable long-run relationship between per capita real health care expenditure, per capita real income and technological change, proxied by total R&D expenditure. Albrecht, Neyt and Verbeke (2005) proxy the impact of new technologies on health care expenditure by the number of researchers.

When applying time series methods one needs to pay special attention to the existence of stochastic trends (non-stationarity), the existence of cointegrating relationship and possible endogeneity among dependent and explanatory variables.

Non stationarity (Unit roots)

After Culyer (1990), Hitiris and Posnett (1992) and others claimed that there seems to exist a strong relationship between HCE and aggregate income, Hansen and King (1996) pointed out that it is possible that the strong positive correlations observed between HCE and GDP in the previous studies were a result of non-stationarity (and spurious correlation) in the respective time series, rather than evidence of an actual economic relationship. Hansen and King (1994) showed that two-thirds of the variables tested (HCE and GDP per capita in real terms) were found to be non-stationary in levels and no country possessed a data set that was entirely stationary in levels. The non-stationarity of real per capita HCE and GDP was indicated also by Blomqvist and Carter (1996), whose results show clearly that in every country both HCE and GDP are I(l). Similar conclusions, i.e. the existence of a unit root in per capita real HCE and GDP series was confirmed among the others by Gerdtham and Lothgren M. (2000) and by Okunade and Murthy (2002). Using techniques of cointegrated panel, MacDonald and Hopkins (2002) found strong evidence of unit roots in both GDP and HCE data when the data are considered as a panel[107].

Applying augmented Dickey-Fuller unit root tests[108] to the sample under consideration leads to the conclusion that the logarithm of real per capita health care expenditure and the log of real per capita GDP have a unit root, i.e. in most cases a H_o hypothesis of a unit root cannot be rejected. Still, in some cases the test outcomes suggest that the two mentioned series could be stationary once introducing a deterministic trend. When interpreting the results (see Table 63**)** one has to be careful since the power of this test is rather low in a small sample, like the present one.[109]

Following economic reasoning and the outcomes of several studies, HCE_TOT, HCE_PUB and GDP are assumed to be I(1) in this analysis.

[107] On the other hand, recently Carrion-i-Silvestre (2005) suggested that the panel data set of HCE is stationary after the structural breaks are introduced into the model. Since most of the breaks are associated with reforms aimed to extend the coverage and benefits of health care, this argument is in line with the fact that governments play a major role in the financing of HCE in most of the OECD countries, and therefore, it is a consequence of a strong correlation between HCE and GDP.

[108] Applying Phillips-Peron test does not change the results significantly.

[109] Thus, due to a limited number of observations, the series could be claimed to be an I(1) process even if it is I(0) in fact.

Table 63 - Augmented Dickey-Fuller test

	HCE_TOT	HCE_PUB	GDP
AT	0.72	0.61	0.41
BE	0.21	NA	0.36
CZ	0.01	0.03	0.78
DK	0.83	0.09	0.03
FI	0.26	0.27	0.03
FR	0.46	0.29	0.35
DE	0.00	0.00	0.18
EL	0.17	0.02	0.42
HU	0.83	0.93	0.00
IE	0.82	0.67	0.84
IT	0.30	0.62	0.85
LU	0.40	0.28	0.41
NL	0.08	0.06	0.45
NO	0.32	0.02	0.38
PL	0.04	0.24	0.10
PT	0.00	0.24	0.12
SK	0.89	0.45	0.21
ES	0.26	0.01	0.09
SE	0.06	0.01	0.47
UK	0.60	0.90	0.75

Source: Commission services, EPC.

Note: The values represent p-values of the Ho that the series has a unit root. The Ho is rejected if the p-value is smaller than or equal to the significance level. If significance level is fixed at 0.1, Ho is rejected when p-value<= 0.1.

Cointegration

The problem of regressing non-stationarity variables disappears in case their linear combination is stationary. In such a situation, OLS estimates in levels are superconsistent.

Hansen and King (1996) conclude that there is practically no evidence that the two series (HCE and GDP) are cointegrated for any country, i.e. that there is no long-run relationship between HCE and GDP. On the other hand, Blomqvist and Carter (1997) confirm the existence of a cointegration in the country-by-country case. The null hypothesis of no cointegration was rejected at the 5% level for 16 countries. In addition, after pooling country variables, the authors concluded that HCE and GDP are I(1) and are cointegrated around a linear trend. Similar conclusion, i.e. the existence of the long run equilibrium relationship between HCE and GDP, was confirmed among the others by Gerdtham and Lothgren (2000) or by Okunade and Murthy (2002).

Using Dickey-Fuller approach to testing cointegration in the analysed sample leads to the conclusion that health care expenditure and GDP per capita are not cointegrated in many cases (see Table 64)[110]. Although, methodologically not fully correct, the presence of cointegration relationship was tested for all countries even when both series are I(0) or one series is I(0) and the second one is I(1) or vice versa[111].

The test does not provide clear evidence on the existence of the cointegration relationship between the variables for all countries. Still, taking into account the results of the present

[110] When applying Johansen's cointegration test the conclusions are almost the same.
[111] See for example Muscatelli and Hurn (1992) who advocate this approach.

exercise and recently published studies one can assume that HCE and GDP are cointegrated for all countries and decide to estimate the long-run relation between these variables using OLS. A full dynamic error correction model estimate, taking into account the adjustment mechanism over time, is not feasible given the lack of data.

Table 64 - Cointegration test (Dickey-Fuller two stage approach)

	HCE_TOT	HCE_PUB
AT	0.7	0.2
BE	0.3	NA
CZ	0.0	0.0
DK	0.8	0.2
FI	0.2	0.2
FR	0.0	0.0
DE	0.5	0.7
EL	0.3	0.0
HU	0.1	0.1
IE	0.0	0.1
IT	0.5	0.7
LU	0.0	0.1
NL	0.0	0.0
NO	0.0	0.0
PL	0.1	0.3
PT	0.0	0.1
SK	0.2	0.4
ES	0.2	0.2
SE	0.5	0.7
UK	0.3	0.7

Source: Commission services, EPC.

Note: The values represent p-values of the Ho that the residual series has a unit root, i.e. that the variables (HCE, GDP and over_65) are not cointegrated. The Ho is rejected if the p-value is smaller than or equal to the significance level. If significance level is 0.1 than Ho is rejected when p-value<= 0.1.

9.3.2. Technology trend estimation

Following Blomqvist and Carter (1996), the model was extended by a linear time trend. Such a deterministic trend is expected to account for the impact of technological change on health care expenditure. The authors stress that their estimates of the deterministic trend coefficient are very imprecise and vary widely in magnitude between countries. Still, their trend coefficient estimates suggest that HCE in the sample of countries tends to rise by as much as 2% per year even if income remains constant. Okunade and Murthy (2002) also confirm a significant and stable long-run relationship among HCE, GDP and technological change (this time proxied by total R&D expenditure). As suggested earlier, this can be taken as a support for the growing consensus that the technology growth has been the most important determinant of the growth in the cost of health care in industrialized countries since the World War II.

Table 65 presents the results when estimating equation [3] using OLS. The results should be interpreted carefully, especially for RAMS countries where the length of time series is extremely short.

Table 65 - Single equation estimates

		HCE_TOT		HCE_PUB				HCE_TOT		HCE_PUB	
AT	cons	-10.478	**	-17.893	***	IT	cons	2.33		6.12	
	GDP	1.632	***	2.438	***		GDP	0.46		0.02	
	OVER 65	0.107	***	0.070	*		OVER 65	-0.03		-0.01	
	trend	0.002		-0.010			trend	0.02		0.02	
BE	cons	-15.074	***			LU	cons	19.45	**	22.39	**
	GDP	2.369	***				GDP	-1.20		-1.58	*
	OVER 65	-0.079	**				OVER 65	-0.17		-0.12	
	trend	0.005					trend	0.09	***	0.09	***
CZ	cons	8.186		9.639		NL	cons	3.78		3.77	
	GDP	-0.044		-0.088			GDP	0.36		0.08	
	OVER 65	0.030		-0.055			OVER 65	-0.06		0.18	*
	trend	0.039		0.043			trend	0.03	***	0.00	
DK	cons	12.643	***	10.120	**	NO	cons	-12.72	***	-14.32	***
	GDP	-0.311		-0.131			GDP	1.81	***	1.97	***
	OVER 65	0.006		0.032	**		OVER 65	0.02		-0.01	
	trend	0.026	***	0.018	**		trend	-0.01		-0.01	
FI	cons	0.616		-1.870		PL	cons	6.57	**	2.55	
	GDP	0.508	**	0.669	**		GDP	-0.11		0.45	
	OVER 65	0.127	***	0.221	***		OVER 65	-0.17		-0.30	
	trend	-0.002		-0.023	**		trend	0.09	*	0.09	
FR	cons	-7.297	***	-12.323	***	PT	cons	0.11		-4.10	
	GDP	1.500	***	1.981	***		GDP	0.54	***	0.92	**
	OVER 65	-0.037	*	-0.014			OVER 65	0.03		0.06	
	trend	0.014	***	0.004			trend	0.03	***	0.03	**
DE	cons	-4.676	**	-4.407		SK	cons	-32.56	**	-14.64	***
	GDP	1.185	***	1.141	***		GDP	3.48	***	2.17	***
	OVER 65	0.011		0.001			OVER 65	0.19		-0.11	
	trend	0.008	**	0.011	**		trend	-0.06		-0.03	**
EL	cons	5.403	**	-2.875		ES	cons	-3.99		-2.54	
	GDP	-0.054		0.823	**		GDP	1.08	***	0.95	*
	OVER 65	0.082	**	0.052			OVER 65	-0.02		-0.10	**
	trend	0.018	***	0.016	**		trend	0.02	***	0.04	***
HU	cons	12.766	**	23.127	**	SE	cons	-7.16	*	-7.36	
	GDP	0.551		0.180			GDP	1.35	***	1.32	***
	OVER 65	-1.148	***	-1.745	***		OVER 65	0.03	**	0.07	***
	trend	0.205	***	0.294	***		trend	0.00		-0.01	
IE	cons	4.044	***	3.548	**	UK	cons	4.68	**	5.53	
	GDP	0.693	***	0.887	***		GDP	0.14		0.05	
	OVER 65	-0.389	***	-0.517	***		OVER 65	-0.02		-0.03	
	trend	0.019	***	0.011	*		trend	0.03	***	0.04	***

Source: Commission services, EPC.

Note: *** statisticaly significant at 1% level, ** statisticaly signicicant at 5% level, * statisticaly significant at 10% level

The coefficient corresponding to GDP is interpreted as an elasticity of HCE with respect to GDP. The coefficient corresponding to OVER 65 is interpreted as a semi-elasticity of HCE with respect to the development of demographic factors. The coefficient corresponding to *trend* can be interpreted as an average annual growth rate of HCE due to technology and other non-demographic factors.

The estimated parameters are characterised by a quite high degree of dispersion[112]. Taking into account only statistically significant results, one can conclude that the average growth rate varies from 0 to 9% per annum.

Two additional operations were performed. First, in an effort to obtain more robust results, the individual country data was pooled. Second, to reflect the accession year to the EU, the

[112] The high degree of dispersion among individual country parameters was confirmed for example by Blomqvist and Carter (1996).

dataset was split into two subgroups. The first one includes EU15 countries plus Norway, while the other subgroup includes the available 4 out of 12 Recently Acceded Member States (RAMS)[113].

Table 66 - Pooled fixed effect regression estimates

		HCE_TOT		HCE_PUB	
EU	cons	-0.07		-0.16	
	GDP	0.70	***	0.69	***
	OVER 65	-0.01		0.00	
	trend	0.02	***	0.02	***
EU_15	cons	-0.21		-2.34	**
	GDP	0.71	***	0.89	***
	OVER 65	-0.01		0.01	
	trend	0.02	***	0.02	***
RAMS	cons	1.79		2.76	
	GDP	0.56	***	0.50	**
	OVER 65	-0.04		-0.05	
	trend	0.03	***	0.03	***

Source: Commission services, EPC.

Note: *** statistically significant at 1% level, ** statistically significant at 5% level, * statistically significant at 10% level

As indicated in Table 66, for both total and public health care spending, the trend coefficient for EU15 countries is about 0.02, while in the case of RAMS countries, the coefficient is slightly higher (0.03). The difference in the level of the trend parameter between EU15 and RAMS countries can be explained by the lower level of health care standards in RAMS countries and their tendency to converge to EU level in the following years.

The estimated value of income elasticity seems to be rather low (below 1). The surprisingly low value of the income elasticity can be a result of introducing a *trend* and the OVER 65 variable both growing remarkably in case of a majority of the countries over the period 1960-2006.

9.3.3. Main findings

At individual country level we found that the trend growth rate of health-care expenditure shows a very wide dispersion. This may be due to other country-specific factors affecting health-care expenditure not captured in the estimation. Finally, based on our results for a pooled regressions, it seems that HCE trend growth rate is 2% and 3% p.a. for EU15 and EU12 RAMS countries respectively, which can be assigned mainly to technological progress, as well as to other non-demographic factors. At the same time, the regression exercise show an income elasticity lower than 1 (around 0.7 on average). These results may be considered to represent an underlying, average trend in health-care expenditure, estimated to be somewhat lower for the EU15 countries than for the RAMS countries.

[113] In Table 66, the EU15 group comprises of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, the UK and the group RAMS covers only the Czech republic, Hungary, Poland and Slovakia.

9.4. Budgetary impact of medical technology developments - applying econometric estimates to the standard AWG health care projection model.

The results of the econometric exercise described in the previous section are used to build an alternative methodology to project the impact of technology on health care expenditure in the future. In practical terms, this methodology is based on the 'standard' AWG health care methodology, to which two additional and partially counterbalancing elements are added. On the one hand, an extra increase in per capita health care expenditure due to non-demographic drivers (see HCE trend growth rate in Table 66), which amounts to about 2% per year, is added to the existing demographic effect. On the other hand, reflecting the results of the econometric exercise, the income effect is weakened by applying an income elasticity equal 0.7 (i.e. GDP coefficient from Table 66).

Although estimates are available for all countries covered by the analysis, their values differ a lot (see Table 65), being strongly dependent on data availability and time series length which, especially for most Recently Acceded Member States, is very short. Thus, it has been decided to use the panel data estimates.

As in any long-term projection, one should assume a convergence process towards a stationary steady state conditions. Thus, in the projection methodology, the two discussed effects are assumed to gradually disappear over time, thus the extra increase due to non-demographic drivers declines to zero while income elasticity of demand converges to unity), although uncertainty about the speed of this process call for caution while interpreting the results.

Table 67 and Table 68 present the results of the technology scenario using as input data the results of the econometric exercise presented above. In the first variant, the impact of technology disappear completely at the end of projection period (by 2060) (Table 67), while in the second one (Table 68), the impact of technology is assumed to disappear after 30 years (by 2038).

Table 67 - Results of the technology scenario (convergence by 2060) – HC spending as % of GDP

	2007	2010	2020	2030	2040	2050	2060	*Change 2007-2060*	*difference from pure demographic scenario*
BE	7,6	8,1	9,7	11,4	12,9	13,8	14,1	*6,5*	*5,0*
BG	4,7	4,8	5,4	6,1	6,8	7,4	7,5	*2,8*	*2,1*
CZ	6,20	6,5	7,7	9,3	10,7	11,8	12,4	*6,2*	*3,9*
DK	5,9	6,3	7,8	9,2	10,2	10,9	11,1	*5,2*	*4,0*
DE	7,4	7,9	9,7	11,6	13,3	14,4	14,6	*7,2*	*5,2*
EE	4,9	5,0	5,7	6,5	7,4	8,1	8,6	*3,6*	*2,4*
IE	5,8	6,2	7,4	8,8	10,2	11,4	12,1	*6,3*	*4,3*
EL	5,0	5,2	6,2	7,3	8,5	9,3	9,6	*4,7*	*3,2*
ES	5,5	5,9	7,0	8,3	9,8	10,9	11,2	*5,6*	*3,9*
FR	8,1	8,7	10,4	12,2	13,7	14,6	14,9	*6,8*	*5,3*
IT	5,9	6,3	7,5	8,9	10,2	11,0	11,1	*5,3*	*4,0*
CY	2,7	2,9	3,4	4,0	4,6	5,1	5,4	*2,7*	*1,8*
LV	3,5	3,5	3,9	4,5	5,1	5,5	5,7	*2,3*	*1,6*
LT	4,5	4,6	5,2	6,0	6,9	7,6	7,9	*3,4*	*2,2*
LU	5,8	6,1	7,1	8,4	9,6	10,3	10,6	*4,8*	*3,5*
HU	5,8	6,0	7,0	8,3	9,5	10,4	11,0	*5,2*	*3,5*
MT	4,7	5,2	6,7	8,6	10,4	11,7	12,8	*8,1*	*4,3*
NL	4,8	5,1	6,4	7,6	8,6	9,2	9,3	*4,5*	*3,4*
AT	6,5	6,9	8,5	10,1	11,6	12,6	12,8	*6,3*	*4,6*
PL	4,0	4,2	4,9	5,8	6,6	7,3	7,6	*3,6*	*2,3*
PT	7,2	7,7	9,3	10,9	12,4	13,6	14,3	*7,1*	*5,0*
RO	3,5	3,6	4,1	4,8	5,6	6,3	6,7	*3,2*	*1,8*
SI	6,6	6,9	8,2	9,8	11,3	12,3	12,7	*6,1*	*4,1*
SK	5,0	5,1	6,1	7,3	8,5	9,6	10,0	*5,1*	*2,8*
FI	5,5	5,9	7,2	8,6	9,7	10,3	10,5	*5,0*	*3,7*
SE	7,2	7,6	9,0	10,4	11,5	12,2	12,6	*5,4*	*4,4*
UK	7,5	8,0	9,5	11,3	13,0	14,2	14,9	*7,4*	*5,2*
NO	5,6	6,0	7,4	9,0	10,3	11,1	11,5	*5,8*	*4,2*
EU27	6,7	7,1	8,5	10,1	11,6	12,6	13,0	*6,3*	*4,6*
EU15	6,9	7,3	8,8	10,4	11,9	12,9	13,3	*6,4*	*4,7*
EU12	4,7	4,8	5,6	6,6	7,6	8,4	8,9	*4,2*	*2,6*
EA	6,7	7,2	8,6	10,2	11,6	12,6	12,9	*6,2*	*4,6*

Source: Commission services, EPC.

Table 68 - Results of the technology scenario (convergence over 30 years) - health care spending as % of GDP

	2007	2010	2020	2030	2040	2050	2060	Change 2007-2060	difference from pure demographic scenario
BE	7,6	8,1	9,5	10,8	11,4	11,6	11,8	4,1	2,7
BG	4,7	4,8	5,3	5,9	6,2	6,4	6,4	1,7	1,0
CZ	6,20	6,5	7,7	8,8	9,6	10,0	10,4	4,2	1,9
DK	5,9	6,3	7,6	8,7	9,1	9,2	9,3	3,3	2,2
DE	7,4	7,9	9,5	10,9	11,7	12,1	12,1	4,7	2,7
EE	4,9	5,0	5,7	6,2	6,7	7,0	7,3	2,3	1,1
IE	5,8	6,2	7,2	8,3	9,1	9,6	10,1	4,2	2,3
EL	5,0	5,2	6,1	6,9	7,5	7,9	8,0	3,1	1,6
ES	5,5	5,9	6,9	7,9	8,7	9,2	9,3	3,8	2,0
FR	8,1	8,7	10,2	11,5	12,1	12,3	12,4	4,3	2,9
IT	5,9	6,3	7,4	8,4	9,0	9,2	9,2	3,4	2,1
CY	2,7	2,9	3,4	3,8	4,1	4,4	4,5	1,8	1,0
LV	3,5	3,5	3,9	4,3	4,6	4,7	4,8	1,4	0,7
LT	4,5	4,6	5,1	5,7	6,2	6,5	6,6	2,2	1,0
LU	5,8	6,1	7,0	8,0	8,5	8,8	8,9	3,1	1,8
HU	5,8	6,0	7,0	7,9	8,6	9,0	9,3	3,5	1,8
MT	4,7	5,1	6,6	8,1	9,3	9,9	10,7	6,0	2,2
NL	4,8	5,1	6,3	7,2	7,6	7,7	7,8	2,9	1,8
AT	6,5	6,9	8,3	9,5	10,3	10,6	10,7	4,2	2,4
PL	4,0	4,2	4,9	5,5	5,9	6,2	6,4	2,4	1,1
PT	7,2	7,7	9,1	10,3	11,1	11,7	12,1	4,9	2,7
RO	3,5	3,6	4,0	4,6	5,1	5,4	5,7	2,2	0,8
SI	6,6	6,9	8,1	9,3	10,1	10,4	10,6	4,0	2,0
SK	5,0	5,1	6,0	7,0	7,7	8,2	8,4	3,5	1,2
FI	5,5	5,8	7,1	8,2	8,6	8,7	8,8	3,3	1,9
SE	7,2	7,6	8,8	9,8	10,2	10,4	10,5	3,3	2,4
UK	7,5	8,0	9,4	10,7	11,6	12,1	12,5	5,0	2,8
NO	5,6	6,0	7,3	8,5	9,1	9,4	9,6	3,9	2,3
EU27	6,7	7,1	8,4	9,5	10,3	10,6	10,8	4,1	2,4
EU15	6,9	7,3	8,7	9,8	10,6	10,9	11,1	4,2	2,5
EU12	4,7	4,8	5,6	6,3	6,8	7,2	7,5	2,8	1,3
EA	6,7	7,2	8,5	9,6	10,3	10,6	10,7	4,0	2,4

Source: Commission services, EPC.

The results of the technology scenario in the first variant suggest a significant growth in public health care expenditure over the projection period. An increase of almost 6.3% of GDP (in absolute terms) shows that continuation of the past trends in the public spending on health care, even under a strong assumption of the extra effect fading away with time, almost doubles the current level of spending, which exerts a strong pressure on the public finances.

The results of the second variant are obviously lower than those of the first one, as the impact of technology is assumed to disappear almost twice as fast, while the final level of spending is very similar to that of the *"OECD assumptions scenario"*. In both cases the difference from the income elasticity scenario (respectively 4.2% and 2% of GDP) may be interpreted as the expected impact of technology and other supply side factors not related to the increase in the national income.

9.5. Conclusions

Medical science and development of new technologies are supposed to strongly affect the public expenditure on health care. This is the conclusion in practically all available empirical studies, and it is confirmed by the empirical analysis presented in this section. Although the estimated impact differs, even considerably across various methodologies, the effect of technology is generally expected to exceed considerably demographic and income effects, as reflected in the standard AWG health care expenditure model. Dependent on a number of assumptions, the additional (over the pure impact of demographic changes) impact of technological developments over the next half-century is estimated to vary from 2.4 to 4.6% of GDP.

Still, interpretation of these results should be very cautious and a number of caveats should be borne in mind. First, the budgetary impact estimated in the presented models does not include solely the effect of future developments in the cost of 'medicines (pharmaceuticals and vaccines), medical equipment, health-care procedures, supportive systems, and the administrative systems that can tie all these disparate elements together'[114]. In fact, it also reflects other non-demographic factors (except for national income), such as a number of cost drivers not covered by the presented specifications. These are non-quantifiable factors such as institutional and legal setting of health care system, developments in prices of health care goods and services etc.

Second, projected future developments in health care expenditure are calculated using estimates based on the past trends as such approach was the considered to be the only available solution, given the well known lack of data. However, there is no evidence that the past trends are going to continue in the future. Given the very high uncertainty surrounding any prediction of future evolution in science and technology and its impact on economic variables, the proposed approach must be considered as a first, rather simplistic, guess.

Third, given the fact that potential for technological development is closely dependent on the financial resources available for capital investment in the medical sector, the impact of technology is partially reflected in the relation between health care spending and national income. As such, the income elasticity scenario, projecting higher spending in countries with higher potential GDP growth, already takes into account to some extent this relationship.

[114] Definition of medical technology, as quoted in OECD (1998), *Health Policy Brief. Ageing and Technology*, Working Party on Biotechnology, DSTI/STP/BIO(97)13 of 17 June 1998

9.6. Additional tables

Table 69 - Philips-Perron unit root test

	HCE_TOT	HCE_PUB	GDP
AT	0.6	0.6	0.0
BE	0.2	NA	0.0
CZ	0.5	0.4	0.1
DK	0.8	0.4	0.0
FI	0.6	0.6	0.5
FR	0.5	0.3	0.4
DE	0.0	0.0	0.2
EL	0.2	0.0	0.2
HU	0.8	0.9	0.0
IE	0.7	0.9	0.9
IT	0.7	0.9	1.0
LU	0.7	0.6	0.7
NL	0.6	0.3	0.5
NO	0.4	0.1	0.6
PO	0.1	0.0	0.1
PT	0.0	0.2	0.4
SK	1.0	1.0	0.8
ES	0.1	0.0	0.5
SE	0.7	0.6	0.9
UK	0.5	0.8	0.4

Source: Commission services, EPC.

Note: The values represent p-values of the Ho that the series has a unit root. The Ho is rejected if the p-value is smaller than or equal to the significance level. If significance level is 0.1 than Ho is rejected when p-value<= 0.1.

Table 70 - Number of cointegrating relations using Johansen's cointegration test

	HCE_TOT	HCE_PUB
AT	1	1
BE	1	1
CZ	1	1
DK	0	1
FI	1	1
FR	1	1
DE	1	1
EL	0	1
HU	1	1
IE	1	1
IT	0	0
LU	1	1
NL	1	0
NO	1	1
PL	1	1
PT	1	1
SK	NA	NA
ES	0	1
SE	0	0
UK	0	0

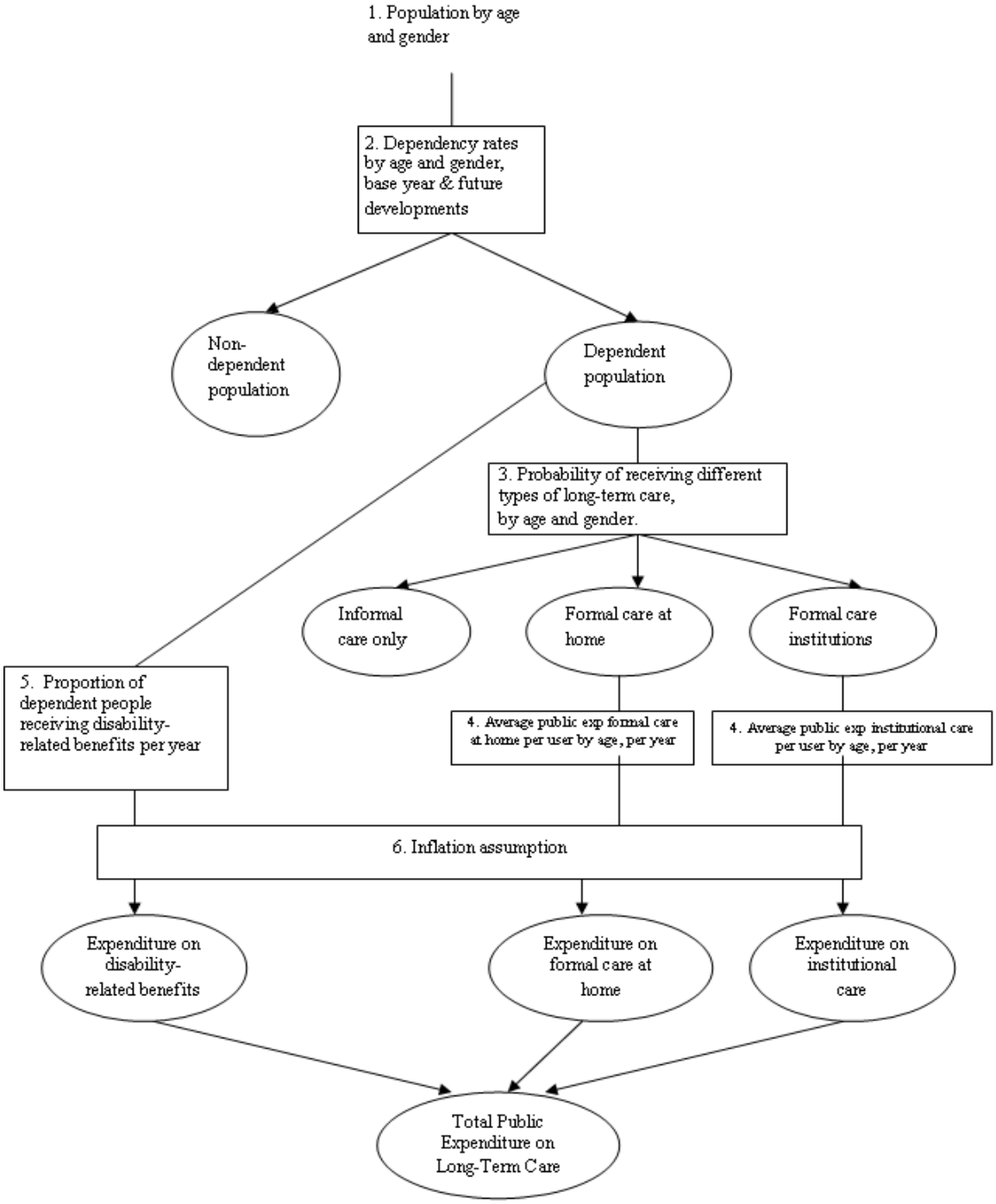
Source: Commission services, EPC.

10. ANNEX 3: Long-term care

10.1. Summary of the methodology used to project long-term care expenditure

The model prepared for the 2006 projection exercise, based on a proposal by Comas-Herrera et al., (2005), has been also used in this projection exercise. Graph 93 provides an illustration of the structure of the model. The square boxes indicate data that need to be entered into the model to make projections for each year, and the round boxes indicate calculations that are produced within the model for each year.

Graph 93 – Model structure



Source: Comas-Herrera et al., (2005)

It is a macro simulation model similar to those used for Germany, Italy and Spain in the European Study of Long-Term Care Expenditure (Comas-Herrera and Wittenberg, 2003 and Comas-Herrera et al, 2003). That model in turn built on the experience of constructing the Personal Social Services Research Unit (PSSRU) Long Term Care expenditure model for England (Wittenberg et al., 1998 and 2001).

The main steps involved in the projection of long-term care expenditure are as follows.

***Step 1*:** a projection is made of the dependent population, who are assumed to need some form of long-term care service, and the non-dependent population, who are assumed not to be in need of long-term care services. This is made by extrapolating age and gender-specific dependency ratios of a base year (estimated using disability rates) to the population projection (by age and gender).

The difference between the terms "dependency" and "disability" is worth stressing. The term "disability" refers to some functional impairment of an individual. The term "dependent" refers to the share of the population having some disability which requires the provision of a care service. There are many people with some form of disability who can lead completely independent lives without the need for care services. More specifically, the projection makes use of the concept of ADL-dependency which refers to difficulties in performing at least one Activity of Daily Living (ADL) (Katz et al., 1963).

Step 2 is to split, by age and gender, the dependent elderly population into three groups depending on the type of care they will receive, namely (i) formal care at home, (ii) formal care in institutions (both of which impact on public spending but their unit costs differ) and (iii) informal care, which has no impact on public spending.

The model assumes that all those receiving home care or institutional care have difficulties with one or more ADLs, and that all persons deemed ADL-dependent either receive informal care, home care or institutional care. The split by type of care is made by calculating the "probability of receiving different types of long-term care by age and gender". This probability is calculated for a base year using data on the numbers of people with dependency (projected in step 1), and the numbers of people receiving formal care at home and in institutions (provided by Member States). Informal care is a "default category". It is assumed that the difference between the number of dependent people and the number of people receiving formal care (at home or in institutions) is the number of people who rely exclusively on informal care.

Step 3 involves the calculation of public spending for home and institutional care, by multiplying the number of people receiving long-term care services (at home and in institutions) by the average age-specific public expenditure of formal care (at home and in institutions) per year and per user. Average expenditure is calculated for a base year using data on total public expenditure in home care and institutional care and the numbers of people receiving formal care at home and in long-term care institutions (as provided by Member States).

Two assumptions are required:

- current expenditure in services divided by the number of users equals the long-run unit costs of services;
- average expenditure increases with the age of the user.[115]

[115] In practice, average expenditure per user (aged 65 and above) is decomposed, for each type of service, into average expenditure by smaller age groups, by assuming that expenditure by age increases at the rate given

***Step 4*:** by adding up the expenditure on formal care at home and in institutions, total public expenditure on long-term care services is obtained. Public expenditure on cash benefits for people with ADL-dependency is then added to the expenditure on services, in order to obtain total public expenditure on long-term care; note that cash benefits are assumed to grow in line with the numbers of dependent people.

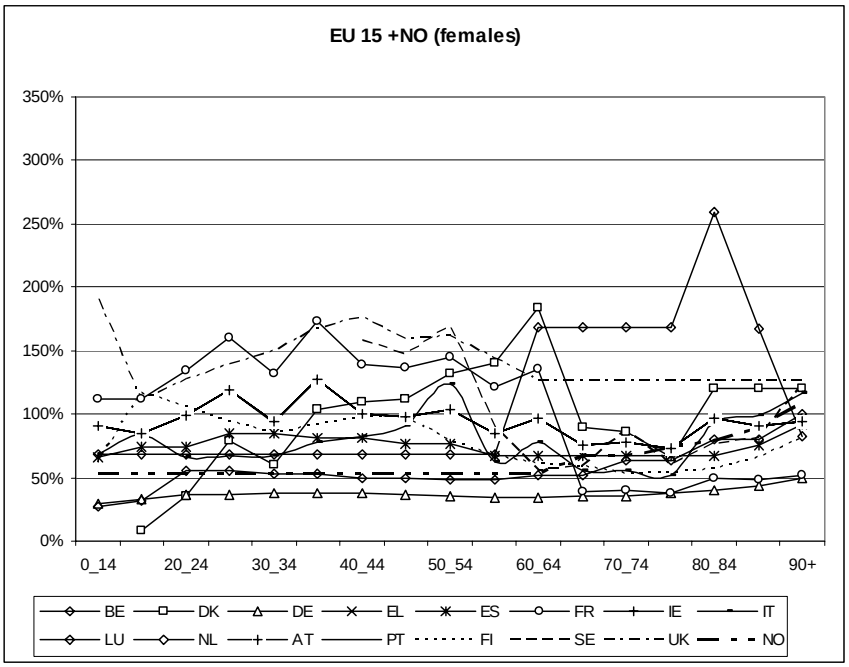
An important caveat to note is that while dependency rates are an indicator of the need for care, those needs may not necessarily translate into actual public expenditure, as most long-term care is provided by unpaid informal carers. Expenditure profiles contain information about the propensity to receive paid formal care, which depends on a number of factors other than dependency that affect demand for paid care such as household type, availability of informal carers, income or housing situation (Wittenberg et al, 1998). Most of these factors, in turn, are also correlated with age.

10.2. Input data used to project long-term care expenditure

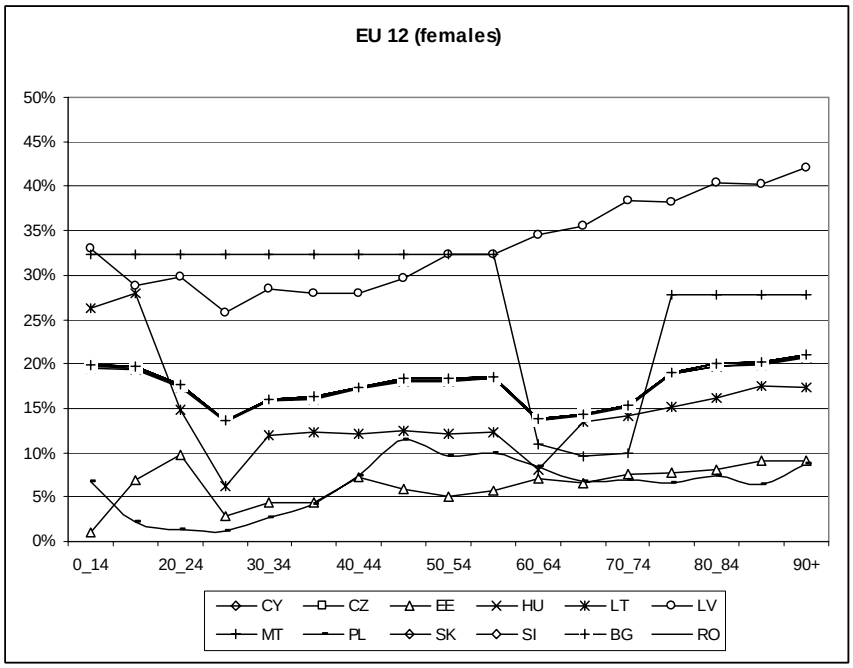
10.2.1. Age-related expenditure profiles per beneficiary

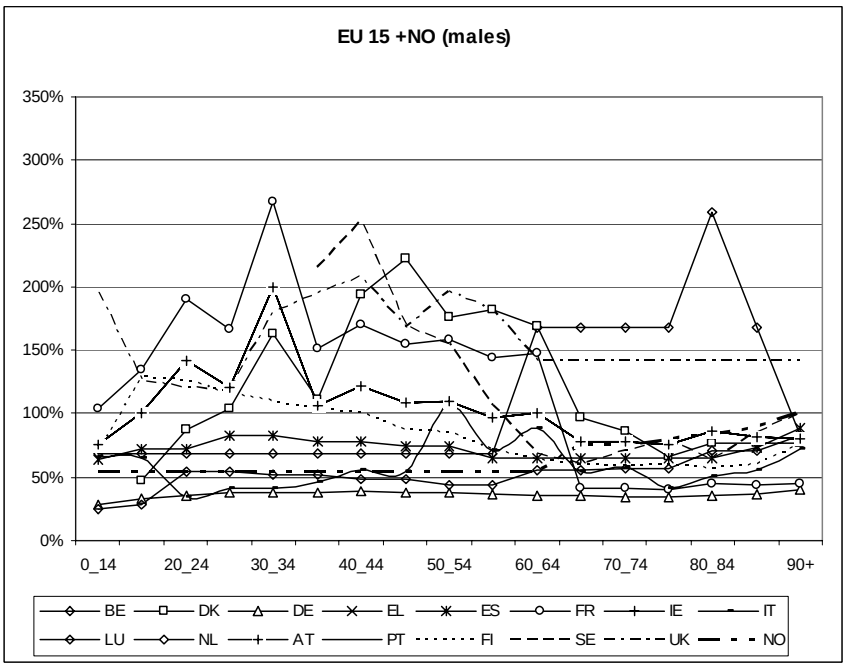
Graph 94 displays the age-related expenditure profiles as % of GDP per capita, grouped into EU15 and EU12 countries, which have been used in the projection of long-term care expenditure.

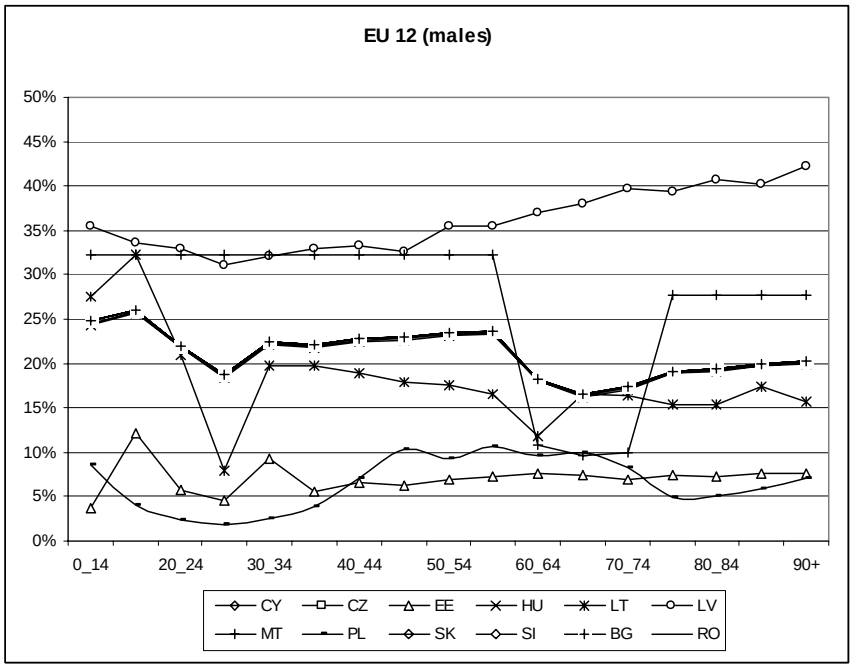
Graph 94 – Age-related expenditure profiles of long-term care provision (spending per beneficiary as % of GDP per capita)



by the age-related expenditure profile. It is an approximation, as the age-related expenditure profile provides information on spending in formal care by age, without distinction between care provided at home and in institutions.


EU 12 (females)
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
0_14
20_24
30_34
40_44
50_54
60_64
70_74
80_84
90+
CY
CZ
EE
HU
LT
LV
MT
PL
SK
SI
BG
RO


EU 15 +NO (males)
350%
300%
250%
200%
150%
100%
50%
0%
0_14
20_24
30_34
40_44
50_54
60_64
70_74
80_84
90+
BE
DK
DE
EL
ES
FR
IE
IT
LU
NL
AT
PT
FI
SE
UK
NO



Source: Commission services, EPC.

10.2.2. Dependency rates

Dependency rates are drawn from the SHARE survey in Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, Belgium, the Czech Republic and Poland. For the remaining Member States, they are drawn from the Survey on Living and Working Conditions (SILC). Romania and Bulgaria have not provided figures to the SILC questionnaire and have thus been assigned different measures of disability.

In the case of Romania, the data are taken from the Health Interview Survey (2004) and indicate the percentage of people in a given age group who have suffered from severe activity restriction in the past 6 months. In the case of Bulgaria, the figures, taken from the 2001 Health Condition Survey, indicate the percentage of people who have had a long-standing illness or health problem.

The SHARE database includes information on the percentage of people with *'the prevalence of 1+ limitations with activities of daily living among men and women over 50 years of age'*. The data from SILC survey provides for the percentage of people in a given age group who *'are severely restricted in activities they usually do because of health problems for at least the last 6 months'*. In case of the UK, the English Longitudinal Study of Ageing (ELSA) produces figures that are fully comparable with the SHARE methodology.

Dependency tends to increase by age and, on average, is more prevalent among women than among men. Bulgaria, Estonia, Cyprus, Luxemburg, Lithuania, Hungary, Poland, Portugal, Romania, Slovakia, Finland and the UK have above average dependency rates at most ages.

Table 71 – Dependency rates

	65-69		70-74		75-79		80-84		85-89		90+	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
BE	15	12	9	16	19	27	37	47	46	55	61	69
BG	59	62	59	62	70	66	70	66	56	71	56	72
CZ	5	12	10	15	15	17	31	31	38	38	40	40
DK	9	7	7	10	14	23	28	42	35	50	48	63
DE	7	9	12	13	19	19	38	43	40	48	44	58
EE	27	24	27	24	41	48	42	50	60	60	60	60
IE	13	11	14	12	24	23	27	27	27	40	32	48
EL	5	7	10	11	10	20	27	42	32	48	40	55
ES	7	13	12	19	19	26	37	48	38	48	39	48
FR	6	11	7	14	22	22	34	46	37	52	47	43
IT	5	7	12	20	14	27	33	45	33	45	33	45
CY	23	32	24	32	40	49	41	50	52	57	53	58
LV	24	27	24	27	33	38	34	39	37	54	38	55
LT	22	27	23	28	44	48	46	51	58	72	59	72
LU	11	14	12	15	23	20	25	26	41	67	53	77
HU	32	31	32	31	38	41	39	43	45	56	47	59
MT	8	9	9	10	26	23	26	23	26	49	26	49
NL	6	6	5	10	10	18	31	34	37	43	47	55
AT	7	9	12	12	12	20	28	40	33	46	41	53
PL	21	24	21	24	32	36	33	37	41	49	41	49
PT	24	32	24	32	42	50	44	52	54	62	60	67
RO	18	22	18	22	35	44	35	45	63	77	63	77
SI	17	22	18	22	24	28	25	30	40	34	41	36
SK	28	30	28	30	40	50	40	50	46	60	46	60
FI	20	24	20	24	32	40	35	44	39	56	47	66
SE	6	5	9	16	18	12	29	40	34	48	41	54
UK	21	19	25	26	27	36	39	49	43	54	50	60
NO	13	13	13	13	16	28	19	32	40	47	49	59

Source: Commission services, EPC compiled from SHARE and SILC surveys. For Bulgaria, the data are drawn from the 2001 Health Condition Survey implemented by the National Statistical Institute; for Romania, the data come from the 2004 Health Interview Survey.

Note: For Bulgaria, the definition of the disability rate is not comparable with either SHARE or SILC, the disability rate is defined as long-standing illness or health problem.

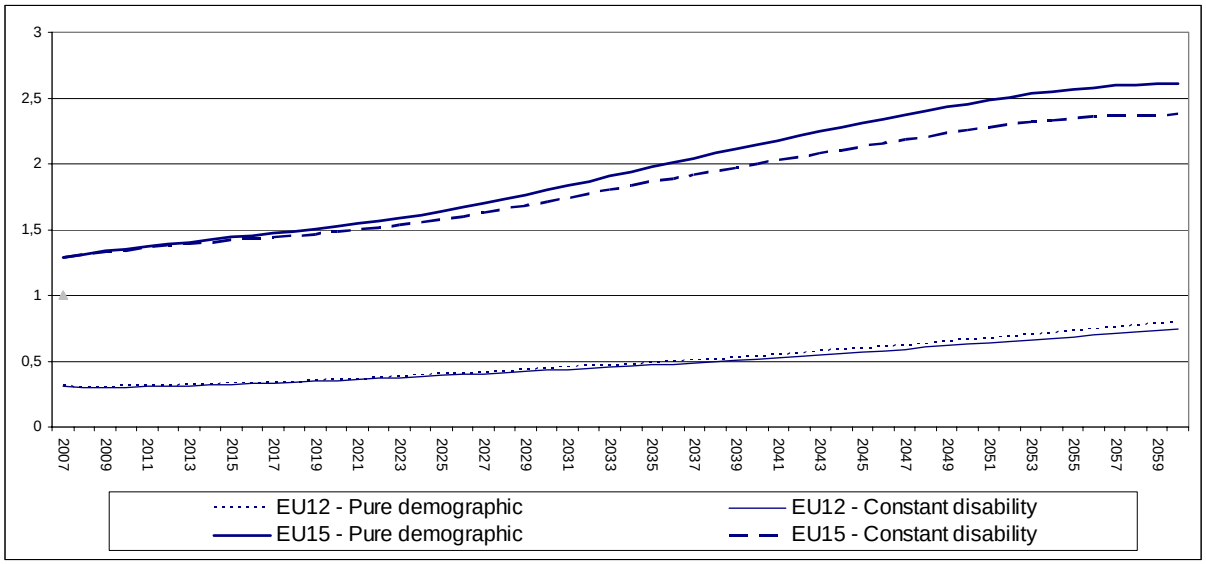
10.3. Projection results

Table 72 - Increase of public expenditure on long-term care over the period 2007 to 2060 and difference relative to the pure demographic scenario

	Change 2007-2060									Diff. From pure demographic in p.p. of GDP							
	Pure demographic	Constant disability	Fast growth	Slow growth	Per capita	Shift to formal care at home	Shift to formal care institutional	Shift to formal care mix between home and institutional	AWG reference scenario	Constant disability	Fast growth	Slow growth	Per capita	Shift to formal care at home	Shift to formal care institutional	Shift to formal care mix between home and institutional	AWG reference scenario
BE	1,6	1,2	1,9	1,3	1,3	1,8	2,2	2,0	1,4	-0,4	0,3	-0,3	-0,2	0,2	0,6	0,4	-0,2
BG	0,2	0,2	0,3	0,2	0,2	0,3	0,3	0,3	0,2	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,0
CZ	0,5	0,4	0,5	0,4	0,4	0,5	0,7	0,6	0,4	-0,1	0,1	-0,1	-0,1	0,0	0,2	0,1	0,0
DK	1,7	1,3	2,1	1,4	1,4	2,1	1,7	1,9	1,5	-0,4	0,4	-0,3	-0,3	0,3	0,0	0,2	-0,2
DE	1,5	1,3	1,8	1,3	1,3	1,7	2,0	1,8	1,4	-0,2	0,3	-0,2	-0,2	0,1	0,5	0,3	-0,1
EE	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,0
IE	1,4	1,2	1,6	1,2	1,1	1,5	1,8	1,7	1,3	-0,2	0,2	-0,2	-0,3	0,1	0,4	0,3	-0,1
EL	2,4	2,0	2,8	2,1	2,0	2,6	3,0	2,8	2,2	-0,5	0,4	-0,4	-0,5	0,2	0,6	0,4	-0,2
ES	0,9	0,8	1,0	0,8	0,8	1,0	3,2	2,1	0,9	-0,1	0,1	-0,1	-0,1	0,0	2,2	1,1	-0,1
FR	0,9	0,7	1,1	0,7	0,7	1,0	1,3	1,1	0,8	-0,2	0,2	-0,2	-0,2	0,1	0,4	0,2	-0,1
IT	1,4	1,1	1,7	1,1	1,2	1,9	2,5	2,2	1,3	-0,3	0,3	-0,3	-0,2	0,5	1,1	0,8	-0,1
CY	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
LV	0,5	0,5	0,6	0,4	0,4	0,6	1,5	1,1	0,5	0,0	0,1	-0,1	-0,2	0,1	1,0	0,5	0,0
LT	0,6	0,5	0,7	0,5	0,4	0,7	0,9	0,8	0,6	-0,1	0,1	-0,1	-0,2	0,1	0,3	0,2	0,0
LU	2,2	1,9	2,5	1,8	2,2	2,4	2,9	2,7	2,0	-0,3	0,4	-0,3	0,1	0,2	0,8	0,5	-0,1
HU	0,4	0,4	0,5	0,3	0,3	0,6	0,8	0,7	0,4	0,0	0,1	-0,1	-0,1	0,2	0,4	0,3	0,0
MT	1,9	1,4	2,1	1,6	1,5	1,9	2,5	2,2	1,6	-0,4	0,3	-0,3	-0,4	0,0	0,6	0,3	-0,2
NL	5,2	4,2	6,1	4,4	4,2	5,4	6,2	5,8	4,7	-0,9	0,9	-0,8	-1,0	0,2	1,1	0,6	-0,5
AT	1,3	1,1	1,6	1,1	1,1	1,5	1,4	1,5	1,2	-0,3	0,3	-0,2	-0,3	0,2	0,1	0,1	-0,1
PL	0,7	0,7	0,8	0,6	0,5	1,0	0,8	0,9	0,7	-0,1	0,1	-0,1	-0,2	0,2	0,0	0,1	0,0
PT	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	0,1	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0
RO	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
SI	1,8	1,7	2,1	1,6	1,2	2,1	2,4	2,2	1,8	-0,1	0,3	-0,3	-0,6	0,2	0,6	0,4	-0,1
SK	0,4	0,4	0,5	0,4	0,3	0,6	0,4	0,5	0,4	0,0	0,1	-0,1	-0,1	0,2	0,0	0,1	0,0
FI	2,7	2,5	3,1	2,3	2,3	2,9	3,8	3,3	2,6	-0,2	0,5	-0,4	-0,4	0,2	1,1	0,7	-0,1
SE	2,6	2,0	3,2	2,0	2,0	2,8	3,4	3,1	2,3	-0,6	0,6	-0,6	-0,5	0,3	0,9	0,6	-0,3
UK	0,5	0,4	0,7	0,4	0,4	0,6	0,7	0,6	0,5	-0,1	0,1	-0,1	-0,1	0,0	0,1	0,1	-0,1
NO	2,9	2,5	3,4	2,4	2,3	3,0	3,9	3,4	2,7	-0,4	0,5	-0,5	-0,6	0,1	0,9	0,5	-0,2
EA	1,5	1,2	1,8	1,2	1,2	1,7	2,3	2,0	1,4	-0,3	0,3	-0,3	-0,3	0,2	0,8	0,5	-0,1
EU27	1,3	1,0	1,5	1,0	1,0	1,4	1,9	1,6	1,1	-0,2	0,3	-0,2	-0,2	0,2	0,6	0,4	-0,1
EU15	1,3	1,1	1,6	1,1	1,1	1,5	2,0	1,7	1,2	-0,2	0,3	-0,2	-0,2	0,2	0,7	0,4	-0,1
EU12	0,5	0,4	0,6	0,4	0,4	0,6	0,6	0,6	0,5	-0,1	0,1	-0,1	-0,1	0,1	0,2	0,1	0,0

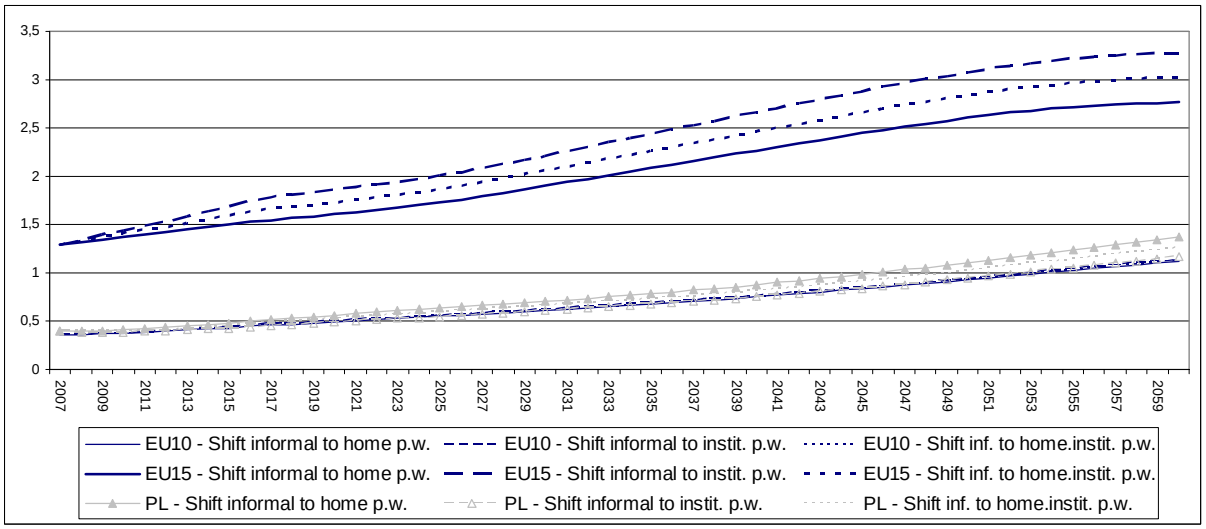
Note: According to internal Spanish projections the expenditure calculated in the scenario of shift from informal care to home care is underestimated and the expenditure of the shift to institutions is overestimated, due to differences in the definitions used.
Source: Commission services, EPC.

Graph 95 – The impact of an improvement in the disability status, projected expenditure for the period 2007-2060, as % of GDP



Source: Commission services, EPC.

Graph 96 – The impact of a policy change: a shift from informal to formal care, projected expenditure on long-term care for the period 2007-2060, as % of GDP



Source: Commission services, EPC.

Note: *An EU10 average is calculated excluding Poland This is because in Poland (as well as Slovakia), a higher increase is projected when care is provided at home than in institutions, in contrast to all other Member States. As Poland accounts for about 40% of the EU10 expenditure, this affects the results for the EU10.*

11. ANNEX 4: Unemployment benefit expenditure

Decomposition of total unemployment benefit expenditure

This set of assumptions can be illustrated by decomposing the total unemployment benefit spending UB, as follows:

$$UB = GRR \times pcw \times \frac{UBr}{U} \times U \quad (1)$$

where GRR is the gross replacement rate, *pcw* is per capita wage, UBr is the number of recipients (unemployed persons U receiving unemployment benefits UB), and thus the ratio $\frac{UBr}{U}$ is the take-up ratio. Given that per capita wages can also be written as: $pcw = \frac{W}{Y} \times \frac{Y}{L}$, (where L is employment, Y is GDP and W is total wages)

then UB can be re-written as:

$$UB = GRR \times \frac{W}{Y} \times \frac{Y}{L} \times \frac{UBr}{U} \times U \quad (2)$$

where W/Y is the share of wages in the income distribution and Y/L is labour productivity.

Per capita UB is: $UBpc = \frac{UB}{U} = GRR \times \frac{W}{Y} \times \frac{Y}{L} \times \frac{UBr}{U}$ and this can be expressed in terms of GDP per worker (or Ypc=Y/L) as follows:

$$\frac{UBpc}{Ypc} = \frac{UB/U}{Y/L} = GRR \times \frac{W}{Y} \times \frac{Y}{L} \times \frac{UBr}{U} \times \frac{L}{Y} \quad (3)$$

Thus, the total expenditure as percentage of GDP can be expressed as:

$$\frac{UB}{Y} = GRR \times \frac{W}{Y} \times \frac{UBr}{U} \times \frac{U}{L} \quad (4)$$

Given that L = LF (1-*u*), where LF = labour force and *u* = unemployment rate, the ratio (U_t/L_t) can also be re-written as $u_t/(1-u_t)$ and:

$$\frac{UB}{Y} = GRR \times \frac{W}{Y} \times \frac{UBr}{U} \times \frac{u}{(1-u)}. \quad (5)$$

In this formulation, under the assumption of constant GRR and take-up ratio (UBr/U), and a constant share of wages in income distribution (W/Y), as a result of the assumption that wages grow at the same rate as labour productivity, changes in the unemployment rate (or the ratio of unemployed to employed persons, U/L) are the only driver of the change of unemployment benefit spending over time.

The basic approach applied to run projections for unemployment benefit expenditure (as percentage of GDP) is as follows. The starting point is the estimation of average per-capita

unemployment insurance expenditure in the base year, which is then combined with the projections of unemployed persons

More specifically, the projection involves the following two steps.

- Step 1: the average unemployment benefits received by each unemployed person (and as percentage of GDP per worker) in the base year is estimated. The average amount of UB expenditures (as % of GDP) over the period 2005-2006 is divided by the average of the ratio unemployed/employed persons over the same period.

  An average of expenditure is used as a starting point to avoid imposing an excessive weight on a particular year given the cyclicality of labour market conditions and possible statistical errors. Whereas in the previous projection exercise, the starting point was the average over the last five years, this time the average was calculated over the shorter period 2005-2006, to take account of recent reforms reducing the size of benefits. In the absence of alternative reasonable assumptions on the future number of UB beneficiaries (which result from entitlement and eligibility rules that affect coverage, take up rates, and so on) and the average duration of unemployment spells, the calculation assumes that all these elements remain constant. This approximation is neutral and does not lead to any systematic bias in the projections.

  In order to guarantee the comparability of projections across countries, statistics were drawn from Eurostat's database on Social protection Expenditure (ESSPROSS), specifically, the two main components of social protection spending on unemployment: 'Full unemployment ' and Partial unemployment', see Table 44.[116]

- Step 2: for each projection year, the ratio unemployment benefit /GDP per head in the base year (from step 1) is multiplied by the corresponding projected ratio of the future number of unemployed persons and employed persons (U/L) for each country. The projections of employed and unemployed persons are drawn from the baseline scenario (no policy change). This generates projections of UB spending, expressed as a share of GDP.[117]

[116] As a general rule, early retirement and pre-retirement benefits are included in the pension projections.

[117] The projection does not take into account that unemployment benefits may be subject to income tax, so that after tax unemployment benefit spending as % of GDP may be lower. However, this effect is likely to be quite small and relatively constant over time.

Table 73 - Unemployment benefit expenditure projections, % of GDP, baseline scenario

																Change in p.p.	
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2020	2030	2040	2050	2060	2007-2020	2007-2060
	(actual figures)																
BE	2.1	1.9	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.7	1.5	1.5	1.5	1.5	1.5	*-0.39*	*-0.45*
BG	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	*-0.05*	*-0.05*
CZ	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	*-0.02*	*-0.03*
DK	1.0	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	*-0.16*	*-0.17*
DE	1.1	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.6	0.6	0.6	0.6	0.6	*-0.19*	*-0.31*
EE	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*-0.02*	*-0.02*
IE	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	*0.07*	*0.06*
EL	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	*-0.05*	*-0.09*
ES	1.4	1.3	1.4	1.4	1.4	1.3	1.3	1.2	1.2	1.2	0.9	0.9	0.9	0.9	0.9	*-0.15*	*-0.37*
FR	1.4	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	0.9	0.9	0.9	0.9	0.9	*-0.17*	*-0.30*
IT	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	*-0.02*	*-0.03*
CY	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	*-0.07*	*-0.08*
LV	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	*-0.05*	*-0.05*
LT	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*-0.01*	*-0.01*
LU	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	*0.04*	*0.04*
HU	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	*-0.02*	*-0.06*
MT	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	*0.00*	*-0.01*
NL	1.4	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	*-0.08*	*-0.08*
AT	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	*-0.03*	*-0.05*
PL	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	*-0.05*	*-0.05*
PT	1.1	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.8	*-0.24*	*-0.38*
RO	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	*-0.03*	*-0.04*
SI	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	*-0.01*	*-0.02*
SK	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	*-0.03*	*-0.05*
FI	1.4	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	*-0.23*	*-0.24*
SE	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	*-0.05*	*-0.06*
UK	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	*0.00*	*-0.01*
NO	0.3	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	*0.16*	*0.16*
EA12	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	*-0.14*	*-0.23*
EA	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	*-0.14*	*-0.23*
EU27	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	*-0.12*	*-0.19*
EU15	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	*-0.10*	*-0.17*
EU10	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	*-0.05*	*-0.05*
EU25	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	*-0.12*	*-0.18*

Source: Commission services, EPC.

Table 74 - Unemployment benefit expenditure projections under the alternative scenarios

	Change 2007-2060					Diff. From baseline in p.p. of GDP			
	Baseline	Higher employment rate	Higher employment rate of older workers	Higher life expectancy	Zero net migration	Higher employment rate	Higher employment rate of older workers	Higher life expectancy	Zero net migration
BE	-0.45	-0.68	-0.45	-0.45	-0.44	-0.232	-0.001	0.000	0.006
BG	-0.05	-0.08	-0.05	-0.05	-0.05	-0.028	-0.001	0.000	0.000
CZ	-0.03	-0.06	-0.03	-0.03	-0.03	-0.034	-0.002	0.000	0.000
DK	-0.17	-0.49	-0.18	-0.17	-0.18	-0.313	-0.010	0.000	-0.001
DE	-0.31	-0.44	-0.32	-0.31	-0.31	-0.134	-0.009	0.000	-0.003
EE	-0.02	-0.04	-0.02	-0.02	-0.02	-0.019	-0.001	0.000	0.000
IE	0.06	-0.17	0.05	0.06	0.06	-0.226	-0.010	0.000	-0.001
EL	-0.09	-0.14	-0.09	-0.09	-0.09	-0.052	-0.003	0.000	0.000
ES	-0.37	-0.57	-0.38	-0.37	-0.37	-0.204	-0.013	0.000	-0.001
FR	-0.30	-0.52	-0.31	-0.30	-0.30	-0.217	-0.013	0.000	0.000
IT	-0.03	-0.12	-0.04	-0.03	-0.03	-0.090	-0.006	0.000	-0.001
CY	-0.08	-0.17	-0.08	-0.08	-0.08	-0.094	-0.003	0.000	-0.003
LV	-0.05	-0.10	-0.05	-0.05	-0.05	-0.051	-0.002	0.000	0.000
LT	-0.01	-0.04	-0.02	-0.02	-0.01	-0.020	-0.001	0.000	0.000
LU	0.04	-0.11	0.03	0.04	0.04	-0.149	-0.007	0.000	0.000
HU	-0.06	-0.12	-0.06	-0.06	-0.06	-0.063	-0.004	0.000	0.000
MT	-0.01	-0.10	-0.01	-0.01	-0.01	-0.090	-0.006	0.000	-0.001
NL	-0.08	-0.51	-0.10	-0.08	-0.08	-0.424	-0.013	0.000	-0.001
AT	-0.05	-0.24	-0.05	-0.05	-0.05	-0.190	-0.008	0.000	-0.005
PL	-0.05	-0.07	-0.05	-0.05	-0.05	-0.017	-0.001	0.000	0.000
PT	-0.38	-0.56	-0.39	-0.38	-0.39	-0.183	-0.012	0.000	-0.007
RO	-0.04	-0.09	-0.04	-0.04	-0.04	-0.052	-0.003	0.000	0.000
SI	-0.02	-0.08	-0.02	-0.02	-0.02	-0.065	-0.003	0.000	-0.001
SK	-0.05	-0.06	-0.05	-0.05	-0.05	-0.012	-0.001	0.000	0.000
FI	-0.24	-0.47	-0.26	-0.24	-0.24	-0.222	-0.012	0.000	-0.001
SE	-0.06	-0.24	-0.06	-0.06	-0.06	-0.182	-0.010	0.000	-0.002
UK	-0.01	-0.05	-0.01	-0.01	-0.01	-0.049	-0.002	0.000	-0.001
NO	0.16	0.03	0.16	0.16	0.16	-0.128	-0.005	0.001	0.000
EA12	-0.23	-0.41	-0.24	-0.23	-0.23	-0.175	-0.010	0.000	0.000
EA	-0.23	-0.41	-0.24	-0.23	-0.23	-0.175	-0.010	0.000	0.000
EU27	-0.19	-0.33	-0.19	-0.19	-0.19	-0.144	-0.008	0.000	-0.003
EU15	-0.17	-0.33	-0.18	-0.17	-0.17	-0.154	-0.009	0.000	0.000
EU10	-0.05	-0.08	-0.05	-0.05	-0.05	-0.025	-0.001	0.000	0.000
EU25	-0.18	-0.33	-0.19	-0.18	-0.18	-0.143	-0.008	0.000	-0.001

Source: Commission services, EPC.

12. ANNEX 5: The potential long-term implications of the economic crisis

Table 75 - Difference in the potential growth rate (p.p.): Baseline – alternative 'crisis' scenarios

Annual average GDP growth rate, difference from Baseline scenario (Baseline - scenario)																
	Permanent shock					Lost decade					Rebound					
Country	2007-10	2011-20	2021-40	2041-60	*2007-60*	2007-10	2011-20	2021-40	2041-60	*2007-60*	2007-10	2011-20	2021-40	2041-60	*2007-60*	Country
BE	0.6	0.9	0.2	0.2	*0.4*	0.6	0.8	0.0	0.0	*0.2*	0.6	-0.2	0.0	0.0	*0.0*	BE
BG	0.1	0.4	0.3	0.2	*0.3*	0.1	0.3	0.0	0.0	*0.1*	0.1	-0.1	0.0	0.0	*0.0*	BG
CZ	0.4	0.2	0.3	0.2	*0.2*	0.4	0.0	0.0	0.0	*0.0*	0.4	-0.2	0.0	0.0	*0.0*	CZ
DK	0.6	0.5	0.2	0.2	*0.3*	0.6	0.3	0.0	0.0	*0.1*	0.6	-0.3	0.0	0.0	*0.0*	DK
DE	0.5	0.6	0.2	0.3	*0.3*	0.5	0.5	0.0	0.0	*0.1*	0.5	-0.2	0.0	0.0	*0.0*	DE
EE	2.4	1.5	0.3	0.2	*0.6*	2.4	1.4	0.0	0.0	*0.4*	2.4	-1.0	0.0	0.0	*0.0*	EE
IE	2.6	1.3	0.2	0.2	*0.6*	2.6	1.1	0.0	0.0	*0.4*	2.6	-1.0	0.0	0.0	*0.0*	IE
EL	0.6	0.6	0.3	0.2	*0.3*	0.6	0.4	0.0	0.0	*0.1*	0.6	-0.2	0.0	0.0	*0.0*	EL
ES	1.2	0.6	0.2	0.3	*0.4*	1.2	0.4	0.0	0.0	*0.2*	1.2	-0.5	0.0	0.0	*0.0*	ES
FR	0.6	0.9	0.2	0.3	*0.4*	0.6	0.7	0.0	0.0	*0.2*	0.6	-0.2	0.0	0.0	*0.0*	FR
IT	0.5	0.8	0.2	0.3	*0.4*	0.5	0.6	0.0	0.0	*0.2*	0.5	-0.2	0.0	0.0	*0.0*	IT
CY	0.8	0.9	0.3	0.2	*0.4*	0.8	0.8	0.0	0.0	*0.2*	0.8	-0.3	0.0	0.0	*0.0*	CY
LV	3.6	1.6	0.3	0.2	*0.7*	3.6	1.4	0.0	0.0	*0.5*	3.6	-1.5	0.0	0.0	*0.0*	LV
LT	2.3	1.8	0.3	0.2	*0.7*	2.3	1.6	0.0	0.0	*0.5*	2.3	-1.0	0.0	0.0	*0.0*	LT
LU	1.3	0.6	0.3	0.3	*0.4*	1.3	0.5	0.0	0.0	*0.2*	1.3	-0.5	0.0	0.0	*0.0*	LU
HU	1.6	1.6	0.3	0.2	*0.6*	1.6	1.4	0.0	0.0	*0.4*	1.6	-0.7	0.0	0.0	*0.0*	HU
MT	0.4	1.2	0.2	0.2	*0.4*	0.4	1.0	0.0	0.0	*0.2*	0.4	-0.1	0.0	0.0	*0.0*	MT
NL	0.4	0.5	0.2	0.3	*0.3*	0.4	0.4	0.0	0.0	*0.1*	0.4	-0.2	0.0	0.0	*0.0*	NL
AT	0.5	0.4	0.2	0.3	*0.3*	0.5	0.2	0.0	0.0	*0.1*	0.5	-0.2	0.0	0.0	*0.0*	AT
PL	0.9	1.0	0.2	0.2	*0.4*	0.9	0.8	0.0	0.0	*0.2*	0.9	-0.4	0.0	0.0	*0.0*	PL
PT	0.9	0.6	0.2	0.3	*0.4*	0.9	0.4	0.0	0.0	*0.1*	0.9	-0.3	0.0	0.0	*0.0*	PT
RO	1.2	1.2	0.3	0.2	*0.5*	1.2	1.0	0.0	0.0	*0.3*	1.2	-0.5	0.0	0.0	*0.0*	RO
SI	0.2	0.0	0.3	0.2	*0.2*	0.2	-0.1	0.0	0.0	*0.0*	0.2	-0.1	0.0	0.0	*0.0*	SI
SK	0.6	0.1	0.3	0.2	*0.2*	0.6	-0.1	0.0	0.0	*0.0*	0.6	-0.2	0.0	0.0	*0.0*	SK
FI	0.7	0.5	0.2	0.2	*0.3*	0.7	0.4	0.0	0.0	*0.1*	0.7	-0.3	0.0	0.0	*0.0*	FI
SE	0.7	0.9	0.2	0.2	*0.4*	0.7	0.7	0.0	0.0	*0.2*	0.7	-0.3	0.0	0.0	*0.0*	SE
UK	1.0	0.8	0.2	0.2	*0.4*	1.0	0.6	0.0	0.0	*0.2*	1.0	-0.4	0.0	0.0	*0.0*	UK
NO	0.8	0.1	0.3	0.3	*0.3*	0.8	-0.1	0.0	0.0	*0.1*	0.8	-0.4	0.0	0.0	*0.0*	NO
EA12	0.7	0.7	0.2	0.3	*0.4*	0.7	0.6	0.0	0.0	*0.2*	0.7	-0.2	0.0	0.0	*0.0*	EA12
EA	0.7	0.7	0.2	0.2	*0.4*	0.7	0.5	0.0	0.0	*0.1*	0.7	-0.4	0.0	0.0	*0.0*	EA
EU27	0.8	0.7	0.2	0.2	*0.4*	0.8	0.6	0.0	0.0	*0.2*	0.8	-0.3	0.0	0.0	*0.0*	EU27
EU15	0.7	0.7	0.2	0.2	*0.4*	0.7	0.6	0.0	0.0	*0.2*	0.7	-0.3	0.0	0.0	*0.0*	EU15
EU10	1.0	0.8	0.3	0.2	*0.4*	1.0	0.7	0.0	0.0	*0.2*	1.0	-0.4	0.0	0.0	*0.0*	EU10
EU25	0.7	0.7	0.2	0.2	*0.4*	0.7	0.6	0.0	0.0	*0.2*	0.7	-0.3	0.0	0.0	*0.0*	EU25

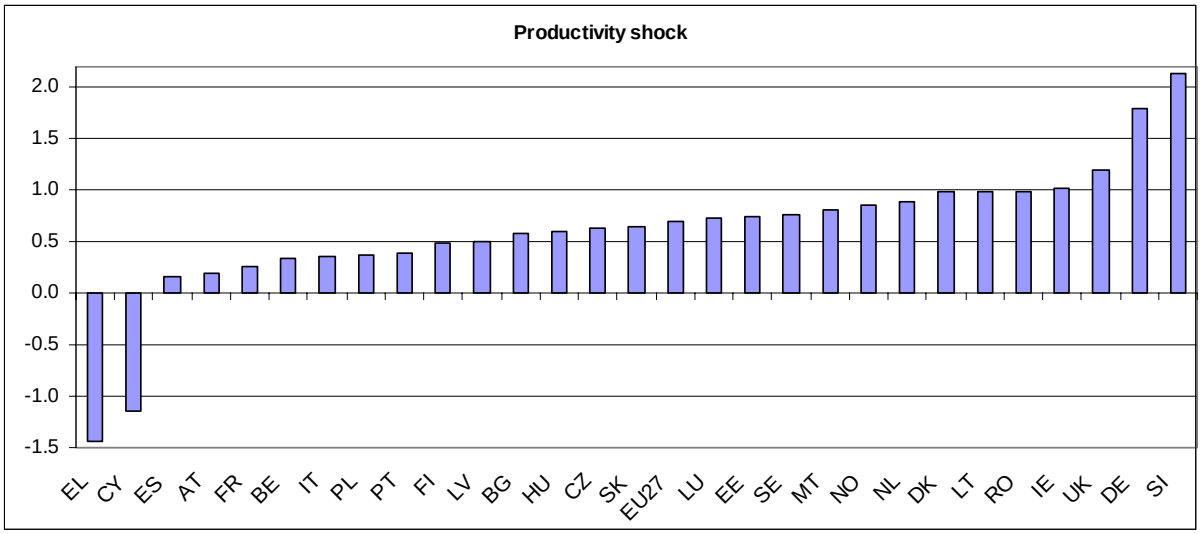
Source: Commission services, EPC.

Table 76 - Public pension expenditure under the AWG baseline and difference to the alternative crisis scenarios, % and p.p. change of GDP

Public pension-to-GDP ratio, p.p. of GDP								
	Change 2007-2020				Change 2007-2060			
		Difference from baseline				Crisis scenarios		
Country	Baseline (% of GDP)	Rebound - Baseline	Lost decade - Baseline	Permanent shock - Baseline	Baseline (% of GDP)	Rebound - Baseline	Lost decade - Baseline	Permanent shock - Baseline
BE	1.8	*0.0*	*1.1*	*1.2*	4.8	*0.0*	*1.4*	*2.6*
BG	0.1	*0.0*	*-0.4*	*-0.3*	3.0	*0.0*	*-1.0*	*-0.6*
CZ	-0.9	*0.0*	*0.2*	*0.3*	3.3	*0.0*	*0.5*	*0.7*
DK	1.6	*0.0*	*0.2*	*0.2*	0.1	*0.0*	*0.1*	*0.2*
DE	0.0	*0.0*	*0.1*	*0.1*	2.3	*0.0*	*0.1*	*0.1*
EE	0.3	*0.0*	*0.4*	*0.4*	-0.7	*0.0*	*0.3*	*0.4*
IE	1.1	*0.0*	*0.9*	*0.8*	6.1	*0.0*	*1.6*	*1.4*
EL	1.5	*0.0*	*1.4*	*1.8*	12.4	*0.0*	*1.3*	*3.8*
ES	1.1	*0.0*	*0.9*	*1.0*	6.7	*0.0*	*1.4*	*2.6*
FR	0.6	*0.0*	*1.2*	*1.4*	1.0	*0.0*	*1.0*	*2.0*
IT	0.1	*0.0*	*1.0*	*1.2*	-0.4	*0.0*	*0.3*	*0.9*
CY	2.6	*0.0*	*1.7*	*2.0*	11.4	*0.0*	*0.9*	*1.7*
LV	-0.3	*0.0*	*0.9*	*1.0*	-0.4	*0.0*	*0.6*	*0.9*
LT	0.1	*0.0*	*0.3*	*0.4*	4.6	*0.0*	*0.5*	*0.6*
LU	1.2	*0.0*	*0.9*	*1.0*	15.2	*0.0*	*0.1*	*0.1*
HU	0.2	*0.0*	*1.6*	*1.7*	3.0	*0.0*	*0.6*	*1.0*
MT	2.1	*0.0*	*0.9*	*1.0*	6.2	*0.0*	*0.7*	*1.6*
NL	1.2	*0.0*	*0.2*	*0.3*	4.0	*0.0*	*0.3*	*0.3*
AT	0.3	*0.0*	*0.7*	*0.9*	0.9	*0.0*	*0.7*	*2.1*
PL	-1.8	*0.0*	*0.9*	*1.0*	-2.8	*0.0*	*0.5*	*1.0*
PT	1.0	*0.0*	*0.8*	*0.9*	2.1	*0.0*	*1.0*	*1.9*
RO	2.3	*0.0*	*-0.1*	*-0.1*	9.2	*0.0*	*-0.2*	*-0.1*
SI	1.2	*0.0*	*-0.2*	*-0.2*	8.8	*0.0*	*-0.2*	*-0.3*
SK	-0.5	*0.0*	*0.3*	*0.4*	3.4	*0.0*	*0.3*	*0.4*
FI	2.6	*0.0*	*0.8*	*1.0*	3.3	*0.0*	*0.5*	*1.0*
SE	-0.1	*0.0*	*0.7*	*0.8*	-0.1	*0.0*	*0.7*	*0.9*
UK	0.3	*0.0*	*0.3*	*0.3*	2.7	*0.0*	*0.5*	*0.6*
NO	2.6	*0.0*	*0.1*	*0.1*	4.7	*0.0*	*0.1*	*0.3*
EU27	0.4	*0.0*	*0.7*	*0.8*	2.4	*0.0*	*0.6*	*1.1*
EA	0.5	*0.0*	*0.8*	*0.9*	2.7	*0.0*	*0.7*	*1.3*
EA12	0.5	0.0	0.8	0.9	2.7	0.0	0.7	1.3
EU15	0.5	0.0	0.7	0.8	2.4	0.0	0.6	1.2
EU10	-0.9	0.0	0.7	0.8	1.0	0.0	0.3	0.6
EU25	0.4	0.0	0.7	0.8	2.3	0.0	0.6	1.1

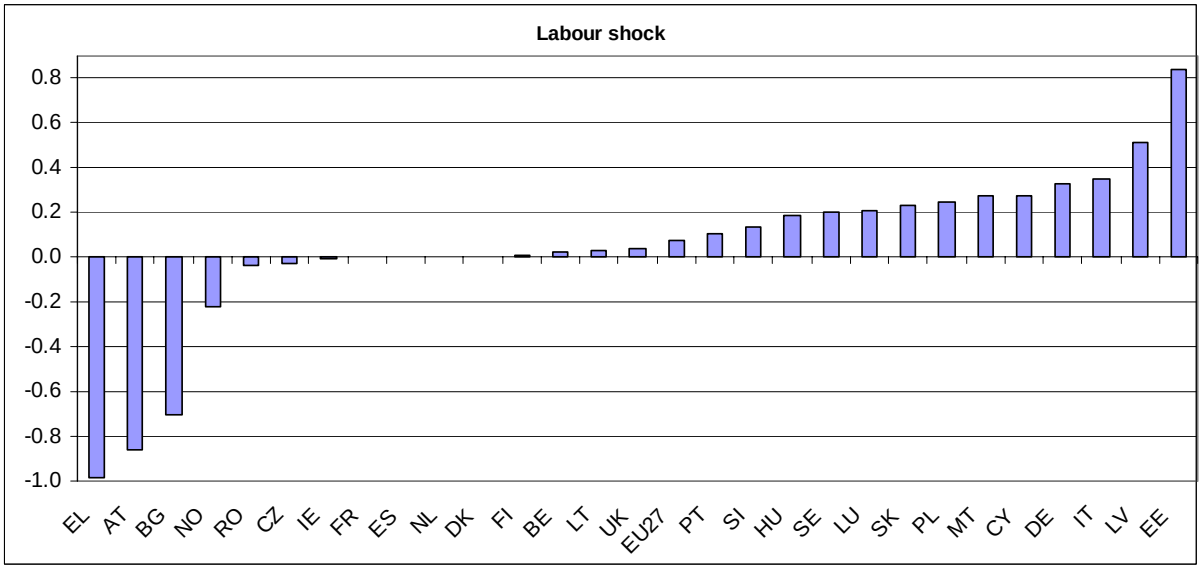
Source: Commission services, EPC.

Graph 97 – Average elasticity (2007-2060) of public pension expenditure with respect to GDP: labour productivity growth shock



Source: Commission services, EPC.

Graph 98 – Average elasticity (2007-2060) of public pension expenditure with respect to GDP: structural unemployment rate shock



Source: Commission services, EPC.

13. REFERENCES

J. Albrecht, M. Neyt and T. Verbeke (2005), *'Bureaucratisation and the growth of health care expenditures in Europe'*, Working Papers of Faculty of Economics and Business Administration, Ghent University, No. 05/335.

Australian Productivity Commission (2005), *'Economic Implications of an Ageing Australia'*, Research Report, Canberra, Australia.

Bac C. (2004), *'Les déterminants macro-économiques des dépenses de santé : comparaison entre quelques pays développés'*. Annex to : Alain Vasselle, Projet de loi relatif à l'assurance maladie. Rapport n° 424 (2003-2004), fait au nom de la commission des affaires sociales, déposé le 21 juillet 2004, available at: http://www.senat.fr/rap/l03-424-1/l03-424-112.html

Bac C. and D.Balsan (2001), *'Modélisation des dépenses d'assurance maladie'*, Document de travail, No.19, Direction de la recherche, des études, de l'évaluation et des statistiques DREES.

Baldacci E. and D. Tuzi, (2003), *'Demographic trends and pension system in Italy: an assessment of 1990s reforms'*, in Labour, No. 17, Vol. 17, special issue.

Barro, R.J. and X. Sala-i-Martin (1995), *'Economic Growth'*. McGraw-Hill, USA.

Batljan I. and M.Lagergren (2004), *'Inpatient/outpatient health care costs and remaining years of life. Effect of decreasing mortality on future acute health care demand'*, Social Science and Medicine, Vol.59, pp.2459-2466.

Blomqvist, A. G. and R.A.L. Carter (1997), *'Is health care really a luxury?'*, Journal of Health Economics, Elsevier, vol. 16(2), pp. 207-229.

Booth H., Maindonald J. and Smith L. (2002), *'Applying Lee-Carter under conditions of variable mortality decline'*, Population Studies, No. 56, pp. 325-336.

Brugiavini A. and F. Peracchi (2005), *'Fiscal implications of pension reforms in Italy'*, in Gruber J; and D; A. Wise (editors)(2005), *'Social Security Programs and Retirement around the World: Fiscal Implications'*, NBER Website. 26 July 2005.

Brugiavini A. and F. Peracchi (2003), '*Wealth and Retirement decisions*', Labour, Vol. 17, Special Issue, Blackwell Publishing.

Burniaux J., M., R. Duval and F. Jaumotte (2003), *'Coping with ageing: a dynamic approach to quantify the impact of alternative policy options on future labour supply in OECD countries'*, OECD Economic Department WP. No. 371.

Busse R., C.Krauth and F.W.Schwartz (2002), '*Use of acute hospital beds does not increase as the population ages: results from a seven year cohort study in Germany*', Journal of Epidemiology and Community Health 2002, Vol. 56, pp.289-293.

Börsch-Supan A. (2003), *'Labor market effects of population aging'*, Labour, Vol. 17, Special Issue, Blackwell Publishing.

Carone G. (2005): *'Long-term labour force projections for the EU25 Member States: a set of data for assessing the impact of ageing'*, DG ECFIN, European Economy, *Economic Papers No. 235*.

Carone G., D. Costello, N. Diez Guardia, G. Mourre, B. Przywara, A. Salomaki (2005), *'The economic impact of ageing populations in the EU25 Member States'*, DG ECFIN, European Economy, *Economic Papers No. 236*.

Carone G., Denis C., McMorrow K., Mourre G. and W. Röger (2006), *'Long-term labour productivity and GDP projections for the EU25 Member States: a production function framework'*, DG ECFIN, European Economy, *Economic Papers, No. 253*.

Carrion-i-Silvestre, J. Ll. (2005), *'Health Care Expenditure and GDP: Are They Broken Stationary?'*, *Journal of Health Economics*, 24(5), pp. 839-854.

Culyer A.J. (1990), *'Cost containment in Europe'*, in: Health Care Systems in Transition, OECD.

Denis C., D. Grenouilleau, K. Mc Morrow and W. Röger (2006): *'Calculating potential growth rates and output gaps – A revised production function approach'*, DG ECFIN, European Economy, *Economic Papers No. 247*.

Docteur E. and H. Oxley (2003), *'Health-care systems: lessons from the reform experience'*, OECD Health Working Papers, No. 9, DELSA/ELSA/WD/HEA(2003)9.

Downes, J., A. Drew and P. Ollivaud (2003), *'The OECD medium-term reference scenario: economic outlook'*, OECD Economics Department Working Papers, No. 372, Paris.

Duval R. (2003), *'The retirement effects of old-age pension and early retirement schemes in OECD countries'*, OECD Economic Department WP, No. 370.

Economic Policy Committee (2001), '*Budgetary challenges posed by ageing populations*', EPC/ECFIN/655/01-EN of 24 October 2001.

Economic Policy Committee (2003a), '*The impact of ageing populations on public finances: overview of analysis carried out at EU level and proposals for a future work programme*', EPC/ECFIN/407/04-rev.3-EN of 22 October 2003.

Economic Policy Committee (2003b), '*Budgetary challenges posed by ageing population: the impact on public spending on education*', EPC/ECFIN/435 or 22 October 2003.

Economic Policy Committee (2008), *'The 2009 budgetary projection exercise of the Ageing Working Group: Second progress report to the EPC'*, ECFIN/CEFCPE(2008)REP/ 52951 rev, Brussels, 23/06/2008.

Economic Policy Committee and European Commission (2005), *'The 2005 EPC projections of age-related expenditure (2004-2050) for the EU25 Member States: underlying assumptions and projection methodologies'* in European Economy Reports and Studies, No.4.

Economic Policy Committee and European Commission (2006*), 'The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-*

term care, education and unemployment transfers (2004-2050)', European Economy, Special report, No. 1/2006.

Economic Policy Committee and European Commission (2007) *'Pensions Schemes and Projection Models in EU-25 Member States'*, European Economy, Occasional papers No. 35, November 2007.

European Commission (2006), *'The long-term sustainability of public finances in the European Union'*, European Economy, No. 4/2006.

European Commission and Economic Policy Committee (2008), '*The 2009 Ageing Report: Underlying Assumptions and Projection Methodologies for the EU-27 Member States (2007-2060)',* European Economy, No. 7/2008.

European Commission (2008a), *'Economic forecast – Spring 2008'*, European Economy, No. 1/2008.

European Commission (2008b), *'Public finances in EMU in 2008'*, European Economy, No. 4/2008.

Eurostat (2004), *'Classification of funded pension schemes in case of government responsibility or guarantee'*, News release 30/2004, 2 March.

Eurostat (2005a) '*EU25 population rises until 2025, then falls*', Eurostat press release 448/2005 of 8 April 2005.

Eurostat (2005b), *'AWG ad hoc scenario'*, presentation to the AWG meeting of 16 June 2006.

Eurostat (2008a), *'Ageing characterises the demographic perspectives of the European societies'*, Statistics in Focus, No. 72/2008.

Eurostat (2008b), *'Population projections 2008-2060. From 2015, deaths projected to outnumber births in the EU27'*, News release No. 119/2008, 26/8/2008. EUROPOP2008 convergence scenario is available at:

http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/data/popul/populat/proj/proj_08c&language=en&product=EU_MAIN_TREE&root=EU_MAIN_TREE&scrollto=263

Eurostat (2009), *'Methodology and main results of the Eurostat Population Projections 2008-based (EUROPOP2008)'*, Eurostat, Methodologies and Working Papers series, Luxembourg, forthcoming.

Fries J.F. (1980), '*Ageing, natural death, and the compression of morbidity'*, The New England Journal of Medicine, Vol. 303, pp. 130-135.

Fries J.F. (1989), '*The compression of morbidity: near or far?'*, Milbank Memorial Fund Quarterly, Vol. 67, pp. 208-232.

Gerdtham U.G. (1992), '*Pooling international health care expenditure data'*, Health Economics, Vol. 1, pp. 217-231.

Gerdtham U.G. and M.Löthgren (2000), *'On stationarity and cointegration of international health expenditure and GDP'*, Journal of Health Economics, No. 19(4), pp. 461-75.

Gerdtham U.G., J.Sogaard, B.Jonsson, F.Andersson (1992a), *'A Pooled Cross-Section Analysis of the Health Care Expenditures of the OECD Countries'*, Developments in Health Economics And Public Policy, Vol. 1, pp. 287-310.

Gerdtham U.G., J.Sogaard, F.Andersson, B.Jonsson (1992b), *'An Econometric Analysis of Health Care Expenditure: a Cross-Section Study of the OECD Countries'*, Journal of Health Economics, May, Vol. 11(1), pp. 63-84.

Getzen, T.E. (1990), *'Macro Forecasting of National Health Expenditures'*, Advances in Health Economics and Health Services Research, Vol. 11, pp. 27-48.

Getzen T.E. (2000), *'Health care is an individual necessity and a national luxury: Applying multilevel decision models to the analysis of health care expenditures'*, Journal of Health Economics, Vol. 19(2), pp. 259-270.

Global Forum for Health Research (2006), *'Monitoring Financial Flows for Health Research 2006: The changing landscape of health research for development'*.

Global Forum for Health Research (2008), *'Monitoring Financial Flows for Health Research 2008: Prioritizing research for health equity'*.

Gruber J. and D.A. Wise (2002), *'Social Security Programs and Retirement Around the World: Micro Estimation'*, NBER Working Paper No. W9407.

Gruber J. and D.A. Wise (2005a), *'Social security programs and retirement around the world: fiscal implications-Introduction and summary'*, NBER Working Paper No. 11290.

Gruber J and D.A. Wise (editors) (2005b), *'Social Security Programs and Retirement around the World: Fiscal Implications'*, NBER Website. 26 July 2005. http://www.nber.com/books/intlSS-p3/index.html.

Gruenberg E.M. (1977), *'The failure of success'*, Millbank Memorial Fund Quarterly, Vol. 55, pp. 3-24.

Hansen P. and A. King (1996), *'The determinants of health care expenditure: A cointegration approach'*, Journal of Health Economics, Vol. 15(1), pp. 127-137.

Hatton, T. J. and J. G. Williamson (2003), *'What fundamentals drive world migration?'* Discussion Paper No. 2003/23, United Nations University/ World Institute for Development Economics Research, March.

Latulippe D. (1996) *'Effective retirement age and duration of retirement in the industrial countries between 1950 and 1990'*, ILO, Issues in Social Protection DP No. 2.

Leu R.E. (1986), *'The public-private mix and international health care costs'*, in A.J. Culyer and B.Jönsson, eds., *Public and Private Health Services: Complementarities and Conflicts*, Blackwell, Oxford and New York, pp. 41-63.

L'Horty Y., A.Quinet, F.Rupprecht (1997), '*Expliquer la croissance des dépenses de santé: le rôle de niveau de vie et du progrès technique'*, Economie et Prévision, No. 129-130, pp. 255-266.

MacDonald G. and S.Hopkins (2002), *'Unit root properties of OECD health care expenditure and GDP data'*, Health Economics No. 11, pp. 371-376.

Madsen M. (2004), '*Methodologies to incorporate 'death-related' costs in projections of health and long-term care based on Danish data'*, Ministry of Finance, Denmark.

Manton K.G. (1982), *'Changing concepts of morbidity and mortality in the elderly population'*, Milbank Memorial Fund Quarterly, Vol. 60, pp. 183-244.

Montanino A., B.Przywara and D.Young (2004), *'Investment in Education: the Implications for Economic Growth and Public Finances'*, DG ECFIN, European Economy, *Economic Papers, No. 217*.

Murthy N.R.V. and V.Ukpolo (1994), '*Aggregate health care expenditure in the United States'*, Applied Economics, Vol. 26, pp. 797-802.

Muscatelli A. and S.Hurn (1992), *'Econometric modeling of cointegrated time series'*, Journal of Economic Surveys No. 6, pp. 1-43.

Newhouse J.P. (1992), '*Medical Care Costs: How Much Welfare Loss?'*, Journal of Economic Perspectives, Summer, Vol.6(3), pp. 3-21.

OECD (1998), '*Health Policy Brief. Ageing and Technology'*, Working Party on Biotechnology, DSTI/STP/BIO(97)13 of 17 June 1998.

OECD (2003), '*Labour force participation of groups at the margin of the labour market: past and future trends and policy challenges*', Working Party No. 1 on Macroeconomic and Structural Policy Analysis, ECO/CPE/WP1(2003)8.

OECD (2006a), '*Costs of Care for Elderly Populations. Guidelines for estimating long-term care expenditure'*, DELSA/HEA/DIS(2006)4, 14 February 2006.

OECD (2006b), '*Projecting OECD Health and Long-term Care Expenditures: What are the Main Drivers?'*, OECD Economics Department Working Paper No. 477.

OECD (2007), *'Data collection on long-term care (focussing on recipients)'*, Meeting of OECD Health Data National Correspondents, DELSA/HEA/HD(2007)7, 28 September 2007.

Okunade A.A and V.N.R.Murthy (2002), *'Technology as a 'major driver' of health care costs: a cointegration analysis of the Newhouse conjecture'*, Journal of Health Economics, Vol.21(1), pp.147-159.

Oliveira Martins J. and C. de la Maisonneuve (2006), *'The Drivers of Public Expenditure on Health and Long-Term Care: An Integrated Approach'*. OECD Economic Studies No. 43, 2006/2.

Olshansky S.J., M.A.Rudberg, B.A.Carnes, C.K.Cassel, J.A.Brody (1991), '*Trading off longer life for worsening health'*, Journal of Aging and health, Vol. 3, pp. 194-216.

Raitano M. (2006), *'The Impact of Death-Related Costs on Health-Care Expenditure: A Survey'*, ENEPRI Research Report No. 17.

Rochaix L. and S.Jacobzone (1997), *'L'hypothèse de demande induite : un bilan économique'*, Economie et Prévision, No.129-130, pp. 25-35.

Rogers A. and Castro L.J. (1981), *'Model Migration Schedules'*, IIASA Research Report RR-81-03, Laxenburg (AT).

Scherer P. (2002), '*Age of withdrawal from the labour force in the OECD countries*', Labour Market and Social policy Occasional Papers, No. 49-DELSA.

Schmertmann C. (2003), *'A system of model fertility schedules with graphically intuitive parameters'*, Demographic Research, No. 9, pp. 81-110.

Schmertmann C. (2005): *'Quadratic spline fits by nonlinear least squares'*, Demographic Research, No. 12, pp. 105-106.

Schulz E. (2005), '*The influence of supply and demand dfactors on aggregate health care expenditure with a specific focus on age composition'*. ENEPRI Research Report No.16.

Seshamani M. and A.M.Gray (2004), '*A longitudinal study of the effects of age and time to death on hospital costs'*, Journal of Health Economics, Vol. 23, No. 2, pp. 217-235.

Siegel J.S. and Swanson D.A. eds. (2004), *'The Methods and Materials of Demography'*, 2nd ed. Elsevier Academic Press, San Diego (USA).

Solow, R. M. (1956), *'A Contribution to the Theory of Economic Growth'*, Quarterly Journal of Economics, No. 70, pp. 65-94.

Technical Panel on Assumptions and Methods (2007), Report to the Social Security Advisory Board, October.

United Nations (2004), *'World Population Prospects – The 2002 Revision'*, Vol. III, Analytical Report.

United Nations (2008), *'World Population Prospects: The 2006 Revision'*, Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

Verbrugge L.M. (1984), *'Longer life but worsening health? Trends in health and mortality of middle-aged and older persons'*, Milbank Memorial Fund Quarterly, Vol. 62, pp. 475-519.

World Health Organization (2000), '*The World Health Report 2000. Health Systems: Improving Performance'*.

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