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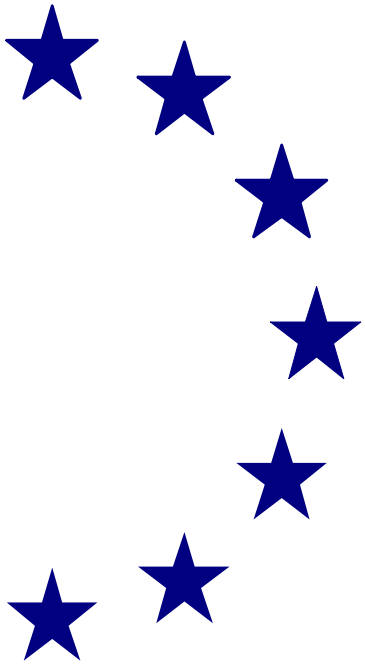

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The 2005 EPC projection of age-related expenditure:

Agreed underlying assumptions and projection methodologies

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Economic Policy Committee

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The 2005 EPC projection of age-related expenditure: Agreed underlying assumptions and projection methodologies

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1. Underlying assumptions in baseline scenario and planned sensitivity tests

1.1 Overview of the 2005 projection exercise of age-related expenditure

The mandate and broad principles

In 2003, the ECOFIN Council gave the Economic Policy Committee (EPC) a mandate to produce a new set of long-run budgetary projections for all twenty-five Member States covering pensions, health care, long-term care, education, unemployment transfers and, if possible, contributions to pensions/social security systems.[1] This follows the projection exercises of 2001 and 2003.[2] The age-related expenditure 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 the analysis on the impact of ageing populations on the labour market and potential growth which will be relevant for the Lisbon strategy and Broad Economic Policy Guidelines.

In light of this mandate, the EPC developed a work programme establishing the broad arrangements for organising the budgetary projection exercise and for reaching agreement on the assumptions and methodologies.[3] The work has been carried out by the EPC Working Group on Ageing Populations (AWG) and the Commission services with a view to improve the earlier projection exercise 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 agreed principles of simplicity, comparability, consistency, prudence and transparency.

To this end, it was agreed that the projections should be made on the basis of a common demographic projection and common macroeconomic assumptions to be agreed in the EPC, which would be used for all age-related expenditure items. It was also agreed that the projections should be made on the basis of "no policy change", i.e. only reflecting enacted legislation but not possible future policy changes (although account would be taken of provisions in enacted legislation that enter into force over time).

Participation in the budgetary projection exercise and working method

The work has been prepared by experts from 25 Member States, the Commission services (represented by DG ECFIN, the Directorate General for Economic and Financial Affairs), the ECB and the OECD. DG ECFIN has provided necessary analysis and calculations. The European Central Bank, the OECD[4] and IMF[5] have also contributed to the work. Eurostat

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1 Member States can also submit projections for additional expenditure and revenue items, for example family allowances, to the AWG provided they are based on the agreed underlying assumptions.

2 The 2001 projections on pension, health care and long-term were published in Economic Policy Committee (2001), '*Budgetary challenges posed by ageing populations*', EPC/ECFIN/655/01-EN of 24 October 2001. The projections on education and unemployment transfers were included in Economic Policy Committee (2003) '*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/435/03of 22 October 2003 which summarises more recent projections made by several EU Member States, and outlines how the budgetary projections are used in the annual assessment of the sustainability of Member States' public finances.

3 "*Work programme for the 2004/05 long-run budgetary projection exercise*", Note from DG ECFIN to the AWG (ECFIN/1/04-EN) of 8 January 2004.

4 The 2001 projections were carried out in parallel with the OECD, see Dang et al. (2001), *'The fiscal implications of ageing: projections of age-related spending'*, OECD Economics Department Working Papers, ECO/WKP(2001)31, Paris. In 2004, the OECD envisaged

have played a central role by preparing a population projection. Other Commission services have also been associated with this work, especially the Directorate General Employment, Social Affairs and Equal Opportunities Directorate General and the Health and Consumer Protection. The EPC and its AWG have coordinated the work with other Council formations, especially the Social Protection Committee.[6]

EPC expressed a strong preference for national statistical institutes to be closely involved in the preparation of the Eurostat population projection. This has been achieved by Eurostat, which actively consulted Member States via the "Population Projection" Interest Group on CIRCA, and through meetings of Eurostat's Working Group on Population Projection.

Coverage and general overview

Graph 1 below presents an overview of the entire age-related projection exercise. The starting point is a common "AWG scenario" population projection for the period 2004 to 2050. Next, the EPC agreed a common set of exogenous macroeconomic assumptions covering the labour force (participation, employment and unemployment rates), labour productivity and the real interest rate. These combined assumptions enable the computation of GDP for all Member States up to 2050.

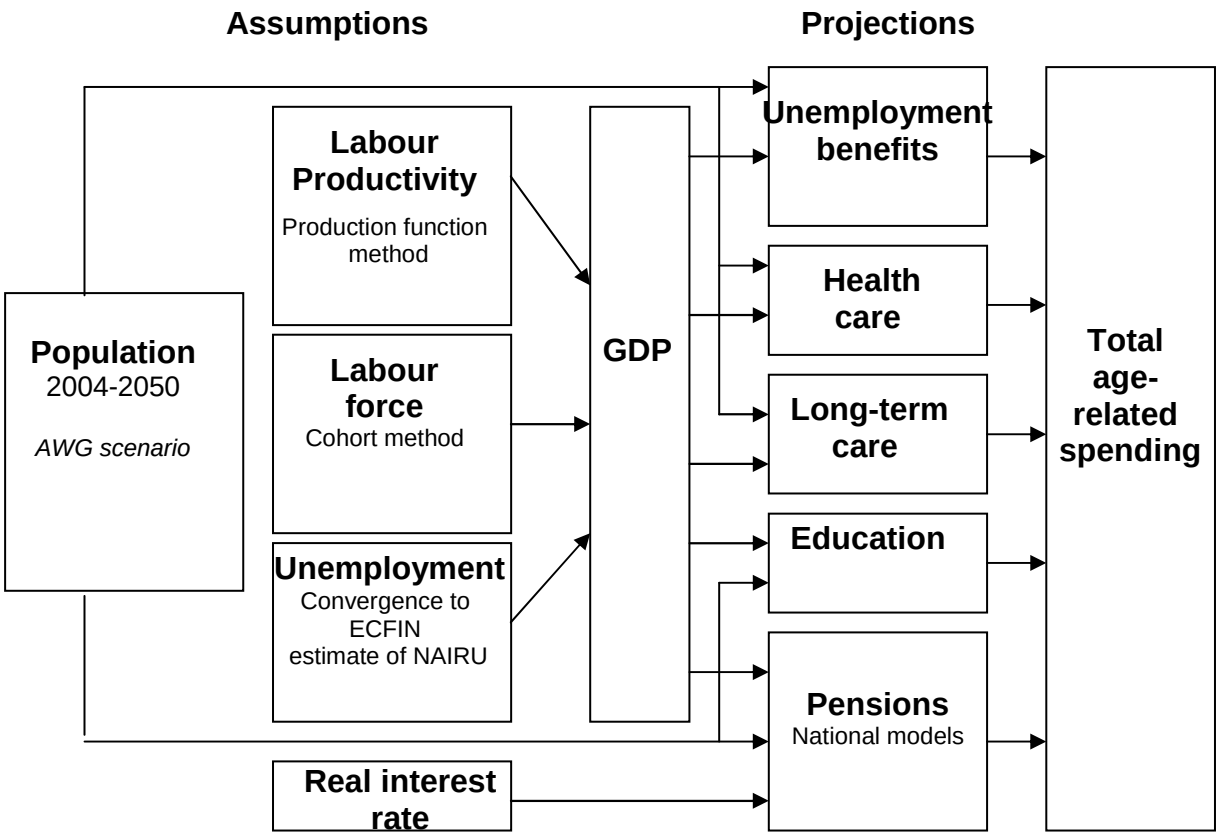
On the basis of these assumptions, separate budgetary projections are run for five age-related expenditure items. The projections for pensions are run by the Member States using their own national model(s). The projections for health care, long-term care, education and unemployment are run by the European Commission, on the basis of a common projection model. The results of the set of projections will be aggregated to provide an overall projection of age-related public expenditures.

running a parallel exercise alongside the EPC's, see OECD (2004), '*Report on the Joint EC/OECD Ad Hoc Meeting of Experts on Revised Projections of the Fiscal Cost of Ageing*'. ECO/CPE/WP1(2004)5. This project did not proceed, although the OECD Secretariat has actively contributed to theEPC's work. The OECD continues work on issues related to ageing populations, see Oliveira et al. (2005), '*The impact of ageing on demand, factor markets and growth*', OECD Economic Working Papers N°249.

[5] The work of the EPC does not reflect the positions of these international organisations.

[6] The EPC and DG ECFIN would like to thank David Stanton, Chairman of the Indicators Sub-Group attached to the SPC, for his valuable contributions to the budgetary projection exercise.

Graph 1 Overview of the 2005 projection of age-related expenditure



Approach to agreeing on the underlying assumptions and specific adjustments

The EPC adopted the following approach to reach agreement on the underlying exogenous assumptions and on the projection methodologies to use:

- a survey of the economic literature was carried out to identify best practices in international organisations and national authorities in making long-run budgetary projections. This has mostly been done on the basis of contributions from DG ECFIN and the OECD, and AWG members;

- on issues where specific expertise was requireda series of workshops was organised to which external academics and experts were invited;[7]

- the EPC has reached agreement on underlying assumptions, projection methodologies and coverage by consensus on the basis of proposals prepared by DG ECFIN. The underlying assumptions have been made by applying a common methodology uniformly to all Member States. Specific adjustments have, however, been made for several Member States, either to take account of relevant country-specific

[7] The EPC and DG ECFIN would like to express their gratitude to Adelina Comas-Herrera and Ilija Batljan who provided advice on projection methodologies to be used to project health care and long-term care spending during their periods as Visiting Research Fellows in DG ECFIN. The work does not reflect the positions of these individuals, nor of any contributors to the workshops/ conferences organised to prepare the budgetary projections.

circumstances or when the common methodology led to economically unsound outcomes. Table 1 below provides an overview of the underlying assumptions, indicating the Member States for which adjustments were made to the commonly agreed methodology;

- given the uncertainty surrounding the assumptions underpinning long-run budgetary projections, a number of sensitivity tests will be carried our in addition to the baseline or central variant, so as to quantify the responsiveness of projection results to changes in key underlying assumptions;

- 'pure' sensitivity tests are planned, which introduce a uniform change or shock to a single underlying assumption/ parameter in the projection framework for all Member States. Additonal 'policy scenario' on migration may be carried out in 2006, after the budgetary projections are finalised. This would allow to gauge the impact of policy measures (but moving away from a "no policy change" scenario, introducing asymmetric shocks across Member States relative to the baseline scenario, and possibly involving several assumptions/ parameters);

- before being finalised, the budgetary projections will be subject to a process of peer review in the AWG. In addition, the EPC will use the country fiches provided by Member States , which will *inter alia* describe the national pension model(s) used to make the pension projection and other relevant information on data sources and institutional factors which could be driving the budgetary projections.

Table 1 Overview of underlying assumptions and adjustments for certain Member States

	Population AWG scenario (differences compared with EUROPOP2004)		Labour force projections			Productivity		
	Convergence in life-expectancy across EU15	Data adjustment for migration	Data adjustment for pension reforms	Data adjustment for conversion into national account equivalent	Special convergence rule on NAIRU	Data adjustment for conversion into national account equivalent	TFP adjustment to speed up the catch up of EU15 countries	Real convergence of EU10
BE								
CZ								
DK								
DE								
EE								
EL								
ES								
FR								
IE								
IT								
CY								
LV								
LT								
LU								
HU								
MT								
NL								
AT								
PT								
PO								
SI								
SK								
FI								
SE								
UK								

Source: DG ECFIN
Note: The grey areas indicate the adjustments that have been made.

1.2 Demographic projections

1.2.1 Background and main features of baseline population scenario

The EPC agreed to use a population projection prepared by Eurostat, hereafter referred to as the "AWG scenario". It is based on, but is not identical to, the EUROPOP2004 projection released by Eurostat in May 2005 (see Eurostat, 2005c).[8] In brief:

- the fertility rate assumptions are the same as those in the baseline of EUROPOP2004 for all 25 Member States;

- for the EU10, the assumptions on life expectancy are the same as those in the baseline of EUROPOP2004. For the EU15, the assumptions on life expectancy are based on an AWG scenario produced by Eurostat;

- the migration assumptions are the same as those in the baseline of EUROPOP2004 for all Member States, except Germany, Italy and Spain, where specific adjustments were made to the level and or age structure of migrants in the AWG scenario.

1.2.2 Fertility rate

The fertility rate assumptions in the AWG scenario are the same as those used in the baseline of EUROPOP2004 for all 25 Member States. For the EU15 Member States, fertility is derived from an analysis of postponement of childbearing and recuperation of fertility rates at a later age.[9] The fertility assumptions for the EU10 Member States have been prepared on the basis of a study made for Eurostat by the Netherlands Interdisciplinary Demographic Institute (NIDI). Fertility is postponed as a consequence of modernisation and westernisation; at the end of the projection period, fertility rates in most EU10 countries are assumed to converge to an EU average median age at childbearing of 30 years.

Table 2 presents the fertility assumptions used in the EPC budgetary projection exercise. The total fertility rates increase over the projection period in all Member States, except France, Ireland and Malta, where slight declines are projected. In all cases, fertility rates will remain well below the natural replacement rate of 2.1 needed to stabilise the population size. For the EU25,[10] fertility rates are projected to rise from 1.48 in 2004 to 1.60 by 2030 and to stay constant around that level until 2050.

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[8] Eurostat (2005) '*EU25 population rises until 2025, then falls*', Eurostat press release 448/2005 of 8 April 2005. For simplicity, the baseline variant of the trend scenario of EUROPOP2004 is referred to as EUROPOP2004 baseline in the text.

[9] For an overview of the methodology used, see Eurostat (2004), '*EUROPOP2004: methodology for drafting fertility assumptions in the EU15 Member States*', ESTAT/F/1/POP/06(2004)/FS REV.1, 2 December 2004.

[10] Note that all EU averages are weighted by the population size.

Table 2 Baseline assumptions on fertility rates used in the 2005 EPC budgetary projection exercise

	2004	2010	2020	2030	2040	2050	*change*
BE	1.62	1.66	1.69	1.70	1.70	1.70	*0.08*
DK	1.76	1.78	1.79	1.79	1.80	1.80	*0.04*
DE	1.35	1.41	1.44	1.45	1.45	1.45	*0.10*
GR	1.29	1.41	1.49	1.50	1.50	1.50	*0.21*
ES	1.30	1.36	1.40	1.40	1.40	1.40	*0.10*
FR	1.89	1.87	1.86	1.85	1.85	1.85	*-0.04*
IE	1.97	1.89	1.81	1.80	1.80	1.80	*-0.17*
IT	1.31	1.38	1.40	1.40	1.40	1.40	*0.09*
LU	1.65	1.73	1.78	1.79	1.80	1.80	*0.15*
NL	1.75	1.76	1.75	1.75	1.75	1.75	*0.00*
AT	1.40	1.42	1.44	1.45	1.45	1.45	*0.05*
PT	1.45	1.52	1.59	1.60	1.60	1.60	*0.15*
FI	1.76	1.78	1.79	1.80	1.80	1.80	*0.04*
SE	1.74	1.84	1.85	1.85	1.85	1.85	*0.11*
UK	1.72	1.74	1.75	1.75	1.75	1.75	*0.03*
CY	1.47	1.43	1.49	1.50	1.50	1.50	*0.03*
CZ	1.15	1.24	1.44	1.50	1.50	1.50	*0.35*
EE	1.39	1.45	1.54	1.60	1.60	1.60	*0.21*
HU	1.30	1.33	1.51	1.59	1.60	1.60	*0.30*
LT	1.29	1.30	1.41	1.55	1.60	1.60	*0.31*
LV	1.30	1.42	1.53	1.59	1.60	1.60	*0.30*
MT	1.66	1.49	1.54	1.60	1.60	1.60	*-0.06*
PL	1.21	1.19	1.42	1.58	1.60	1.60	*0.39*
SK	1.19	1.18	1.33	1.52	1.59	1.60	*0.41*
SI	1.18	1.27	1.46	1.50	1.50	1.50	*0.32*
EU25	*1.48*	*1.52*	*1.57*	*1.59*	*1.60*	*1.60*	*0.12*
EU15	*1.53*	*1.57*	*1.60*	*1.60*	*1.60*	*1.61*	*0.07*
EU10	*1.23*	*1.24*	*1.44*	*1.56*	*1.58*	*1.58*	*0.36*

Source: AWG scenario
Note: EU averages are weighted by population size

1.2.3 Life expectancy

For the EU10, the assumptions are the same as in the baseline of EUROPOP2004.[11] The method is based on age-specific mortality rates (ASMR) and other mortality indicators resulting from life tables. Eurostat assumes that the trend of decreasing mortality rates observed over the period of 1985 to 2002 will continue at the same speed until 2019, and slow down thereafter. This assumption results in bigger improvements in life expectancy at birth until 2019 than during the period of 2019 to 2050. Additional assumptions were made whereby in the medium and long-run, the speed of improvements in mortality reduction will converge gradually towards the pattern of average improvements in the EU15.

For EU15 Member States, the assumptions are based on an AWG scenario produced by Eurostat at the request of the AWG for the purpose of making the 2005 budgetary projections. In brief, the AWGscenario introduces a convergence factor in life expectancy at birth towards the average outcome of EU15 Member States emerging from the baseline scenario of EUROPOP2004. This change was made as the assumptions on life expectancy at birth in EUROPOP2004 are based on an extrapolation until 2050 of the trends observed during the

[11] Eurostat (2004) '*EUROPOP2004: methodology for drafting mortality assumptions'*, ESTAT/F/1/POP/06(2004)/KG REV.1, 3 December 2004, provides a detailed overview of the projection methodology.

past 17 years (20 years in some cases), which leads to some divergences across Member States, including neighbouring countries. The EPC considered that the life expectancy assumptions in the EUROPOP2004 baseline may not be fully suitable as a starting point for making long-run budgetary projections whose primary use is to help assess the sustainability of Member States' public finances. Projected changes in age-related public expenditures would be heavily determined by the projected (diverging) changes in life expectancy at birth: this would make it difficult for policy-makers to disentangle the changes in age-related expenditures due to projected increases in life expectancy from those which are due to the institutional characteristics of national pensions and health care systems.

Tables 3 and 4 present the baseline assumptions on life expectancy at birth for males and females used in the 2005 EPC budgetary projection exercise. Large increases of life expectancy at birth are projected to take place during the projection period. Life expectancy at birth for males is projected to increase by 6.3 years in the EU25, and by 5.1 years for females, resulting in some convergence in levels of life expectancy between males and females. Female life expectancy is nonetheless projected to be 5 years higher than for males in 2050, at 86.6 years for the EU25 as a whole.

There are significant differences in the life expectancy improvements projected across Member States. They range from 4.6 in Sweden to 9.6 in Hungary for males and from 3.9 in Spain to 6.6 in Hungary for females. The largest gains in life expectancy are projected to take place in the EU10, where levels are currently lower than in the EU15 (except in Cyprus and Malta). Despite this, life expectancy at birth in the EU10 will remain below the EU15 average, according to the projection. This is especially the case for men, with a projected life expectancy of 78.7 years in 2050 as compared to 82.1 years for the EU15 on average.

Table 3 Baseline assumptions on life expectancy at birth for males used in the 2005 EPC budgetary projection exercise

	2004	**2010**	**2020**	**2030**	**2040**	**2050**	***change***
BE	75.5	76.9	78.9	80.3	81.4	82.1	*6.6*
DK	75.2	76.4	78.1	79.5	80.6	81.4	*6.2*
DE	76.1	77.2	78.9	80.2	81.2	82.0	*5.9*
GR	76.4	77.1	78.2	79.3	80.2	81.1	*4.6*
ES	76.6	77.6	79.1	80.2	81.0	81.7	*5.1*
FR	76.2	77.4	79.3	80.6	81.6	82.3	*6.1*
IE	75.5	76.8	78.7	80.2	81.3	82.2	*6.6*
IT	77.3	78.3	79.9	81.1	82.1	82.8	*5.5*
LU	75.0	76.4	78.4	79.9	81.0	81.8	*6.8*
NL	76.2	77.0	78.3	79.4	80.3	81.1	*4.8*
AT	76.2	77.4	79.3	80.8	81.9	82.8	*6.6*
PT	74.2	75.5	77.4	79.0	80.2	81.2	*6.9*
FI	75.3	76.7	78.7	80.2	81.2	81.9	*6.6*
SE	78.1	79.0	80.4	81.4	82.1	82.6	*4.6*
UK	76.4	77.6	79.4	80.7	81.7	82.4	*6.0*
CY	76.3	77.5	79.0	80.2	81.1	81.9	*5.6*
CZ	72.4	73.7	75.9	77.8	78.8	79.7	*7.4*
EE	65.5	66.5	68.9	71.6	73.5	74.9	*9.4*
HU	68.5	70.1	72.8	75.2	77.0	78.1	*9.6*
LT	66.5	67.4	69.6	72.3	74.3	75.5	*9.0*
LV	64.9	65.8	68.0	70.9	72.9	74.3	*9.3*
MT	76.2	77.4	79.0	80.1	81.0	81.8	*5.6*
PL	70.5	72.0	74.6	76.8	78.2	79.1	*8.7*
SK	69.7	70.9	73.1	75.3	76.7	77.7	*8.0*
SI	72.6	73.9	76.1	77.9	78.9	79.8	*7.3*
EU15	76.4	77.5	79.1	80.4	81.4	82.1	*5.8*
EU10	70.1	71.6	74.0	76.3	77.7	78.7	*8.6*
EU25	75.4	76.5	78.4	79.8	80.8	81.6	*6.3*

Source: AWG scenario
Note: EU averages are weighted by population size

Table 4 Baseline assumptions on life expectancy at birth for females used in the 2005 EPC budgetary projection exercise

	2004	2010	2020	2030	2040	2050	*change*
BE	81.6	82.9	84.8	86.1	87.0	87.5	*5.9*
DK	79.6	80.5	82.1	83.3	84.3	85.2	*5.6*
DE	81.7	82.7	84.2	85.4	86.2	86.8	*5.1*
GR	81.4	82.1	83.3	84.4	85.2	85.9	*4.5*
ES	83.4	84.3	85.6	86.5	87.0	87.3	*3.9*
FR	83.4	84.4	85.8	86.8	87.5	87.9	*4.5*
IE	80.7	81.8	83.6	85.0	86.0	86.8	*6.2*
IT	83.2	84.0	85.3	86.4	87.2	87.8	*4.6*
LU	81.4	82.4	83.9	85.1	86.0	86.7	*5.3*
NL	80.8	81.4	82.5	83.5	84.4	85.2	*4.3*
AT	82.1	83.2	84.7	85.9	86.7	87.2	*5.2*
PT	81.0	82.2	83.9	85.2	86.0	86.7	*5.7*
FI	81.9	82.8	84.2	85.3	86.0	86.6	*4.8*
SE	82.4	83.2	84.4	85.4	86.1	86.6	*4.3*
UK	80.9	82.1	83.8	85.1	86.0	86.7	*5.7*
CY	80.8	81.6	82.8	83.7	84.5	85.1	*4.3*
CZ	78.8	79.8	81.3	82.7	83.5	84.1	*5.3*
EE	76.9	77.8	79.5	81.2	82.3	83.1	*6.3*
HU	76.8	78.0	79.8	81.5	82.6	83.4	*6.6*
LT	77.6	78.5	80.1	81.8	82.9	83.7	*6.1*
LV	76.2	76.9	78.6	80.4	81.6	82.5	*6.3*
MT	80.7	81.7	82.9	83.7	84.4	85.0	*4.3*
PL	78.5	79.6	81.3	82.8	83.7	84.4	*5.9*
SK	77.8	78.7	80.3	81.8	82.7	83.4	*5.6*
SI	80.2	81.2	82.8	83.8	84.6	85.1	*5.0*
EU15	82.2	83.2	84.6	85.7	86.5	87.0	*4.9*
EU10	78.2	79.2	80.9	82.4	83.4	84.1	*5.9*
EU25	81.5	82.5	84.0	85.2	86.0	86.6	*5.1*

Source: AWG scenario
Note: EU averages are weighted by population size

1.2.4 Net migration flows

As outlined in Eurostat (2004)[12], there are very many uncertainties involved in making projections of net migration flows over the long-run, in part linked to the variety of economic pull and push factors that operate in both home and host countries. The methodology used in making the EUROPOP2004 projections differs for the EU15 and the EU10 Member States.

The assumptions on net migration are the same as those used in the baseline of EUROPOP2004 for all Member States, except Germany[13], Italy and Spain where specific adjustments were made to the level and age structure of migrants (for Spain, changes were

[12] Eurostat (2004): '*EUROPOP2004: Summary Note on Assumptions and Methodology for International Migration*', ESTAT/F-1/POP/19(2004)/GL.

[13] The assumptions on net migration in Germany were changed to take into account that the age-structure of migration was significantly influenced by the reunification and the immigration of German resettlers (Aussiedler) from Eastern Europe. In addition, the level of net migration was adjusted with a constant net migrations of 200,000 "foreigners" p.a. and a decreasing net migration of German resettlers.

only made to the age structure of migrants). This was done to enable more recent information on migration flows in these countries to be taken on board.

Table 5 presents the assumptions on net migration used in the baseline population projection underpinning the 2005 EPC budgetary projection exercise. The projection involves large net flows into the EU25 over the projection period. For the EU25 as a whole, annual net inflows are projected to fall from an estimated 1.3 million people in 2004, equivalent to 0.3% of the EU25 population, to inflows of some 800 000 people by 2015 and thereafter hovering around 850 000 people, or 0.2% of the population.

Table 5 Baseline assumptions on net migration flows used in the 2005 EPC budgetary projection exercise

	in thousands						*as a % of total population*	
	2004	**2010**	**2020**	**2030**	**2040**	**2050**	***2004***	***2050***
BE	24	20	19	19	19	19	*0.2*	*0.2*
DK	8	7	7	7	7	7	*0.1*	*0.1*
DE	270	230	215	205	200	200	*0.3*	*0.3*
GR	43	40	39	35	35	35	*0.4*	*0.4*
ES	508	112	110	105	104	102	*1.2*	*0.3*
FR	64	62	60	59	59	59	*0.1*	*0.1*
IE	16	15	14	13	13	12	*0.4*	*0.3*
IT	150	150	150	150	150	150	*0.3*	*0.3*
LU	3	3	3	3	3	3	*0.6*	*0.4*
NL	21	33	33	32	31	31	*0.1*	*0.2*
AT	25	24	21	19	20	20	*0.3*	*0.3*
PT	42	18	16	15	15	15	*0.4*	*0.2*
FI	6	6	6	6	6	6	*0.1*	*0.1*
SE	28	24	23	22	22	21	*0.3*	*0.2*
UK	139	116	103	99	99	98	*0.2*	*0.2*
CY	6	6	5	5	5	5	*0.8*	*0.5*
CZ	4	3	10	22	21	20	*0.0*	*0.2*
EE	1	-2	0	2	2	2	*0.1*	*0.2*
HU	15	13	14	21	21	20	*0.1*	*0.2*
LT	-6	-6	-1	5	4	4	*-0.2*	*0.2*
LV	-2	-3	-1	3	3	3	*-0.1*	*0.1*
MT	3	2	2	2	2	3	*0.6*	*0.5*
PL	-28	-35	-11	36	35	34	*-0.1*	*0.1*
SK	-2	-2	1	5	5	5	*0.0*	*0.1*
SI	6	6	5	7	7	7	*0.3*	*0.4*
EU25	*1343*	*841*	*841*	*895*	*886*	*879*	0.3	0.2
EU15	*1347*	*859*	*817*	*788*	*781*	*778*	0.4	0.2
EU10	*-3*	*-18*	*24*	*107*	*105*	*101*	-0.1	0.2

Source: AWG scenario

1.2.5 The size and age structure of the population in the baseline scenario

The population projections used as a baseline scenario in the EPC budgetary projection exercise lead to a significant change in the size and age structure of the population in all Member States. Table 6 provides an overview of these changes. Overall, the EU25 population

in 2050 is projected to be both smaller and older than in 2004. Under the baseline scenario, the EU25 total population is projected to increase until 2025, when it will peak at 470 million. According to the projection, the population in 2050, at 454 million, will be smaller than in 2004. The population of working age is projected to start declining in 2010; over the whole projection period, it will drop by 48 million people or 16%. While the young population aged 0 to 14 is projected to decline by over 19%, falling to 60.4 million people, the elderly population, and especially so the very old aged 80 and above, is projected to sharply increase. The number of people aged 65 and above is projected to rise by 58 million (or 77%), while the number of very old people is expected to almost triple, reaching 50 million in 2050.

Table 6 Overview of changes in the size and age structure of the EU25 population, in millions

	Total population			**Young population (0-14)**			**Working-age population (15-64)**			**Elderly population (65+)**			**Very old population (80+)**		
	2004	**2050**	***% change***	**2004**	**2050**	***% change***	**2004**	**2050**	***% change***	**2004**	**2050**	***% change***	**2004**	**2050**	***% change***
BE	10.4	10.8	*4*	1.8	1.6	*-11*	6.8	6.3	*-8*	1.8	3.0	*67*	0.4	1.2	*173*
DK	5.4	5.5	*2*	1.0	0.9	*-16*	3.6	3.3	*-8*	0.8	1.4	*70*	0.2	0.5	*140*
DE	82.5	77.7	*-6*	12.2	9.5	*-22*	55.5	45.0	*-19*	14.9	23.3	*57*	3.4	9.9	*187*
GR	11.0	10.7	*-3*	1.6	1.3	*-18*	7.5	5.9	*-21*	2.0	3.6	*80*	0.4	1.2	*227*
ES	42.3	43.0	*1*	6.2	5.0	*-19*	29.1	22.9	*-21*	7.1	15.0	*111*	1.8	5.3	*199*
FR	59.9	65.1	*9*	11.1	10.4	*-7*	39.0	37.4	*-4*	9.8	17.4	*77*	2.6	6.9	*163*
IE	4.0	5.5	*36*	0.8	0.9	*4*	2.7	3.2	*16*	0.4	1.4	*219*	0.1	0.4	*313*
IT	57.9	53.8	*-7*	8.2	6.2	*-25*	38.5	29.3	*-24*	11.1	18.2	*64*	2.8	7.2	*158*
LU	0.5	0.6	*42*	0.1	0.1	*26*	0.3	0.4	*30*	0.1	0.1	*124*	0.0	0.1	*279*
NL	16.3	17.6	*8*	3.0	2.8	*-9*	11.0	10.6	*-4*	2.3	4.3	*91*	0.6	1.6	*191*
AT	8.1	8.2	*1*	1.3	1.0	*-24*	5.5	4.7	*-15*	1.3	2.5	*95*	0.3	1.0	*204*
PT	10.5	10.1	*-4*	1.6	1.3	*-21*	7.1	5.5	*-22*	1.8	3.2	*83*	0.4	1.1	*181*
FI	5.2	5.2	*0*	0.9	0.8	*-13*	3.5	3.0	*-14*	0.8	1.4	*73*	0.2	0.5	*174*
SE	9.0	10.2	*13*	1.6	1.7	*4*	5.8	6.0	*4*	1.5	2.5	*60*	0.5	0.9	*95*
UK	59.7	64.2	*8*	10.9	9.4	*-13*	39.2	37.8	*-4*	9.5	17.0	*78*	2.6	6.5	*150*
CY	0.7	1.0	*34*	0.1	0.1	*-11*	0.5	0.6	*19*	0.1	0.3	*193*	0.0	0.1	*319*
CZ	10.2	8.9	*-13*	1.6	1.1	*-28*	7.2	5.0	*-31*	1.4	2.8	*93*	0.3	0.8	*164*
EE	1.4	1.1	*-17*	0.2	0.2	*-23*	0.9	0.7	*-27*	0.2	0.3	*33*	0.0	0.1	*124*
HU	10.1	8.9	*-12*	1.6	1.2	*-24*	6.9	5.2	*-25*	1.6	2.5	*60*	0.3	0.8	*131*
LT	3.4	2.9	*-16*	0.6	0.4	*-35*	2.3	1.7	*-26*	0.5	0.8	*49*	0.1	0.3	*171*
LV	2.3	1.9	*-19*	0.4	0.3	*-22*	1.6	1.1	*-30*	0.4	0.5	*30*	0.1	0.2	*131*
MT	0.4	0.5	*27*	0.1	0.1	*1*	0.3	0.3	*12*	0.1	0.1	*141*	0.0	0.0	*254*
PL	38.2	33.7	*-12*	6.6	4.4	*-33*	26.7	19.4	*-27*	5.0	9.9	*100*	0.9	3.0	*226*
SK	5.4	4.7	*-12*	0.9	0.6	*-36*	3.8	2.7	*-28*	0.6	1.4	*124*	0.1	0.4	*210*
SI	2.0	1.9	*-5*	0.3	0.2	*-16*	1.4	1.1	*-24*	0.3	0.6	*97*	0.1	0.2	*252*
EU25	*456.8*	*453.8*	*-1*	74.8	60.4	*-19*	*306.8*	*259.1*	*-16*	*75.3*	*133.3*	*77*	*18.2*	*49.9*	*174*
EU15	*382.7*	*388.3*	*1*	*62.4*	52.7	*-15*	*255.1*	*221.3*	*-13*	*65.2*	*114.2*	*75*	*16.3*	*44.2*	*172*
EU10	*74.1*	*65.5*	*-12*	*12.4*	8.6	*-30*	*51.7*	*37.8*	*-27*	*10.1*	*19.1*	*88*	*1.9*	*5.7*	*193*

Source: For EU10, Eurostat EUROPOP2004 baseline For EU15, AWG scenario

1.3 Labour force projections

1.3.1 The cohort component methodology

"No policy change" assumption in baseline scenario

The EPC agreed to base its labour force projection on the age-cohort methodology developed by the OECD.[14] The methodology takes into account explicitly the evolution of lifetime profiles of participation. It is based on the calculation of the probability of labour market entry and labour market exit for each of the latest cohorts available (based on the average rates between 1998 and 2003). These probabilities are kept constant and, in the baseline scenario, reflect a working assumption of "no policy change".

In essence, the cohort methodology reflects the tendency for women belonging to any given cohort or generation to have their own specific level of participation, which is usually higher at all ages than the corresponding level of participation of older cohorts. Participation rate gaps between subsequent cohorts do not only reflect socio-cultural factors, but also individual characteristics such as number of children and level of education. Thus, the simulation produces an autonomous increase of female participation – referred to as a "cohort effect" – as older women are gradually replaced by younger cohorts.

Moreover, the methodology captures the effects of demographic change on the labour force. Besides the reduction in the size of the working-age population (aged 15-64), an ageing population also increases the share of older workers (aged 55-64) in the total labour force, whose participation rate is significantly lower than that of younger age groups. Projections on the future size and structure of the labour force are obtained by combing projections of activity rates (of each single year of age and gender of people in the labour market) with the baseline working-age population projection described above. The employment projections only refer to the number of persons, and it is assumed that, over projection period, there will be no changes in the hours worked, the breakdown between private and public sector, the share of self-employed and employees, or the share of part-time work.

Some additional assumptions on participation rates

The following additional adjustments were also included in making the labour force projections:

- a correction mechanism for young cohorts: a floor at the rate observed in 2003 was applied to the participation rates of young cohorts (aged 15-19) in some countries (see table 1). This is to avoid extrapolating over the next 50 years the recently observed drop in the participation rates of young cohorts as a result of the extended duration of full-time education;

- account has been taken of the potential effects of recently enacted pension reforms that will be phased in 17 EU Member States. These include reforms to increase statutory

[14] See 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. N. 371; and OECD (2003), '*Labour force participation of groups at the margin of the labour market: past and future trends and policy challenges*', Working Party N° 1 on Macroeconomic and Structural Policy Analysis, ECO/CPE/WP1(2003)8.

retirement ages, to curtail access to early retirement schemes and to remove financial incentives that have encouraged workers to leave the labour force. The effects of these pension reforms have been modelled using a probabilistic model already used within the European Commission for the calculation of the "average exit age" from the labour force;

- for a number of Member States, the conversion of labour force projections based on Labour Force Surveys into national account equivalents.[15]

1.3.2 Projection results for labour force participation and labour supply

Projected increases in participation rates in all Member States

Table 7 presents the participation rates by age group and gender in the EU25 Member States in 2003, and table 8 shows the projected change up to 2050 used in the baseline scenario. Overall participation rates (for the age group 15-64) in the EU25 are projected to increase by about 6 percentage points over the period 2003-2050 (from 69.4% in 2003 to 74.6% in 2025 and to 75.2% in 2050). The biggest increase is projected for older workers (around 22 percentage points for females and 13 p.p. for males) and for women.

Table 7 Participation rates by gender and age group in 2003

	Total				Male				Female			
	Total (15-64)	Young (15-24)	Prime age (25-54)	Older (55-64)	Total (15-64)	Young (15-24)	Prime age (25-54)	Older (55-64)	Total (15-64)	Young (15-24)	Prime age (25-54)	Older (55-64)
BE	65.0	35.2	82.3	28.9	72.9	38.6	90.9	38.8	56.9	31.6	73.6	19.3
DK	79.3	65.2	87.8	62.8	83.7	67.8	91.7	70.4	74.8	62.4	83.8	55.2
DE	72.6	50.1	86.2	45.2	79.5	52.9	93.3	54.7	65.4	47.1	78.8	35.9
GR	65.3	35.8	80.0	43.5	78.1	39.3	94.4	61.4	52.4	32.0	65.4	27.1
ES	67.5	44.7	79.6	43.6	79.9	49.8	92.5	62.8	55.1	39.3	66.5	25.6
FR	69.3	38.5	86.3	38.3	75.4	42.7	93.4	42.7	63.3	34.2	79.2	34.0
IE	68.8	52.4	79.1	50.1	79.2	56.1	91.0	66.2	58.3	48.6	67.2	33.6
IT	62.9	37.8	77.9	30.5	74.9	41.6	91.6	43.1	50.9	34.0	64.1	18.8
LU	65.0	29.0	81.4	30.7	75.5	29.9	94.5	40.2	54.3	28.2	68.0	21.3
NL	76.4	72.7	85.2	45.6	84.0	73.3	93.3	58.3	68.7	72.1	76.9	32.7
AT	72.2	55.6	87.4	31.9	79.9	60.9	94.7	42.9	64.4	50.1	80.1	21.5
PT	72.7	45.2	86.0	53.7	79.3	49.2	92.3	64.9	66.3	41.2	79.7	43.8
FI	74.5	51.2	87.5	53.4	76.7	52.0	90.1	55.1	72.3	50.3	84.8	51.8
SE	77.5	48.0	87.7	72.1	79.4	47.6	89.9	75.1	75.6	48.5	85.4	69.1
UK	75.3	63.3	83.8	57.2	82.4	66.4	91.3	67.4	68.3	60.0	76.4	47.2
CY	70.8	42.0	85.7	52.6	79.6	43.8	95.2	72.7	62.3	40.1	76.7	33.5
CZ	70.3	37.6	87.8	44.5	77.9	40.6	94.4	60.3	62.8	34.6	81.1	30.2
EE	70.1	36.9	85.8	56.8	74.7	42.5	89.5	64.7	65.9	31.1	82.3	50.8
HU	60.5	31.6	77.9	29.5	67.5	35.5	84.9	38.8	53.7	27.5	71.0	22.0
LT	70.0	30.4	88.8	51.3	73.6	34.6	90.6	63.6	66.6	26.0	87.2	42.0
LV	69.3	39.0	86.3	47.8	74.3	45.3	89.7	56.6	64.7	32.4	83.0	41.2
MT	58.6	56.8	66.0	32.9	79.9	59.1	93.8	54.2	36.8	54.4	37.5	12.9
PL	63.8	36.2	81.5	29.9	69.8	40.4	87.2	39.3	57.9	31.9	75.8	21.8
SK	70.1	41.5	89.4	29.1	76.8	45.4	94.1	48.9	63.4	37.5	84.6	12.7
SI	67.3	34.0	87.6	24.2	72.0	38.5	90.7	34.0	62.5	29.1	84.4	15.1
EU25	*69.6*	*45.8*	*83.4*	*42.7*	*77.5*	*49.4*	*91.9*	*53.5*	*61.6*	*42.1*	*74.9*	*32.6*
EU15	*70.4*	*48.2*	*83.5*	*44.2*	*78.7*	*51.7*	*92.5*	*54.8*	*62.1*	*44.7*	*74.4*	*34.0*
EU10	*65.4*	*36.2*	*83.1*	*34.5*	*71.7*	*40.2*	*88.9*	*45.9*	*59.2*	*32.0*	*77.4*	*24.8*

Source: EPC and DG ECFIN

[15] In many countries, employment data from Labour Force Surveys differ significantly from data from National Accounts due to different statistical methodologies. For some countries, where e.g. pension models are based on National Accounts, a conversion was implemented to avoid inconsistencies. See also DG ECFIN (2005), '*Conversion of labour force projections into national account equivalent figures: replies from Member States*', Note for the attention of the AWG meeting of 18/19 April 2005, ECFIN/REP51735/05-EN of 12 April 2005, plus addendum.

Table 8 Projected changes in participation rates up to 2050 used in the 2005 EPC budgetary projection exercise

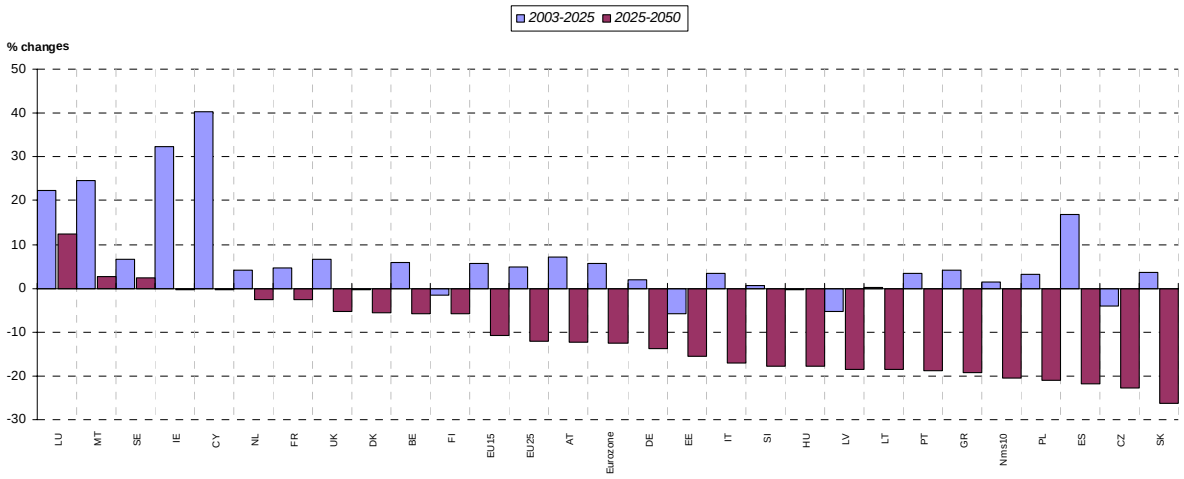
	Total				Male				Female			
	Total (15-64)	Young (15-24)	Prime age (25-54)	Older (55-64)	Total (15-64)	Young (15-24)	Prime age (25-54)	Older (55-64)	Total (15-64)	Young (15-24)	Prime age (25-54)	Older (55-64)
BE	5.0	1.7	6.3	16.0	1.6	1.7	3.3	7.9	8.5	1.5	9.3	23.8
DK	2.1	3.0	1.9	6.2	1.8	4.5	1.7	4.0	2.2	1.3	2.0	8.3
DE	6.4	2.0	3.6	24.0	5.4	2.6	2.3	22.8	7.5	1.3	5.1	25.2
GR	4.6	-1.4	5.3	10.2	-0.1	-1.8	0.4	0.0	9.2	-1.0	10.2	18.8
ES	9.2	-2.6	10.3	20.3	3.1	-2.1	3.6	7.2	15.3	-3.1	16.9	32.2
FR	3.8	0.9	3.8	15.8	2.0	0.5	1.6	14.1	5.3	1.3	5.7	17.5
IE	8.4	-0.3	7.7	19.4	3.9	-0.4	3.5	6.1	12.8	-0.3	11.8	33.1
IT	7.4	-0.8	6.3	24.8	4.3	-0.7	2.5	21.9	10.2	-0.9	9.7	26.8
LU	3.4	0.0	6.7	11.4	-0.7	0.8	2.1	6.6	7.5	-0.8	11.4	16.3
NL	4.0	1.0	5.3	10.5	-0.8	0.7	-0.2	2.7	9.0	1.3	10.9	18.4
AT	6.9	1.6	5.1	27.3	3.9	1.0	1.4	24.0	9.8	2.3	8.7	30.1
PT	5.0	-1.2	5.1	12.5	1.9	-0.5	1.7	5.6	7.8	-1.9	8.2	18.2
FI	5.1	1.3	4.7	14.1	4.8	0.9	4.4	14.4	5.3	1.8	5.0	13.7
SE	3.6	3.7	3.5	6.9	3.3	3.0	2.9	7.4	3.9	4.4	4.0	6.3
UK	3.0	1.9	3.2	8.1	0.1	1.7	0.5	1.1	5.7	2.1	5.5	14.7
CY	9.9	5.1	8.6	18.0	6.5	5.8	2.0	11.8	13.0	4.3	14.6	22.8
CZ	4.2	-0.8	2.8	15.6	1.9	-1.1	0.6	9.1	6.4	-0.5	5.2	20.8
EE	6.0	2.0	5.5	7.0	5.2	2.4	5.3	1.4	6.5	1.6	5.3	10.9
HU	5.9	0.1	4.6	20.6	4.0	0.2	3.3	15.8	7.5	0.1	5.8	23.9
LT	7.1	2.3	4.6	17.1	6.4	-0.2	4.2	12.8	7.6	4.8	4.9	19.3
LV	7.4	3.5	6.6	12.7	7.5	3.6	7.3	10.0	7.2	3.3	5.7	14.1
MT	7.4	2.6	13.9	0.9	0.2	0.4	2.9	-2.2	15.0	4.8	25.7	2.9
PL	7.2	3.0	8.2	19.4	6.6	2.8	5.6	20.6	7.8	3.2	10.6	17.2
SK	3.8	0.7	3.4	22.9	1.9	-0.1	1.8	12.2	5.6	1.4	4.9	30.8
SI	6.1	-2.6	4.7	28.8	4.4	-3.8	4.0	23.8	7.9	-1.2	5.5	33.2
EU25	*5.9*	*2.2*	*5.3*	*17.7*	*3.3*	*2.0*	*2.3*	*13.2*	*8.4*	*2.3*	*8.1*	*21.6*
EU15	*5.7*	*1.4*	*5.1*	*17.8*	*2.8*	*1.3*	*1.9*	*12.9*	*8.5*	*1.4*	*8.2*	*22.2*
EU10	*6.4*	*1.7*	*6.2*	*18.3*	*5.1*	*1.3*	*4.2*	*16.0*	*7.4*	*2.1*	*8.1*	*19.3*

Source: EPC and DG ECFIN

… and labour supply will also decline

The overall labour force (age 15-64) in the EU25 is estimated to increase by 5% from 2003 to 2025 (see graph 2). This is a result of combining the projected population and rates of participation in each gender/ age group. In number of people, this means an increase in the labour force of roughly 10.5 millions. This increase of labour supply over the period 2003-2025 is mainly due to the increase in the female labour supply, while the male labour force is projected to remain largely unchanged (only about 2 million additional people). However, the positive trend in female labour supply is projected to reverse during the period 2025-2050 and, along with the drop in male supply, the overall labour force is expected to decrease by as much as 12% (equivalent to around 27.5 million people, 16.5 million if compared with the level in 2003) although there are wide differences across countries.

Graph 2 Labour force projections used in the 2005 EPC budgetary projection exercise (change in % of people aged 15-64 between 2003 and 2050)



1.3.3 Assumptions on unemployment

To move from labour force projections to employment projections, account must be taken of unemployment. As regards unemployment, the EPC agreed that unemployment rates converge to their structural level, or NAIRU, by 2008, and that they remain constant thereafter. It will use the Commission estimates for the NAIRU as agreed upon in the Output Gap Working Group of the EPC.

The following adjustments are made to this general rule:

- countries with a NAIRU rate in 2008 higher than the average rate of the EU15 can reduce their unemployment rates further to converge to the 2008 EU15 average (7%) by 2015;

- new Member States with a NAIRU above the EU15 average (i.e. Poland and Slovakia) will have 20 years to allow their unemployment rates to converge to the EU15 average;

- to avoid significant changes in the rankings across countries, the structural unemployment rate is reduced by an additional 0.5 p.p.(to reach 6.5%in 2015) for Belgium, the Czech Republic and Italy.

The outcome of these assumptions is presented in table 9. In aggregate terms, unemployment rates in the EU25 are projected to fall from 9.3% in 2003 to 7.8% in 2010 and 6.1% by 2025. A much bigger fall is projected for the EU10 countries, from 14.8% in 2003 to 12% in 2010. The approach to making assumptions results in large projected falls in countries with the highest unemployment rates in the base year of 2003, i.e. a fall of over 10 p.p. in Poland and Slovakia, and of 4.6 p.p. in Spain, to be used in the EPC projection.

Table 9 Assumptions on unemployment rates

	2003	2010	2015	2025	2050	*Change 03-25*
BE	8.2	7.0	6.5	6.5	6.5	*-1.7*
DK	5.5	4.3	4.3	4.3	4.3	*-1.2*
DE	9.9	8.5	7.0	7.0	7.0	*-2.9*
GR	9.8	8.6	7.0	7.0	7.0	*-2.8*
ES	11.6	8.7	7.0	7.0	7.0	*-4.6*
FR	9.0	8.3	7.0	7.0	7.0	*-2.0*
IE	4.8	3.4	3.4	3.4	3.4	*-1.4*
IT	8.9	7.3	6.5	6.5	6.5	*-2.4*
LU	3.7	4.2	4.2	4.2	4.2	*0.6*
NL	3.7	3.2	3.2	3.2	3.2	*-0.5*
AT	4.3	3.4	3.4	3.4	3.4	*-0.9*
PT	6.7	5.6	5.6	5.6	5.6	*-1.1*
FI	9.2	6.8	6.5	6.5	6.5	*-2.7*
SE	5.7	4.3	4.3	4.3	4.3	*-1.4*
UK	5.1	4.6	4.6	4.6	4.6	*-0.5*
CY	4.4	4.2	4.2	4.2	4.2	*-0.2*
CZ	7.9	7.3	6.5	6.5	6.5	*-1.4*
EE	10.3	7.8	7.0	7.0	7.0	*-3.3*
HU	5.9	4.8	4.8	4.8	4.8	*-1.2*
LT	12.5	8.9	7.0	7.0	7.0	*-5.5*
LV	10.7	7.6	7.0	7.0	7.0	*-3.7*
MT	7.6	8.3	7.0	7.0	7.0	*-0.6*
PL	20.1	15.8	12.9	7.0	7.0	*-13.1*
SK	17.6	15.2	12.5	7.0	7.0	*-10.6*
SI	6.8	5.5	5.5	5.5	5.5	*-1.2*
EU25	*9.3*	*7.8*	*6.7*	*6.1*	*6.1*	*-3.1*
EU15	*8.2*	*7.0*	*6.1*	*6.1*	*6.0*	*-2.2*
EU10	*14.8*	*12.0*	*10.0*	*6.6*	*6.6*	*-8.3*

Source: DG ECFIN

1.3.4 Employment rate projections

Given the population projections, the unemployment rate assumptions and the labour force projections, the overall employment rate (age 15-64) in the EU25 is projected to increase from 63% in 2003 to 70% in 2025, and to stabilise at 70.7% at the end of the projection period, see table 10. The female employment rate is projected to increase by some 10 percentage points to 65.5% by 2050, above the Lisbon employment target of 60%. The employment rate of older workers is projected to increase by some 18 percentage points over the projection period to 60.4% in 2050, and the Lisbon employment target of 50% is projected to be reached by 2013.

Table 10 Projected employments rates used in the 2005 EPC budgetary projection exercise

	Total (15-64)				Females (15-64)				Older workers (55-64)			
	2003	**2010**	**2025**	**2050**	**2003**	**2010**	**2025**	**2050**	**2003**	**2010**	**2025**	**2050**
BE	59.6	62.1	64.7	65.5	51.8	56.0	60.3	61.0	28.1	33.2	42.8	44.4
DK	74.9	76.4	77.3	77.9	70.2	72.0	72.7	73.3	59.8	61.5	65.6	66.7
DE	65.4	70.9	73.2	73.5	59.3	65.8	67.8	68.3	39.5	56.4	65.8	65.7
GR	58.9	62.7	64.9	65.1	44.6	50.0	54.6	55.6	42.1	44.4	51.9	52.9
ES	59.7	66.4	70.3	71.4	46.2	55.6	62.5	64.2	40.6	45.6	59.6	62.5
FR	63.1	64.4	66.7	68.0	57.0	58.9	61.8	63.4	36.3	42.3	49.4	52.9
IE	65.5	70.9	73.6	74.6	55.7	62.7	67.7	69.1	48.8	55.5	66.8	68.9
IT	57.2	61.0	63.6	65.7	44.9	50.0	53.9	56.1	29.4	35.9	49.4	54.6
LU	62.6	64.4	64.9	65.4	51.7	55.6	58.1	58.7	30.3	35.3	40.2	41.8
NL	73.6	75.3	76.5	77.9	66.0	70.1	73.4	75.2	44.4	48.1	53.5	55.2
AT	69.1	73.5	75.1	76.4	61.7	67.8	70.5	71.8	30.1	40.1	54.2	58.0
PT	67.8	71.9	72.9	73.4	61.2	66.4	68.7	69.5	51.4	56.5	63.0	64.7
FI	67.7	70.2	73.8	74.4	65.8	67.9	71.9	72.7	49.4	54.1	62.3	64.9
SE	73.1	74.9	77.4	77.6	71.6	73.5	76.1	76.4	68.8	70.9	75.1	76.6
UK	71.5	72.9	74.2	74.7	65.3	67.3	70.0	71.1	55.4	56.9	62.5	63.9
CY	67.7	73.6	78.2	77.3	59.3	67.0	72.8	72.0	50.2	60.7	65.2	69.1
CZ	64.8	66.8	72.1	69.7	56.6	59.8	66.5	63.8	42.5	48.1	59.8	58.9
EE	62.9	68.4	71.9	70.8	59.3	64.7	68.9	67.4	52.7	55.3	61.7	61.7
HU	56.9	60.8	65.3	63.2	50.7	54.2	60.3	58.6	28.7	39.6	49.8	49.5
LT	61.2	67.3	73.4	71.7	58.4	64.6	71.3	69.0	45.3	53.1	65.1	66.2
LV	61.9	69.9	73.1	71.4	57.8	65.3	69.1	66.7	44.1	53.4	59.2	58.7
MT	54.1	56.7	62.4	61.3	33.7	39.6	49.0	48.6	32.0	29.3	30.3	33.1
PL	51.0	57.0	68.4	66.1	45.8	51.8	64.3	60.9	26.7	35.2	42.7	48.7
SK	57.8	62.1	72.7	68.7	52.2	56.9	68.9	64.3	25.2	38.5	51.7	51.2
SI	62.8	67.7	69.9	69.3	58.0	62.5	65.9	66.4	23.5	40.4	50.0	52.6
EU25	*63.1*	*66.9*	*70.3*	*70.9*	*55.4*	*60.2*	*64.7*	*65.5*	*39.9*	*47.1*	*56.8*	*58.9*
EU15	*64.6*	*68.1*	*70.5*	*71.5*	*56.5*	*61.2*	*64.6*	*66.1*	*41.4*	*48.6*	*58.0*	*60.2*
EU10	*55.7*	*60.7*	*69.4*	*67.1*	*50.0*	*55.2*	*65.0*	*62.1*	*31.7*	*39.8*	*49.2*	*51.9*

Source: DG ECFIN

The number of persons employed (according to the European Labour Force Survey definition) is expected to record a positive annual growth rate of only 0.4% over the period 2003-2025, and then reverse to a larger negative annual growth rate of about -0.5% in the subsequent period (2025-2050). As a result, the overall number of employees in the EU25 in 2050 is projected to be about 9 millions below the level recorded in 2003 (a drop of 600 000 women and 8.2 millions of men).

Table 11 Projected changes in employment (aged 15-64) used in the 2005 EPC budgetary projection exercise

	Changes						*Annual growth rate*	
	(in thousands)			*(as %)*				
	2003-2025	**2025-2050**	**2003-2050**	***2003-2025***	***2025-2050***	***2003-2050***	***2003-2025***	***2025-2050***
BE	315	-249	66	*7.8*	*-5.7*	*1.6*	*0.3*	*-0.2*
DK	23	-151	-129	*0.8*	*-5.6*	*-4.8*	*0.0*	*-0.2*
DE	1887	-5260	-3373	*5.2*	*-13.7*	*-9.3*	*0.2*	*-0.6*
GR	331	-908	-577	*7.5*	*-19.2*	*-13.1*	*0.3*	*-0.8*
ES	3906	-4552	-646	*22.9*	*-21.7*	*-3.8*	*0.9*	*-1.0*
FR	1664	-694	969	*6.8*	*-2.7*	*4.0*	*0.3*	*-0.1*
IE	604	-5	599	*34.3*	*-0.2*	*34.0*	*1.3*	*0.0*
IT	1348	-3985	-2637	*6.2*	*-17.1*	*-12.0*	*0.3*	*-0.7*
LU	41	28	69	*21.7*	*12.4*	*36.8*	*0.9*	*0.5*
NL	381	-212	168	*4.7*	*-2.5*	*2.1*	*0.2*	*-0.1*
AT	304	-502	-198	*8.0*	*-12.3*	*-5.2*	*0.4*	*-0.5*
PT	218	-940	-722	*4.6*	*-18.9*	*-15.2*	*0.2*	*-0.8*
FI	28	-141	-112	*1.2*	*-5.9*	*-4.8*	*0.1*	*-0.2*
SE	353	107	460	*8.3*	*2.3*	*10.9*	*0.4*	*0.1*
UK	1972	-1625	347	*7.1*	*-5.4*	*1.2*	*0.3*	*-0.2*
CY	132	-1	131	*40.5*	*-0.3*	*40.1*	*1.6*	*0.0*
CZ	-126	-1034	-1160	*-2.7*	*-22.8*	*-24.9*	*-0.1*	*-1.0*
EE	-14	-87	-101	*-2.4*	*-15.6*	*-17.6*	*-0.1*	*-0.7*
HU	35	-713	-678	*0.9*	*-17.9*	*-17.1*	*0.0*	*-0.8*
LT	92	-281	-189	*6.5*	*-18.6*	*-13.3*	*0.3*	*-0.8*
LV	-14	-179	-193	*-1.5*	*-18.5*	*-19.7*	*-0.1*	*-0.8*
MT	37	5	42	*25.3*	*2.7*	*28.7*	*1.0*	*0.1*
PL	2698	-3404	-705	*20.0*	*-21.0*	*-5.2*	*0.8*	*-0.9*
SK	369	-672	-303	*16.9*	*-26.3*	*-13.9*	*0.7*	*-1.2*
SI	18	-159	-141	*2.1*	*-17.8*	*-16.1*	*0.1*	*-0.8*
EU25	*16603*	*-25615*	*-9012*	*8.6*	*-12.2*	*-4.7*	*0.4*	*-0.5*
EU15	*13376*	*-19090*	*-5714*	*8.2*	*-10.8*	*-3.5*	*0.4*	*-0.5*
EU10	3227	-6525	-3298	11.3	-20.5	-11.5	0.5	-0.9

Source: DG ECFIN

1.3.5 Projected dependency ratios

Table 12 below compares the demographic dependency ratios from the baseline population projection with the economic dependency ratios emerging from the labour force projection. The old-age dependency ratio (number of people aged 65+ as a percentage of the working age population aged 15-64) is projected to more than double in most countries. For the EU25, it is projected to increase from 24% in 2003 to 51 in 2050. This implies that the EU would move from having 4 people of working age for every person of retirement age in 2003 to a ratio of 2:1. The increase is more pronounced in EU10 than EU15 Member States.

It is also evident from table 12 that there is not a one-to-one correspondence between demographic dependency and changes in economic dependency ratios. The 'effective old-age dependency ratio' is the number of non-active persons aged 65 and above as a percentage of employed persons aged 15 to 64. This ratio is useful when considering the support ratio for public pension schemes, i.e. the number of economically active persons relative to the number of persons of retirement age. As expected, this ratio is higher than the old age-dependency ratio (as it excludes the inactive working-age population from the denominator). It is projected to rise sharply for the EU25 from 37% in 2003 to 48% in 2025 and 70% in 2050.

However, the rate of increase (some 80%) is somewhat more muted than the increase projected for the old-age dependency ratio, and reflects the higher employment rate projection embedded in the underlying assumptions.

More striking are the projected changes in the total economic dependency ratio. This measures the total inactive population (total population less persons employed) as a percentage of persons employed (aged 15 to 64). It gives an indication of the average number of people which each economically active person 'supports', and thus is relevant when considering the prospects for potential GDP per capita growth. As expected, the ratio is much higher than the old-age dependency ratio, as it also includes young people and non-active people of working age (unemployed, non-participants in the labour force) in the numerator.

For the EU 25, this ratio actually falls from 136% in 2003 to 125% in 2025, but thereafter increases to 147% by 2050. These results need to be interpreted carefully. They show that overall economic dependency is projected to decline up to 2025 mostly due to a better labour market performance (especially the projected trend increase in female employment rates), but also due to low fertility (as smaller numbers of young people imply a decline in the youth dependency ratio). However, these effects taper off after 2025, and the increase in the total economic dependency ratio between 2025 and 2050 is noticeably sharp. In practice, the negative economic repercussions of low fertility rates become more evident the further into the future one projects with successively smaller cohorts entering the labour force. If a projection with a longer-term time horizon were available, say up to 2070 or 2100, it is likely that it would show the total economic dependency ratio continuing to rise steeply.

Table 12 Projected dependency ratios

	Old-age dependency ratio = Population aged 65 and over as a percentage of the population aged 15-64 *)				Effective economic old-age dependency ratio= non active population aged 65+ as % of employed population (15-64)				Total economic dependency ratio = Total population less employed as % of employed population (15-64)			
	2003	2025	2050	*change 2003-50*	2003	2025	2050	*change 2003-50*	2003	2025	2050	*change 2003-50*
BE	26	36	47	*21*	43	55	71	*28*	156	150	164	*8*
DK	22	34	42	*20*	28	42	52	*24*	101	106	116	*14*
DE	26	38	52	*26*	39	50	69	*30*	127	117	135	*9*
GR	26	36	60	*35*	41	52	88	*47*	150	141	181	*31*
ES	25	33	66	*41*	40	45	88	*48*	144	118	162	*18*
FR	25	37	46	*21*	39	53	66	*27*	144	146	156	*12*
IE	16	25	45	*29*	23	31	56	*33*	125	108	132	*7*
IT	28	39	62	*34*	49	60	93	*44*	162	149	179	*17*
LU	21	28	36	*15*	33	42	55	*22*	138	137	149	*11*
NL	20	33	41	*20*	27	41	51	*24*	101	107	114	*13*
AT	23	34	52	*30*	33	45	67	*35*	113	108	128	*15*
PT	23	35	59	*36*	30	43	73	*43*	118	116	149	*30*
FI	23	41	47	*24*	33	54	60	*27*	121	128	133	*12*
SE	26	36	41	*14*	35	45	50	*15*	111	113	117	*6*
UK	24	33	45	*21*	32	42	57	*25*	113	114	128	*14*
CY	14	29	43	*30*	18	35	52	*33*	120	96	114	*-6*
CZ	20	35	55	*35*	29	47	76	*46*	119	116	154	*35*
EE	23	31	43	*20*	35	41	57	*22*	135	118	137	*2*
HU	22	34	48	*26*	39	51	74	*35*	156	140	172	*16*
LT	22	29	45	*23*	35	38	60	*25*	144	107	134	*-10*
LV	23	31	44	*21*	35	39	58	*23*	137	113	137	*-0*
MT	19	34	41	*22*	34	54	66	*32*	170	154	168	*-2*
PL	18	33	51	*33*	35	46	74	*40*	183	127	163	*-20*
SK	16	28	51	*34*	28	38	73	*45*	146	105	151	*6*
SI	21	36	56	*35*	32	49	77	*44*	127	124	157	*31*
EU25	*24*	*35*	*51*	*27*	*37*	*48*	*70*	*33*	*136*	*125*	*147*	*11*
EU15	*25*	*36*	*52*	*26*	*38*	*49*	*70*	*32*	*132*	*126*	*145*	*13*
EU10	*19*	*33*	*50*	*31*	*34*	*45*	*73*	*39*	*159*	*124*	*158*	*-1*

Source: DG ECFIN

1.4 Labour productivity and potential growth rates

Projection methodology based on a 'production function approach'

The EPC agreed to use the 'production function approach' to estimate labour productivity growth.[16] Labour productivity (output per worker) is derived from the calculations based on the labour input projections (explained above), the assumptions concerning Total Factor Productivity (TFP) and the investment scenario. This approach aims at shedding some light on the reasons behind productivity developments and obtaining a richer medium-term dynamic including the effect of population growth on labour productivity in the medium run through the change in capital intensity.

The EPC agreed the following assumptions:

- to take the scenario of the Output Gap Working Group (OGWG) over the medium run (2007-2009) while sorting out the level differences between the OGWG and (cohort-approach-based) AWG labour input series;

- the growth rate of Total Factor Productivity (TFP) will converge to 1.1% (i.e. the US trend labour productivity growth) by 2030 for EU15 countries, with different speeds of convergence across Member States[17]. For the EU10, TFP will converge to 1.75% by 2030 and thereafter converge at the same pace so as to reach 1.1% in 2050;

- in order to allow for a faster convergence across EU10 Member States, three quarters of the convergence towards 1.75% and 1.1% is achieved in 2015 and 2035, respectively. Indeed, while a longer period of convergence (by 2050) is necessary for the EU10 Member States, there is a clear need for countries to converge to the same growth of output per worker at the end of the projection horizon;

- as regards the capital deepening assumptions, the EPC agreed to hold the investment/ GDP ratio constant until 2010 for the baseline scenario. A transition to a constant capital/ labour[18] ratio assumption will be introduced gradually (in a linear manner) over the period 2010 to 2030. Finally, the capital/ labour ratio will be held constant from 2030 to 2050 so that the growth of labour productivity will equal TFP growth in this period, as in the long-run steady state of the neoclassical growth model.

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[16] For background material see DG ECFIN (2004) '*Illustrative long run growth projections foir the EU15 and AC10 countries up to 2050'*, Note for the attention of the AWG meeting of 6 May 2004, ECFIN/214/04-EN; DG ECFIN (2004) '*ECFIN's global growth scenario 2000-2050*', Note for the attention of the AWG meeting of 6 May 2004, ECFIN/213/04-EN; DG ECFIN (2004) '*Effects of ageing on long-run productivity growth: a theoretical discussion and empirical assessment*', Note for the attention of the AWG meeting of 6 May 2004, ECFIN/216/04-EN; DG ECFIN (2004), '*Approaches to making long-run productivity projections: considerations for the budgetary projection exercise of the AWG'*, Note for the attention of the AWG meeting of 6 May 2004, ECFIN/218/04-EN of 28 April 2004; European Commission DG ECFIN (2004v), '*An adjusted set of long-run labour productivity projections for the EU25 countries up to 2050: effects of introducing changes suggested at 8/9 November meeting*, Note for the attention of the AWG meeting of 13 December 2004, ECFIN/REP50703/04-EN and European Commission DG ECFIN (2005i), '*Final set of long-run labour productivity, labour input and potential growth rate projections for the EU25 countries up to 2050*', Note for the attention of the AWG meeting of 18/19 April 2005, ECFIN/REP51729/05-EN.

An implication of this approach concerns the cross-country comparability of data: total factor productivity growth numbers are not fully comparable across countries as countries use different methodologies to estimate capital inputs.

[17] Some countries underwent specific adjustments in their TFP profile in the period 2010-2030 such as Greece, Italy, Portugal and Spain, in order to allow for stronger real convergence in productivity level.

[18] Labour here refers to technical-progress-augmented labour (i.e. labour measured by efficiency unit).

Projection results for the baseline scenario

Table 13 presents the outcome of these assumptions in terms of the projections for potential growth rates up to 2050 as well as its determinants. For the EU25, the annual average potential GDP growth rate of 2.5% for the period 2004 to 2010 is projected to decline to 1.2% in the period 2031-2050. The projected fall in potential growth rates is much higher in the EU10 than in the EU15. For the EU10, potential rates of 4.4% between 2004 and 2010 are projected to fall to 0.9% between 2031 and 2050, lower than the projected growth rate of 1.3% for the EU15. This occurs in part because the productivity growth rates between the EU10 and EU15 are assumed to have converged by then, but especially because of less favourable demographic projections as illustrated in table 13 which indicates the contribution of employment to projected growth rates.

Table 13 Projected potential growth rates and determinants (labour productivity and employment) used in baseline EPC budgetary projection exercise
(annual average growth rates)

	Potential Growth			Labour productivity			Employment		
	2004-10	**2011-30**	**2031-50**	**2004-10**	**2011-30**	**2031-50**	**2004-10**	**2011-30**	**2031-50**
BE	2.4	1.7	1.5	1.5	1.8	1.7	0.9	-0.1	-0.2
DK	2.0	1.6	1.6	1.9	1.8	1.7	0.1	-0.2	-0.1
DE	1.7	1.4	1.2	0.9	1.6	1.7	0.8	-0.3	-0.5
GR	2.9	1.6	0.8	2.1	1.8	1.7	0.9	-0.2	-0.9
ES	3.0	2.0	0.6	1.1	1.9	1.7	1.9	0.1	-1.1
FR	2.2	1.8	1.6	1.4	1.7	1.7	0.8	0.1	-0.1
IE	5.5	3.3	1.6	3.4	2.5	1.7	2.0	0.8	-0.1
IT	1.9	1.5	0.9	0.7	1.7	1.7	1.1	-0.2	-0.8
LU	4.0	3.0	3.0	1.8	1.9	1.7	2.2	1.0	1.3
NL	1.7	1.6	1.7	1.1	1.7	1.7	0.6	-0.1	0.0
AT	2.2	1.6	1.2	1.5	1.8	1.7	0.7	-0.2	-0.5
PT	1.9	2.1	0.8	1.2	2.4	1.7	0.7	-0.3	-0.9
FI	2.7	1.7	1.5	2.1	2.0	1.7	0.6	-0.3	-0.2
SE	2.7	2.4	1.8	2.2	2.3	1.7	0.6	0.1	0.1
UK	2.8	2.1	1.5	2.1	2.1	1.7	0.7	0.0	-0.2
CY	4.3	3.5	1.9	2.4	2.9	1.9	1.9	0.6	0.0
CZ	3.5	2.6	0.8	3.4	3.0	1.9	0.1	-0.4	-1.1
EE	6.1	3.0	1.2	5.3	3.6	1.9	0.7	-0.6	-0.7
HU	3.7	2.6	1.1	3.2	2.9	1.9	0.5	-0.3	-0.9
LT	6.5	3.3	1.1	5.7	3.6	1.9	0.8	-0.4	-0.8
LV	7.7	3.4	1.1	6.5	4.1	1.9	1.2	-0.7	-0.8
MT	2.2	2.8	2.0	1.0	2.2	1.9	1.2	0.6	0.0
PL	4.6	3.2	0.9	3.8	3.1	1.9	0.7	0.1	-1.1
SK	4.6	3.4	0.6	3.9	3.3	1.9	0.7	0.1	-1.3
SI	3.7	2.5	1.1	3.3	3.0	1.9	0.4	-0.5	-0.8
EU25	2.4	1.9	1.2	1.5	2.0	1.7	0.9	-0.1	-0.5
EU15	2.2	1.8	1.3	1.3	1.8	1.7	0.9	-0.1	-0.4
EU10	4.2	3.0	0.9	3.5	3.1	1.9	0.6	-0.1	-1.0

Source: DG ECFIN

Table 14 presents the projections for GDP per capita growth rates, and also provides an indication of GDP per capita and productivity levels relative to the average for the EU15. As expected, the projected decline in GDP per capita growth rates in both the EU15 and the EU10 is less than the projected fall in potential output growth rates, since total population growth rates should drop over the period 2004-2050. It is also interesting to note from table 14 that per capita income levels in EU10 are projected to increase from 50% of EU15 average in 2004 to 78% in 2050.

Table 14 GDP per capita growth: Rates and levels (growth rates average and levels relative to EU15)

	GDP per capita growth rates (%)			GDP per capita (EU15=100)			Productivity levels (EU15=100)		
	2004-10	2011-30	2031-50	2004	2030	2050	2004	2030	2050
BE	2.1	1.5	1.6	108	106	109	122	120	120
DK	1.8	1.5	1.7	110	107	111	98	100	100
DE	1.6	1.4	1.5	101	94	95	94	88	88
GR	2.6	1.6	1.1	72	72	68	84	79	79
ES	2.0	1.9	0.9	85	90	81	91	88	88
FR	1.7	1.5	1.6	105	101	103	113	110	110
IE	4.2	2.5	1.2	132	177	167	128	161	161
IT	1.6	1.6	1.3	100	97	94	116	108	108
LU	3.0	2.1	2.4	194	225	268	129	134	134
NL	1.3	1.3	1.7	108	98	103	93	92	92
AT	1.9	1.5	1.4	116	113	112	109	106	106
PT	1.5	2.1	1.1	68	73	68	60	71	71
FI	2.4	1.6	1.7	108	110	115	104	112	112
SE	2.3	2.0	1.7	112	123	129	104	116	116
UK	2.4	1.8	1.5	104	111	113	95	107	107
CY	2.9	2.7	1.6	81	107	110	77	94	97
CZ	3.6	2.8	1.3	64	89	86	59	86	90
EE	6.6	3.5	1.6	46	86	87	46	82	86
HU	3.9	2.8	1.4	54	76	75	61	81	84
LT	7.0	3.7	1.5	43	86	87	46	80	84
LV	8.3	3.9	1.5	42	93	94	42	88	92
MT	1.3	2.2	1.7	68	73	76	80	81	84
PL	4.7	3.4	1.3	45	75	73	54	76	79
SK	4.7	3.6	1.0	48	83	77	52	76	80
SI	3.6	2.5	1.4	73	94	94	71	96	100
EU25	2.2	1.8	1.4	92	97	97	93	97	98
EU15	1.9	1.7	1.4	100	100	100	100	100	100
EU10	4.6	3.2	1.3	50	80	78	56	80	83

Source: DG ECFIN

1.5 Other macroeconomic assumptions

Real interest rates: The EPC agreed to assume a real interest rate of 3%.

Inflation: The EPC agreed that projections should be reported in 2004 prices. However, for technical reasons, some countries may need to introduce an assumption on inflation into their models, and in this event, the EPC agreed that it should be 2% for all countries.

Growth of real wages: The EPC agreed to assume that real wages grow in line with labour productivity. As a result, the wage share is assumed to remain constant over the projection period. The rule is applied to all Member States uniformly.[19]

1.6 Sensitivity tests

Overview of agreed sensitivity tests

Given the uncertainty surrounding many assumptions underpinning long-run budgetary projections, it is necessary to carry out a number of sensitivity tests to quantify the

[19] The assumption is well-founded in economic theory. If the real wage is equal to the marginal productivity of labour, it follows that under the standard features of the production function, real wage growth is equal to labour productivity growth and real unit labour costs remain constant.

responsiveness of projection results to changes in key underlying assumptions. In addition to running a baseline projection, the EPC has agreed to run a series of sensitivity tests, an overview of which can be seen in table 15 below.[20] The EPC and Commission have followed a bottom-up approach to produce the overall set of assumptions, i.e. from population projections through labour input and to GDP growth projections. Therefore, each sensitivity test involves the recalculation of all assumptions and re-running the labour force and productivity function-based models, in order to keep a consistent macroeconomic framework.

Table 15 Overview of agreed sensitivity tests: difference in assumptions compared with the baseline scenario

Population	**Labour force**		**Productivity**	**Interest rates**
High life expectancy	***High employment rate***	***High employment rate amongst older workers (aged 55-64)***	***High/ low productivity***	***High/ low interest rate***
Decrease of 15% in age-specific mortality rates (ASMRs) by 2050, via a linear increase from 0% in 2004. This leads to an increase in life expectancy at birth of roughly 1-1.5 years by 2050.	Employment rate increases by 1 p.p. over the period 2005-2015 and remains 1 p.p. higher over the period 2015-2050. The change in the employment rate is reflected in a parallel change in unemployment rate (NAIRU).	Employment rate of older workers increases by 5 p.p. over the period 2005-2025 (that is about 0.25 per year) and remains 5 p.p. higher over the period 2025-2050. The change in the employment rate is reflected in a parallel change in participation rate.	Labour productivity increases/ decreases by 0.25 over the period 2010-2015 (that is about 0.04 per year) and remains 0.25 p.p. higher/ lower over the period 2015-2050.	Interest rate 1 p.p. higher/ lower than the 3% in baseline scenario.

Sensitivity test on the demographic assumptions

Table 16 summarises the assumptions on life expectancy in the sensitivity test and the difference relative to the baseline scenario. The EPC agreed to run a sensitivity test on high life expectancy. Gains in life expectancy have important implications for spending on pensions, health care and long-term care, and are a major source of financial pressure/ risk for social protection systems. A decrease of 15% in age-specific mortality rates (ASMRs) is assumed by 2050, via a linear increase from 0% in 2004. This leads to an increase in life expectancy at birth of roughly 1-1.5 years by 2050. The largest changes in population with higher life expectancy occur in the numbers of the elderly (5% higher in the EU25 than in the baseline scenario) and the very old (10.2% higher than in the baseline scenario). Overall, the old-age dependency ratio would be 2.5 percentage points higher in this high life expectancy scenario than in the baseline scenario.

[20] See DG ECFIN (2005), '*Sensitivity tests and policy scenarios for the budgetary projection exercise: some suggestions*', ECFIN REP 5163 of 13 April 2005.

Table 16 Summary of assumptions on life expectancy in sensitivity tests and difference relative to the baseline AWG scenario

	males		*difference with baseline*		females		*difference with baseline*	
	2020	**2050**	***2020***	***2050***	**2020**	**2050**	***2020***	***2050***
BE	79.4	83.6	*0.6*	*1.5*	85.3	88.8	*0.5*	*1.3*
DK	78.7	83.1	*0.6*	*1.6*	82.6	86.9	*0.5*	*1.6*
DE	79.5	83.7	*0.6*	*1.8*	84.7	88.2	*0.5*	*1.5*
GR	78.8	82.8	*0.6*	*1.7*	83.8	87.3	*0.5*	*1.4*
ES	79.6	83.3	*0.6*	*1.6*	86.1	88.6	*0.4*	*1.3*
FR	79.9	83.9	*0.6*	*1.5*	86.3	89.2	*0.5*	*1.3*
IE	79.3	84.1	*0.6*	*1.9*	84.2	88.6	*0.5*	*1.8*
IT	80.4	84.4	*0.5*	*1.6*	85.8	89.1	*0.5*	*1.3*
LU	79.0	83.4	*0.6*	*1.7*	84.5	88.3	*0.5*	*1.6*
NL	78.8	82.7	*0.5*	*1.7*	83.0	86.7	*0.5*	*1.5*
AT	79.8	84.3	*0.5*	*1.5*	85.2	88.5	*0.5*	*1.3*
PT	78.0	82.9	*0.6*	*1.7*	84.4	88.0	*0.5*	*1.3*
FI	79.3	83.5	*0.6*	*1.5*	84.7	87.9	*0.5*	*1.3*
SE	80.9	84.2	*0.5*	*1.5*	84.9	88.0	*0.5*	*1.4*
UK	79.9	84.1	*0.6*	*1.7*	84.3	88.1	*0.5*	*1.5*
CY	79.6	83.5	*0.6*	*1.6*	83.3	86.5	*0.5*	*1.4*
CZ	76.4	81.4	*0.6*	*1.7*	81.8	85.5	*0.5*	*1.4*
EE	69.6	77.0	*0.7*	*2.2*	80.0	84.7	*0.6*	*1.5*
HU	73.5	80.1	*0.7*	*1.9*	80.4	85.0	*0.5*	*1.5*
LT	70.4	77.7	*0.8*	*2.1*	80.7	85.3	*0.6*	*1.5*
LV	68.8	76.4	*0.8*	*2.2*	79.2	84.1	*0.6*	*1.6*
MT	79.5	83.4	*0.5*	*1.6*	83.4	86.4	*0.5*	*1.4*
PL	75.2	81.0	*0.6*	*1.8*	81.8	85.9	*0.5*	*1.4*
SK	73.7	79.5	*0.6*	*1.8*	80.8	84.8	*0.5*	*1.4*
SI	76.7	81.6	*0.6*	*1.7*	83.3	86.5	*0.5*	*1.4*
EU25	*78.9*	*83.3*	*0.6*	*1.7*	*84.5*	*88.0*	*0.5*	*1.4*
EU15	*79.7*	*83.8*	*0.6*	*1.7*	*85.1*	*88.4*	*0.5*	*1.4*
EU10	*74.7*	*80.5*	*0.6*	*1.7*	*81.4*	*85.6*	*0.5*	*1.4*

Source: DG ECFIN and AWG

Sensitivity tests on the labour force assumptions

The EPC agreed to run the following two sensitivity tests on the labour force:

- an increase in the *total employment rate* (for persons aged 15 to 64). In particular, compared with the baseline scenario, the employment rate is assumed to increase by 1 percentage point over the period 2005-2015, and to remain 1 p.p. higher over the period 2015-2050. The change in the employment rate is reflected in a parallel change in the unemployment rate (NAIRU).

- an increase in the *employment rate of older workers* (aged 55 to 64). Compared with the baseline scenario, the employment rate of older workers would increase by 5 percentage points over the period 2005-2025 (i.e. by about 0.25 per year) and remain 5

p.p. higher over the period 2025-2050. The change in the employment rate is reflected in a parallel change in participation rate.

Sensitivity tests on the other macroeconomic assumptions

The sensitivity tests agreed on other macroeconomic assumptions are the following:

- *labour productivity growth* is assumed to increase/decrease by 0.25 over the period 2010 to 2015 (that is about 0.04 per year), and remain 0.25 percentage point higher/ lower than in the baseline scenario;

- *real interest rates* are set 1 percentage point higher/lower than the 3 % in the baseline scenario.

2. Issues related to the coverage and projection methodology for various age-related expenditure items

2.1 Pensions

Following a questionnaire survey carried out in 2004, the EPC has agreed that:

- pension projections cover social security and other public pensions as well as mandatory private pensions.[21] A list of the pension schemes to be covered in the projection exercise is provided in chapter 6. Regarding the projections of occupational pensions, the EPC considered that, where these pensions are of major importance, Member States should provide the projections on a voluntary basis;

- social security and other public pensions are broken down into two categories – first, old-age and early retirement pensions (including minimum and earnings-related pensions), with a preference for the inclusion also of disability and widow's pensions paid out to persons over the standard retirement age – second, other pensions (disability, survivors', partial pensions without any lower age limit, including minimum and earnings-related pensions). Mandatory private pensions are not broken down into sub-groups;

- projections of contributions to social security and mandatory private pension schemes are provided on a voluntary basis;

- projections should be done for both gross and net pensions. The EPC agreed that the estimation of net pension can be done either through an average pensioner approach or on the basis of aggregate income and tax statistics, depending on data availability or model specification at country level.

[21] DG ECFIN (2004), European Commission DG ECFIN (2004p), '*Reporting framework for pension expenditure and contributions: definitions and clarifications*', Note for the attention of the AWG meeting of 8/9 November 2004, ECFIN/REP50496rev.1 of 29 October 2004.

2.2 Health care

Ageing is only one driver of health care expenditure

The 2001 projection exercise methodology consisted of applying profiles of average health expenditure per capita, provided for a base year by Member States, to a population projection done by Eurostat. The projections were run under the assumption of constant age- and gender-contingent demand and consumption of health care over time. They were also made under two cost assumptions, i.e. expenditures per capita grow exactly at the same rate as GDP per capita (which can be considered neutral in macroeconomic terms), and expenditures per capita increase at the same rate as GDP per worker (to reflect the labour intensity of the health care sector).

The 2001 report of the EPC clearly recognised the limitations of this projection methodology, in particular regarding the strong assumption of holding age-related expenditure profiles constant over time, the failure to link expenditure to years of remaining life (death-related costs), and the absence of non-demographic drivers of spending from the projection exercise. According to the literature, the demand for health care (and social care) depends ultimately on the health status and functional ability of (elderly) citizens, and not on age *per se*. While age is a useful indicator of the health status of an elderly population (and shown by the steep upward slope of age-related expenditure profiles), it is not the causal factor. Health care spending is mostly driven by:

- the health status of the population;
- economic growth and development;
- new technologies and medical progress;
- the organisation and financing of the health care system;
- health care resource inputs, both human and capital.

A detailed analysis of the factors driving health care spending over the long-run can be found in European Commission (2005)[22] which also reviews methodologies used by the various national authorities and international organisations for making projections of health care spending. Another note, European Commission (2004)[23], reviews both aggregate and microeconomic measures that have been taken to control health care spending in Member States.[24]

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[22] DG ECFIN (2005), 'Factors driving public expenditures on health/long-term care over the long run and an overview of methodologies used to make expenditure projections', Note for the attention of the AWG meeting of 18/19 April 2005, ECFIN/REP51821/05-EN of 15 April 2005.

[23] DG ECFIN (2004), '*Controlling health care expenditures: some recent experiences with reform'*, Note for the attention of the Economic Policy Committee, ECFIN/157/04 Rev.1 of 16 March 2004.

[24] The policy challenges facing health care systems in EU Member States as a result of demographic change are also reviewed in "*Health care in an ageing society: a challenge for EU countries*", Background Paper of the Netherlands EU Presidency for the Informal Health Council in Noordwijk, 9-10 September 2004.

Agreement on the need to extend projections to cover non-demographic factors

Given these considerations, the EPC has recognised the need to include non-demographic factors in the 2005 projection exercise. Rather than trying to construct an all-encompassing projection methodology to capture all demographic and non-demographic factors, the EPC has agreed to consider the possibility that four different approaches could be used to project health care spending, and that several different scenarios could be run under each approach. The analysis of the feasibility of these approaches is being prepared by DG ECFIN on the basis of preliminary projections.[25] This would mark a departure from the method followed in the 2001 projection exercise, where there was a single baseline scenario and several variant scenarios derived from that baseline.[26] An overview of all approaches is presented in table 17 and can be summarised as follows:

- *Approach I – application of age-related expenditure profiles to different developments in health status:* by assuming that age-related spending per capita on health care remains constant over time, the 2001 budgetary projection exercise implicitly assumed that a large share of the gains in life expectancy up to 2050 would be spent in bad health. This is a very strong and, according to the literature, possibly overly pessimistic assumption. A scenario could be run which repeats the 2001 projection exercise (a pure demographic scenario with constant expenditure profiles). However, an additional stylised scenario could be run by shifting the age-related expenditure profiles outwards linked to the projected gains in life expectancy: such stylised scenarios could implicitly assume that some of the projected gains in life expectancy up to 2050 are spent in good health. Graph 3 below illustrates the different scenarios for life expectancy and whether it will be spent in good health.

- *Approach II – death-related costs:* projections could be run linking health care spending to years of remaining life. As explained in European Commission (2004n)[27], there is strong evidence that a large share of total spending on health care during a person's life is concentrated in the final years of life. Based on data available from micro studies from several national sources, it would be possible to run projections based on constructed stylised profile of "death-related" costs;

- *Approach III – extrapolation of cost developments on the basis of past trends:* the OECD[28] has developed a methodology using past data to decompose changes in spending on health care which are due to demographic and non-demographic factors, and has made

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[25] DG ECFIN (2005), 'Preliminary results of the health care projections – approach I application of the age-related expenditure profiles to different developments in health status', Note for the attention of the AWG meeting of 16 June 2005, ECFIN/REP/52772/05-EN of 10 June 2005; DG ECFIN (2005), 'Approach II to project Health care expenditure taking account of 'death-related costs': revised preliminary projection results'. Note for the attention of the Ageing Working Group attached to the EPC of 17-18 October 2005, ECFIN/REP/54733 of 11 October 2005; DG ECFIN (2005), 'Preliminary results of the health care expenditure projections – approach IV: decomposing unit costs and applying different assumptions on evolution of costs'. Note for the attention of the Ageing Working Group attached to the EPC of 17-18 October 2005, ECFIN/ REP/54746 of 12 October 2005.

[26] When the budgetary projections on health care and long-term care are finalised, it may be necessary todiscuss the appropriate choice of a baseline projection for the purposes of making quantitative assessments of the sustainability of public finances.

[27] DG ECFIN (2004), 'Incorporating death-related costs in the long-term budgetary projections of health care and long-term care: a review of existing methodologies and results', Note for the attention of the AWG meeting of 9 September 2004, ECFIN/REP/50281 of 3 September 2004.

[28] Oliveira Martins J., F. Gonand, P. Antolin, C. de la Maisonneueve and K. Yoo (2005), '*The impact of ageing on demand, factor markets and growth*', OECD Economic Working Papers N°249; OECD (2005), *Projecting OECD health and long-term care expenditures: what are the main drivers?*, Working Party No.1 on Macroeconomic and Structural Policy Analysis, ECO/CPE/WP1(2005)14 of 23 September 2005.

projections by extrapolating these trends into the future. The EPC will not carry out projections under this approach, but instead will take account of the OECD projection results, in autumn 2005, when reaching overall conclusions on the future challenges for health care spending.

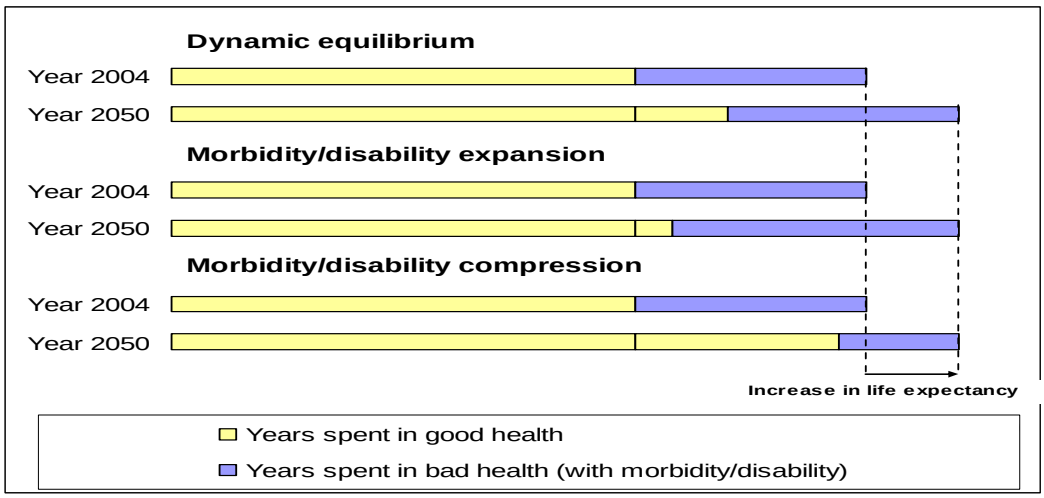
- *Approach IV – changes in unit costs*: future health care spending as a share of GDP will be heavily influenced by the evolution of prices in the health care sector, especially if they exceed price inflation in the economy as a whole. A number of scenarios could be considered. It would be possible to repeat the approach used in the 2001 budgetary projection and to run the "pure demographic scenario" based on the morbidity expansion hypothesis, assuming costs evolve in line with GDP per worker. Other scenarios could be run by disaggregating costs in the health care sector into its component parts (wages, investment, pharmaceuticals), and by running projections with various assumptions on evolution of costs for each of these components.

Table 17 Overview of the different approaches to making health care projections

APPROACH I **Application of age-related expenditure profiles to different developments in health status**	**APPROACH II** **Death-related costs**	**APPROACH III (OECD exercise only)** **Extrapolation of total cost developments on the basis of past trends**	**APPROACH IV** **Changes in unit costs**
"Pure demographic" scenario [based on the expansion of morbidity hypothesis where a larger share of gains in life expectancy are spent in bad health]	Linking health expenditure to remaining years of life, based on a profile derived from existing national studies	Decomposing demographic and non-demographic drivers (based on OECD approach)	"Pure demographic" scenario run assuming costs evolve according to various assumptions (e.g. GDP per worker)
"Constant health" scenario [based on the "Dynamic equilibrium" hypothesis where most of gains in life expectancy are spent in good health]			Disaggregating costs (wages, investment, pharmaceuticals) & applying different assumptions on evolution of costs for each component
"Improved health" scenario [based on the "compression of morbidity" hypothesis where 'healthy life expectancy increases by more than life expectancy at birth']			

Source: DG ECFIN

Graph 3 Different hypotheses for the evolution of healthy life expectancy



Note: In the *pure demographic scenario* based on the 'expansion of morbidity' hypothesis, a large share of the additional years of life expectancy gained between 2004 and 2050 are assumed to be spent in bad health. In the *constant health scenario* based on the "dynamic equilibrium" hypothess , the number of years spent in bad health during a life in 2050, is identical to that in 2004, i.e. all gains in life expectancy are spent in good health. The *improved health scenario* is based on the 'compression of morbidity' hypothesis and involves a shortening of the share of one's lifespan spent in bad health, i.e. the morbidity rate falls faster than the mortality rate.

2.3 Long-term care

Limitations of the 2001 projection exercise

The 2001 exercise included projections for long-term care. Projections were made by applying a constant age-related expenditure profile for long-term care (collected by national authorities for a base year) to the 2000 population projection of Eurostat. As with health care expenditure, projections were made with two cost assumptions, i.e. evolving in line with GDP per capita and GDP per worker. Like with health care, the methodology followed in 2001 has a number of important limitations:

- holding the age-specific spending on long-term care constant over the projection period at the level in a base year (usually 2000) implies that a large share of the projected gains in life expectancy are assumed to be spent in poor health with a high degree of disability: in the literature, this is referred to as the "expansion of morbidity" hypothesis. However, the literature points to other potential scenarios, including a "dynamic equilibrium" hypothesis (nearly all gains in life expectancy are spent in good health and without disability) and a "compression of morbidity" hypothesis (gains in healthy/disability-free life expectancy exceed the gains in life expectancy);

- the 2001 projection only included scenarios on the basis of current institutional arrangements for the provision and financing of long-term care by the public sector, i.e. a "no policy change" scenario. This approach is an appropriate starting point for making long-run projections; however, it could usefully be complemented with additional scenarios to assess the impact of possible future policy changes. Pressure for more public provision/financing of long-term care services could grow substantially in the coming decades due to changes in family structure and the growing labour market attachment of females, trends which may severely constrain the supply of informal care provision;

- the 2001 projection methodology implicitly assumes that the balance between care provided in institutional and home-based settings remains unchanged over the projection period. As above, this is a reasonable starting point for a "no policy change" scenario, but it would be useful to complement this with additional policy scenarios as unit costs may differ substantially between the two settings.

Proposed projection methodology for the 2005 exercise

Given these considerations, the EPC agreed on a projection methodology which is substantially different from that used in 2001, building on a simple macro simulation or cell-based model. Specifically, the methodology would enable the investigation of the impact of changes in the assumptions made about (i) the future numbers of older people (through changes in the population projections used), (ii) the future numbers of dependent older people (by making changes to the prevalence rates of dependency), (iii) the balance between formal and informal care, (iv) the balance between home and institutional care (by changing the proportion of people using home care, those using institutional care and those relying exclusively on informal care) and (v) the costs of a unit of care. The methodology proposed would allows investigating both the future demand for long-term care services and the future provision of care based on current policies and institutional arrangements.

An overview of the proposed projection methodology can be seen in graph 4 below.[29] 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. The main steps can be summarised as follows:

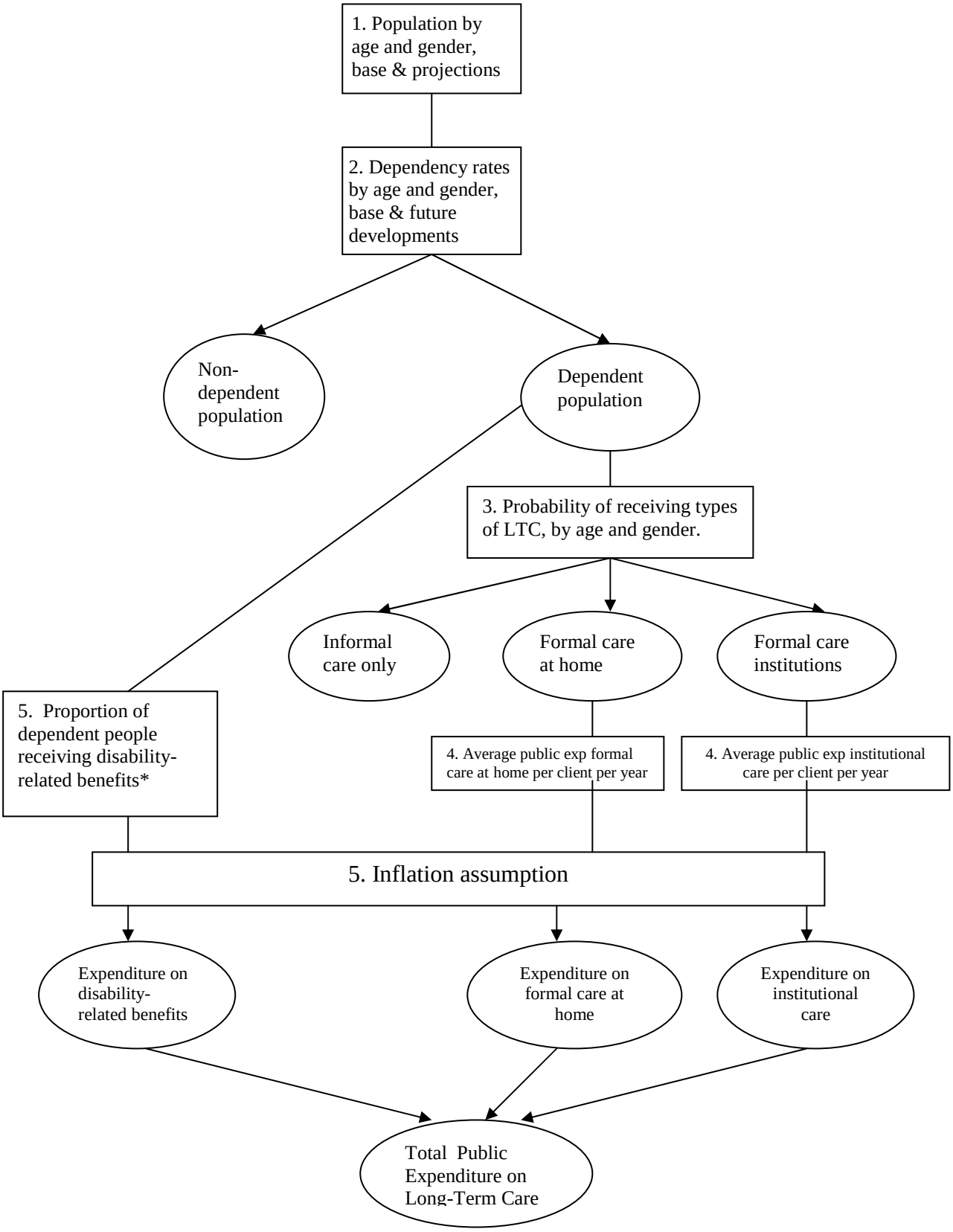
[29] Comas-Herrera Adelina, R. Wittenberg and L. Pickard (2005), '*Making projections of public long-term care expenditure for European countries: a proposed methodology and data requirements'*, Presentation to the joint EC-AWG-OECD workshop of 21-22 February 2005.

- *Step 1*: taking the baseline population projection (by age and gender), 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. The projection of the dependent population is made by extrapolating age and gender-specific dependency ratios of a base year (estimated using existing indicators of disability from comparable sources) to the baseline population projection. It is worth stressing at this point the difference between the terms "dependency" and "disability" used. The term "disability" refers to some functional impairment of an individual. The term "dependent" refers to that 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;

- *Step 2* is to split the dependent population into three groups depending on the type of care they receive, namely (i) informal care, which has no impact on public spending, (ii) formal care at home and (iii) formal care in institutions (both of which impact on public spending but their unit costs may differ). This split can be made by calculating the "probability of receiving different types of long-term care by age and gender". This has to be calculated for a base year using data on the numbers of people with dependency, the numbers of people receiving formal care at home and the numbers of dependent people in long-term care institutions. It is proposed to assume that the difference between the total number of dependent people and the total number of people receiving formal care (at home or in institutions) is the number of people who rely exclusively on informal care.

- *Step 3* would involve the calculation of public spending by multiplying the number of people receiving long-term care services at home and institutions by the respective average public expenditure per year, per user. By adding this up, public total expenditure in long-term care services is obtained. Public expenditure on cash benefits for people with disabilities could be added in order to obtain total public expenditure on long-term care.

Graph 4 Proposed model structure for projecting long-term care needs and expenditure



2.4 Education

When projecting education expenditure, several issues warrant attention and need preliminary clarification. First, a delimitation of what education expenditure and the education sector should include must be made. Education can encompass only schooling, or include tertiary education and even adult education. Pre-primary education can be included or not. Second, being in education is not an exclusive status. For people above a certain age, different 'statuses of activity' are possible, including studying full time, working and studying part time, working full time or neither work nor study. Third, education expenditure takes different forms. Generally, the public sector funds education either by bearing directly the current and capital expenses of educational institutions (direct expenditure for educational institutions), by supporting students and their families with scholarships and public loans, or by transferring public subsidies for educational activities to private firms or non-profit organisations (transfers to private households, institutions and other entities). Fourth, non-demographic drivers can be important to the actual development of expenditures. Costs are often determined by the number of classes rather than the number of students, implying that keeping costs per student constant if the number of students change constitutes an approximation of reality. Income increases and changes in demand for different labour categories may lead to structural trends in costs per student and/or enrolment rates. When projecting education expenditures in the context of a larger exercise, simplifying assumptions is, however, warranted.

The main idea behind the methodology used is to decompose total education expenditure in the base year into expenditure per student and number of students. Expenditure per student is further decomposed into wages, number of teaching and non-teaching staff and the existence of other current and capital expenditures, including transfers. In addition, the share of direct public over total direct expenditure is calculated. Next, assumptions are made for each cost category, enrolment rates and number of young people. The different education levels are treated separately to capture existing differences of e.g. cost structure within the education system.

The decomposition allows applying different assumptions on the future trends of each underlying variables and thus addressing the role of the wage setting, the capacity of the education system to adapt to demographic changes, as well as other institutional factors. However, in the context of the general long-term budgetary exercise, the value-added from such an analysis is considered to be low compared to the increased complexity it would entail. The projections are therefore based on simplifying assumptions, where the staff-to-students ratio, the ratio of other costs to total expenditure and the share of direct public expenditure to total direct expenditure all remain constant. The average wage develops in line with GDP per worker for the whole economy. Taken together, these assumptions imply that also expenditure per student develops in line with GDP per worker. In addition, the current share of transfers over total direct public education expenditure is kept constant over time.

Future developments of the number of students enrolled in each level of education depend on individual behaviour, and in particular on whether education is an alternative to work. For the current exercise, education is considered compulsory up to and including 14 years. For these age groups the projections assume constant enrolment rates. For students aged 15 years and above, the projections take into account labour market developments. An increase in the participation rate in the labour market implies a decrease in the enrolment rate. No other changes in enrolment are included in the projections.

The projections cover public education expenditure for schooling and tertiary education. In particular, projections are run for primary (ISCED 1), lower secondary (ISCED 2), upper secondary and post-secondary non-tertiary (ISCED 3 and 4), and tertiary education (ISCED 5 and 6). As the 2003 exercise showed that comparability is very difficult for pre-primary education (ISCED 0), due to large differences in institutional settings and data problems, this component has been excluded from the exercise.

The exercise uses data from the UOE database which provides detailed information for all 25 EU Member States on enrolment and expenditures in the different education levels[30]. Notably, enrolment is given by both age and level, while in the 2003 exercise, breakdown was only possible by level. The database covers both direct expenditure and transfers. The base year is 2002 (most recent harmonised data) and it refers to the financial year which is in general identical to the calendar year and thus running from 1st of January to 31st of December. The same year refers to the school/academic year 2001/2002.

Compared to the 2003 exercise, a major improvement in the present projection exercise is the use of more reliable and comparable data, made possible by the renewed UOE education database. The exclusion of pre-primary education should also improve the comparability of the exercise. In addition, the methodology better ensures consistency between enrolment rates and labour participation rates and allows for different assumptions for the development of each cost element, enabling a more detailed analysis.

2.5 Unemployment benefits

Although expenditure on unemployment benefits is not an age-related expenditure, the EPC has decided to take this item into account for the sake of consistency with the macroeconomic scenario used in its long-run budgetary projections, and notably the assumptions on participation and unemployment rates.

The projections for public spending on unemployment benefits will be carried out following the same methodology as in the 2001 projection exercise, which is similar to what was done for health care. The basic assumption is that per capita unemployment benefit will grow at the same rate as labour productivity. In brief, they are broadly based on per capita unemployment insurance spending in a base year, multiplied by the projected number of unemployed persons in future years. This simple calculation assumes, under a no-policy change hypothesis, unchanged replacement rates, duration, entitlement conditions, eligibility criteria, take-up rates, tax structure and a constant share of wages in the income distribution over time (that is, the wage per worker grows at the same rate as labour productivity, i.e. GDP per worker). To ensure the comparability of projections across countries, standardised figures on social protection expenditure provided by Eurostat will be used.[31]

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[30] The data collection on statistics of education is administered jointly by the United Nations Educational, Scientific, and Cultural Organisation, Institute for Statistics (UNESCO-UIS), the Organisation for Economic Co-operation and Development (OECD), and the Statistical Office of the European Union (Eurostat). The goal of this data collection is to provide internationally comparable data on key aspects of the education systems. The data collection, including methodological explanations, is available online through Eurostat New Cronos database at http://epp.eurostat.cec.eu.int/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/&product=EU_MAIN_TREE&depth=1.

[31] Two main components were used in the Eurostat definition of social protection spending related to unemployment (i.e. *"kind of benefits"*), that is, benefit spending for "Partial unemployment" and "Full unemployment" respectively.