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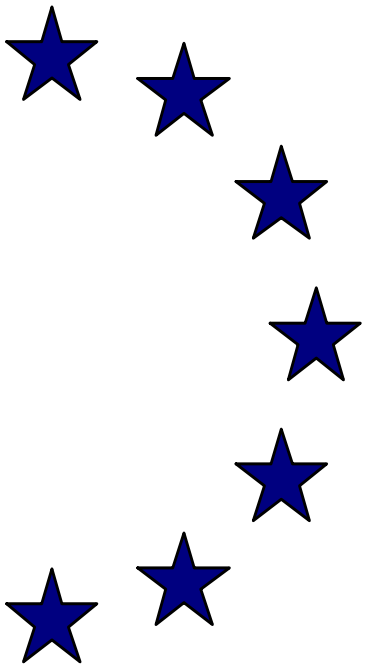

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The economic impact of ageing populations in the EU25 Member States

by

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Directorate-General for Economic and Financial Affairs

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The economic impact of ageing populations in the EU25 Member States

Giuseppe Carone, Declan Costello, Nuria Diez Guardia, Gilles Mourre, Bartosz Przywara, Aino Salomäki

ABSTRACT

This paper presents an assessment of the overall economic impact of ageing for the EU Member States. It draws upon the macroeconomic assumptions developed by the Ageing Working Group attached to the Economic Policy Committee and the Directorate General for Economic and Financial Affairs for the purpose of making age-related expenditure projections. The paper presents and analyses projections of the impact of ageing populations on the labour market using a refined cohort approach by age and gender, as well as projections for potential economic growth rates up to 2050.

The projections point to pressing economic policy challenges for the EU. From an economic perspective, potential growth rates and living standards are projected to fall to levels below those observed in recent decades: moreover, the sources of economic growth will alter over time, with productivity becoming the dominant source. Fiscal challenges will come from both a higher share of the total population in older age cohorts and a decline in the share of the population that is economically active.

Some positive indications emerge from the analysis. First, employment rates and levels are projected to continue rising for at least a decade, which will temporary offset the decline in the size of the working-age populations, and as such provide a window of opportunity to undertake necessary reform measures. Secondly, the projections underpin the validity of the approach adopted by the EU in the Lisbon strategy, including the need to invest in human capital formation. Third, the analysis illustrates the potential benefits of structural reform, and in particular the large impact that pension reforms can have in prolonging working lives and raising effective retirement ages.

As regards policy conclusions, the paper underlines the critical need for further labour market reforms, and the possible need for the EU to look beyond the Lisbon employment targets and deadlines. Even if the EU as a whole achieves the Lisbon employment targets, this will not be sufficient to offset the effects of demographic change and considerable unused labour capacity would remain in many Member States. The paper also argues that ageing is an evolving process, and that a key challenge will be to develop labour market and welfare state policies that are sustainable in the face of uncertain economic and demographic developments. Current financing problems in pension schemes stem to a large extent from the failure of contribution/entitlement parameters in public pension schemes to adjust in the face of increased life expectancy. It will be important to ensure that retirement behaviour takes due account of future increases in life expectancy.

JEL classification: J10, J11, J18, J21, J26, I0, O4, H55

Keywords: ageing population, pension reforms, productivity, labour force, GDP growth, production function, long-term projections.

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1. Introduction

Europe's population will undergo dramatic changes in coming decades due to low fertility, continuous gains in life expectancy and large-scale inward migration. Since the launch of the euro, considerable attention has been paid to the budgetary implications of ageing populations. Common budgetary projections were produced by the EU Economic Policy Committee's Ageing Working Group (henceforth AWG)[1] in 2001 and an annual assessment of the sustainability of public finances on the basis of stability and convergence programmes has been initiated.[2] This paper focuses on the equally important issue of the impact of ageing on the real economy, and in particular on the labour market and potential economic growth.

The paper is structured as follows:

- section 2 contains a summary of the literature on the main transmission channels through which an ageing population can affect the functioning of the real economy;

- section 3 presents projections for the impact of ageing on employment and potential growth in real GDP and GDP per capita. To this end, it reviews the main drivers of demographic change and, on the basis of a new population projection, summarises how the size and age structure of the populations of EU Member States can be expected to change. It then analyses the impact of ageing on the labour market: in particular, based on a cohort model, it presents projections for participation and employment rates and discusses the prospects for meeting the Lisbon employment targets. Section 3 focuses on the impact on labour productivity, and also contains projections for GDP potential growth rates and economic well-being up to 2050 for all 25 EU countries. Most of this analysis, and in particular the employment and GDP projections, draws upon recent work by the Directorate General for Economic and Financial Affairs of the European Commission (henceforth DG ECFIN) and the Ageing Working Group[3] attached to the Economic Policy Committee to prepare macroeconomic assumptions used to make age-related expenditure projections;[4]

- section 4 draws policy conclusions on the scale and nature of the ageing challenge facing the EU. Particular emphasis is placed on the labour market, and especially the importance of achieving and even surpassing the Lisbon employment targets and raising effective retirement ages.

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1 The Economic Policy Committee (EPC) is composed of senior officials from national economics and finance ministries and central banks and serves to prepare the ECOFIN Council. The EPC's Ageing Working Group (henceforth AWG) was established to study the implications of ageing populations for public finances in areas such as pensions, health and education. In 2001, a first set of comparable projections on the long-term budgetary impact of ageing was produced covering pensions, health care and long-term care. See EPC (2001).

2 See parts I.4 and II.3 of European Commission (2005a),

3 The age-related expenditure projections cover public spending on pensions, health care, long-term care, education, unemployment transfers and, if possible, contributions to pensions/social security systems for the EU25 Member States. They are being prepared as part of the mandate given by the ECOFIN Council in November 2003 to the EPC to produce budgetary projections for EU Member States for 2004-2050: the projection results will be presented to the ECOFIN Council in February 2006, on the basis of the agreed underlying assumptions and projection methodologies, details of which can be found in EPC and European Commission (2005a and 2005b).

4 The methodology for making the labour force projections is set out in Carone (2005) together with a detailed presentation of the projection results. The approach used regarding assumptions on labour productivity and other macroeconomic variables are set down in Carone, Denis, McMorrow, Mourre and Röger (2006).

While this analysis does not directly deal with the budgetary cost of ageing populations, it nonetheless casts light on prospective developments in the real economy that are relevant when assessing the sustainability of public finances. A much clearer picture of the budgetary costs of ageing will emerge when the Ecofin Council of February 2006 completes its examination of the age-related expenditure projections being prepared in the Ageing Working Group attached to the EPC.

It is hoped that this analysis on the implications of ageing on employment and growth will be relevant for a wide range of policy debates under way at EU level, including the follow-up to the Green Paper on demographic change, the work on the Lisbon strategy, the open method of co-ordination on pensions and on the sustainable financing of the European Social Model (debated at the informal European summit in Hampton Court under the UK Presidency on 27 October 2005).[5]

2. Transmission channels of ageing to the real economy: a literature survey

2.1 A synthetic overview

The literature on ageing is very abundant[6]. The survey in this section focuses on both the direct impact of an ageing population on GDP growth and GDP per capita, as well as indirect "feedback" effects that can occur arising from the budgetary impact of ageing. Graph 1 sketches the main channels identified by the economic literature through which ageing influences overall economic performance.

Some important issues are not covered, such as the impact of ageing on the structure of capital markets, on future asset values (Poterba 2004, Oliveira et al. 2005)[7] and on global capital market developments (see e.g. McMorrow and Röger 2003 who survey ageing consequences on current account imbalances, international capital flows, movements in exchange rate and international interest rates).

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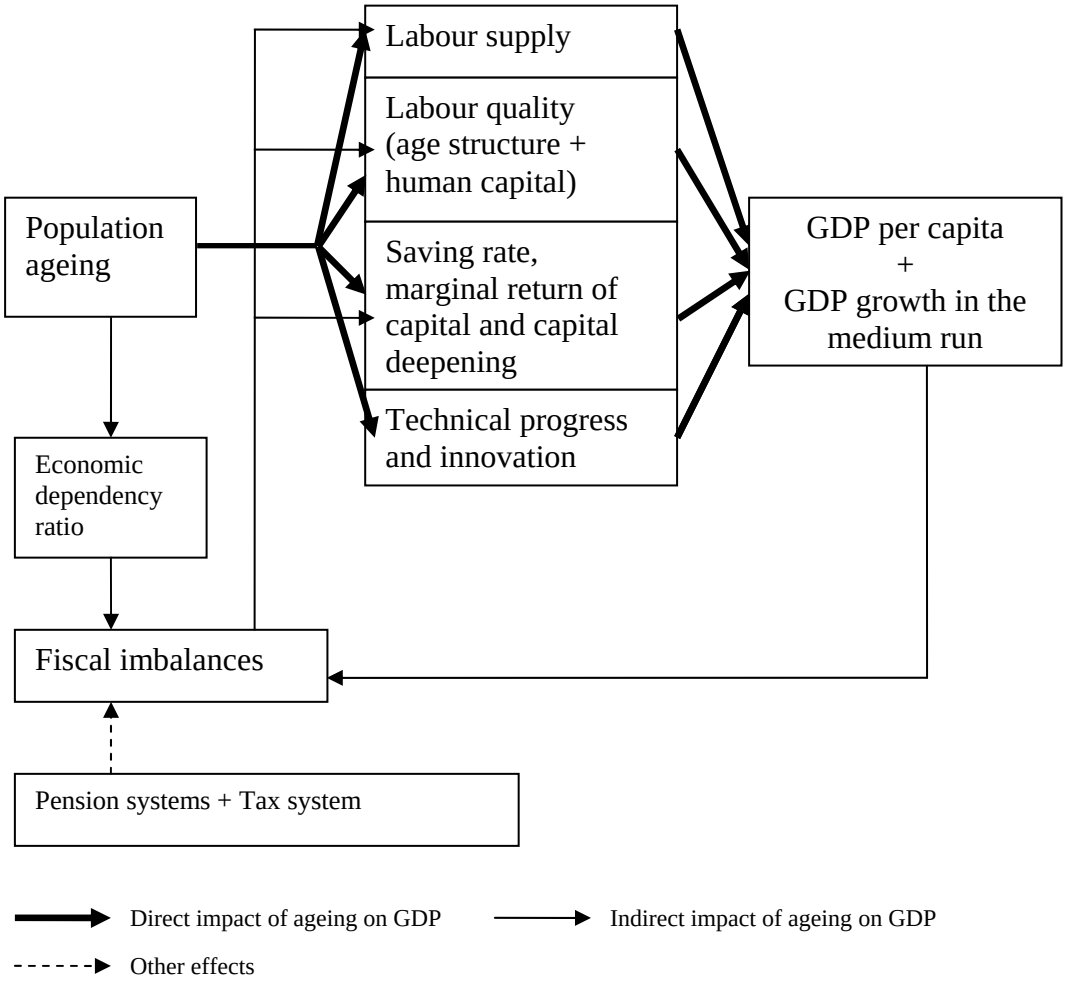
[5] The Commission published a Green Paper on demographic change in March 2005, which can be found at: http://europa.eu.int/comm/employment_social/social_situation/green_paper_en.html. Details of the Commission's work on the Lisbon strategy can be found at: http://europa.eu.int/growthandjobs/index_en.htm. Information related to the open method of co-ordination can be found on the website of DG EMPL at: http://europa.eu.int/comm/employment_social/social_protection/pensions_en.htm. As a contribution to the debate of Heads of State and Government on the European social model, the European Commission issued a Communication in October 2005, "*European values in the globalised world*", which can be found at http://europa.eu.int/growthandjobs/pdf/COM2005_525_en.pdf.

[6] For a comprehensive review see for example Disney (1996). For recent work on the impact of ageing on aggregate demand, see Oliveira Martins et al. (2005). An analysis of the macroeconomic effects of ageing and its impact on financial markets using a general equilibrium model for the EU can be found in Chapter 4 of the 2004 EU Economy Review. A report of the G10 will shortly be published on "*Ageing and pension system reform: implications for financial markets and economic policies*". For an overview of demographic changes in a global context, see IMF (2004). The challenges posed by an ageing population are examined in conjunction with other long-term policy challenges by Heller (2003).

[7] Some issues related to the structure of financial markets are the evolution of annuity markets, the need for new insurance instruments against longevity-related risks and the effect of age on portfolio structure. The "asset meltdown hypothesis" draws upon the life-cycle consumption hypothesis and argues that in coming decades, real interest may rise as a result of a sell-off of assets by older-age cohorts, pulling their prices down. This argument should be viewed with caution and it may not provide a strong basis to justify the large projected rise in the real interest rate. The empirical evidence for such an effect is weak and the literature is fairly mixed on this issue (for example see a short review in Oliveira et al. 2005). Indeed, many elderly people appear to be net savers, in contradiction to what is suggested by the life-cycle consumption hypothesis. Moreover, this hypothesis is based on a partial equilibrium framework, which overlooks potentially important changes in economic behaviours induced by interest rate developments.

Graph 1- Main transmission channels of ageing to overall economic performances



2.2 Direct economic effects of the ageing of population

Ageing will have a direct impact on the real economy via both labour input and productivity. The latter encompasses three separate channels, namely (i) the quality of labour inputs (influenced by the age structure and the human capital accumulated by the workforce), (ii) the capital/labour ratio and (iii) labour-augmenting technical progress, in other words Total Factor Productivity (TFP) embedded in labour inputs.

2.2.1 Impact of ageing on labour supply

A decline in the size of the working-age population may be partly offset by a rise in participation

Ageing not only leads to an increase of the average age of the population, but also leads to a decline in the size of the working-age population as older generations are replaced by less numerous younger cohorts. As a result, it has an adverse impact on potential labour inputs.

As analysed in several recent papers, the effects of decline in the size of the working age-population may be partly offset, at least for some time, by rising female participation rates resulting from a cohort effect (Burniaux et al. 2003, Pissarides et al. 2003, Carone 2005). Changing cultural attitudes and social norms as to gender roles may have a substantial influence on female employment. Participation in the labour market is increasingly the norm for women of all ages. The change in cultural attitudes is reflected in differences between age cohorts or generations, with women from younger generations being much more likely to participate in the labour force than older women. Older cohorts with a low participation rate are progressively retiring and they are being substituted by younger cohorts with higher participation. However, as Burniaux et al. (2003) and Carone (2005) point out, this trend rise in female participation rates may be expected to continue up to the middle of the next decade: further rises would require assuming ever-rising participation rates among not yet born cohorts compared with the youngest observed cohort now reaching working age.

Migration flows could also be used to raise labour supply

Ageing might stimulate migration, which would increase labour supply and stimulate growth provided the skills of the migrants broadly match the economic needs of the host country (e.g. Fehr et al. 2004). European countries already rely on migrants to fill shortages for certain skilled and unskilled tasks (e.g. in the health care sector). Immigration could be a positive factor in labour market adjustment.

It has also been argued that migration could bolster the financial sustainability of public (pay-as-you-go) pension schemes. However, for these benefits to materialise fully, migrants must be employed in the formal economy (thus contributing to the tax and social security systems), pension schemes must be broadly in actuarial balance (otherwise migrants' contributions will be insufficient to cover their future pension entitlements, making the funding of pension systems potentially unsustainable), and the skill structure of migrants must match labour market needs.[8] In practice, these conditions are often not met: immigrants tend to have lower employment rates than natives in many EU countries, and their unemployment rates are roughly two to three times higher on average. Therefore, a key challenge for the EU is to better integrate immigrants into the labour market.[9]

[8] European Commission Green Paper of January 2005 on managing economic migration (COM (2004) 811 final).

[9] For recent work on labour migration, see European Commission (2005b).

Labour supply shortages could aggravate mismatches in the labour market

The projected change in the age structure of the workforce could alter the composition of consumption and domestic demand (Börsch-Supan 2003). This might imply large reallocations between sectors, which require a rise in job mobility. Failing this, population ageing could lead to increasing labour market mismatches with even lower employment than that projected. Lastly, it should be noted that the rise in labour participation needed to increase labour supply might cause a dip in productivity growth in the short term if a significant proportion of the newcomers to the labour market have relatively low skills (Wasmer 2002, Mortensen 2005).[10]

2.2.2 Impact of ageing on the quality of labour input

Does a worker's productivity decline with age?

If an individual's productivity declines with age, then a rising share of older workers in the labour force would reduce overall labour productivity even though age-specific productivity remains constant over time. Whether productivity is affected by age is a complex issue, since the identification of the age effect is blurred by cohort and selection effects. An additional measurement problem comes from the fact that the age-profile of productivity is calculated on the basis of hourly earnings, and there may be a divergence between wages and productivity in the older age brackets due to the payment of seniority wages (Hellerstein et al. 1999).

The empirical evidence is mixed. Barth et al. (1993) find from a survey of human resource executives that older workers are seen as being more reliable and having better skills and work-friendly behaviour than their younger counterparts. Using an employer-employee dataset for the US, Hellerstein et al. (1999) show that prime-age workers (aged 25-54) are just as productive as younger workers, but those aged 55 and over are less productive. Surveying supervisors' ratings, work-sample tests, analyses of employer-employee datasets and other approaches assessing individual productivity across age brackets, Skirbekk (2003) finds evidence suggesting "*that productivity tends to follow an inverted U-shaped profile, where significant decreases take place from around 50 years of age*".

A possible cause of these age-related productivity declines is the reduction in cognitive abilities over a person's life span. Some abilities, such as perception speed, show relatively large decreases from a young age, while others, such as verbal abilities, show only small changes throughout the working life. Although older individuals have longer experience, they may learn at a slower pace and have reductions in their memory and reasoning abilities. This bell-shaped relationship between age and individual productivity is broadly confirmed by Kotlikoff and Wise (1989) and Hansen (1993) for the US, and Meghir and Whitehouse (1996) for the UK, who find that young workers with little experience and older workers are less productive than those of prime age. However, Börsch-Supan (2003) shows that, even when assuming a pronounced bell-shaped relationship, the projected fall in aggregate labour productivity remains fairly small, and is negligible compared with the projected impact of the reduction in labour supply.

[10] This is not a cause for policy concern as there is no genuine trade-off in the long run between policies to raise the employment rate and policies to foster productivity growth. A higher employment rate unambiguously raises growth in GDP per capita in the long run. For a deeper analysis, see chapter 3 in European Commission (2004).

The quality of labour input will also be affected by rising educational attainment levels

The quality of labour will be affected by the rising level of education of the labour force resulting from a cohort effect: younger cohorts are more educated than the older cohorts now approaching retirement, and this is particularly true for women. However, while the average human capital should increase over time, this effect should flatten out when the low-education cohorts are completely replaced in the labour market by the more highly educated cohorts. Moreover, the return on human capital investment decreases with age given the shorter time span during which the investment costs can be made profitable (OECD (2004)). The importance of human capital for growth has been stressed by De la Fuente and Jimeno (2005), who suggest that the elasticity of output with respect to the stock of human capital almost certainly stands above 0.5, i.e. higher than the most optimistic estimates in the previous literature. Running tentative projections, Montanino, Przywara and Young (2004) suggest that the growth of average educational attainment is likely to slow slightly in the future, compared to recent decades. However, education is set to continue to make a substantial contribution to economic growth in the EU as a whole, though the impact varies widely among Member States.

2.2.3 The impact of ageing on capital intensity

A substitution effect in favour of capital

Ageing has three effects on capital intensity: the increasing marginal product of capital, the decline in the savings rate and the international allocation of capital[11].

A decline in the labour resource will raise wages, leading to a substitution of capital for labour. The capital/labour ratio will rise and so will the level of labour productivity and GDP per capita. The AWG assumes that the investment rate will remain broadly constant in the short/medium run, which causes a strong capital deepening in the light of the reduction of labour inputs. This is fully in line with the projected rise in the marginal return on labour. In the longer run, the growth in capital stock should converge to that of labour expressed in efficiency unit by 2030 (European Commission-EPC, 2005). Indeed, according to neoclassical growth models, the ratio of capital to efficient labour remains constant in the steady state (Solow, 1956; Swan 1956).

The impact of ageing on the aggregate savings rate

A second channel through which an ageing population can affect capital intensity is via saving behaviour, especially in a relatively closed economy where private domestic savings represent the main resource for financing investment. The life-cycle hypothesis (LCH) of private saving behaviour, based on the seminal research by Ando and Modigliani (1963), assumes that individuals consume a constant percentage of the present value of their life income, so that the average propensity to consume is higher in young and old households, whose members are either borrowing against future income or drawing on accumulated savings, while prime-age people tend to have higher incomes with a lower propensity to consume and a higher propensity to save.

[11] An additional negative impact could be an ageing capital stock if the ageing of the workforce leads to slower rates of capital accumulation. The "vintage" effects (i.e. changes in technical progress depending on changes in the average age of the capital stock) will induce lower TFP.

According to the modern life-cycle approach, the elderly also tend to save as a precautionary measure in the light of uncertainty about their life expectancy. In other words, they are likely to consume less (and bequeath more, albeit involuntarily) than they might otherwise like because they worry about outliving their resources. Thus, one should not assume that population ageing will be automatically lead to a large and progressive decline in total private savings:[12] it is not clear how the share of income which the elderly save will evolve and what impact this will have on aggregate private saving in the context of an ageing society.

In considering the savings channel, it is important to look at aggregate savings, both public and private. Public savings are a matter of policy choice, but there is strong evidence that ageing populations will lead to increased pressure for additional public spending on pensions and health care: if not offset by an increase in the tax burden or cuts in non-age-related expenditure, this would increase the risk of large underlying budget deficits emerging in future decades. Rosevaere et al. (1996) argue that national savings, both government and private, will decline. They estimate that (under the hypothesis of a partial Ricardian equivalence effect) an increase in the old-age dependency ratio in OECD countries of 20% in the next 30 years will reduce private savings by 6%.

Empirical evidence on the relationship between the dependency ratio and the saving ratio is very mixed, depending heavily upon the estimation method and type of data used (see the literature review in Meredith 1995, Miles 1999, and McMorrow and Roger 2003). While microeconomic studies based on household data suggest that demographics has no effect on private saving patterns, most studies using either time-series or cross-sectional aggregate data conclude that changes in the old-age dependency ratio have a greater impact on saving ratio than those in the youth dependency ratio, though there is no consensus on the scale of the effect[13].

International capital market integration

International mobility of capital combined with financial integration will help achieve a better allocation of saving to investment needs worldwide. McMorrow and Roger (2003) find that the decline in the labour force will lead to lesser investment needs, as the capital stock should broadly follow the development in GDP[14]. The consequence is worldwide excess savings, despite the ageing-related decline in the saving rate. This would result in a fall in worldwide interest rates, entailing an increase in investment and higher capital intensity in the world. Savings and investment will be equalised worldwide through the movement in world interest rates.

Recent work by Fehr et al. (2005) points to a new dimension with the emergence of China as a global economic power. Given China's current and expected saving behaviour, growth rate and fiscal policy, they show that if the expected massive capital flows coming from China are taken into account, the otherwise very gloomy economic projections of ageing in the EU are

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12 For an application of the modern life-cycle model, see H. Faruqee (2002).

13 Averaging out the results of available studies, McMorrow and Roger (2003) underline that, on average, the effect on the savings rate of a 1% rise in the old-age and young-age dependency ratio is -0.75 and -0.52 respectively.

14 The authors use ECFIN's general equilibrium model, which is an international generational overlapping model.

dramatically improved, because China could in this way finance large investments in the EU, raising its capital accumulation and its GDP per capita.

Overall, ageing should have a small positive impact on capital intensity, albeit only a temporary one

While the theoretical relationship between the dependency ratio and the saving ratio is clear according to the life-cycle hypothesis, the overlapping generations models (OLG) made popular by Auerbach and Kotlikoff (1987) reach different conclusions. OLG models allow the impact of ageing to be simulated using a general equilibrium framework and taking due account of various economic interactions, often neglected by partial equilibrium approaches. Simulations with an overlapping generations model (e.g. Miles 1999) suggest that the positive effect of capital deepening on economic growth (due to a higher marginal return of capital and despite declining savings rates) will be fairly marginal compared with the projected drop in labour supply. Even in the event of a 14% rise in the capital/labour ratio, productivity is projected to be only 3.3% higher by 2050 on the basis of a constant population structure. An exogenous rise in Total Factor Productivity would then be needed to compensate for the loss in output resulting from a fall in the working-age population.

2.2.4 Negative impact on Total Factor Productivity (TFP) and innovation

In addition to lower "labour quality", some economists claim that an ageing population could hamper innovation and weigh down TFP growth in the medium and long run (e.g. Barrel 2005)[15]. Barth et al. (1993) also show that, notwithstanding their greater dedication at work, longer experience and better skills, older workers are considered by a panel of employers to be less flexible in accepting new assignments and less receptive to training: this may hamper innovation and the full exploitation of technical progress. Skirbekk (2003) notes that older workers are less likely to adapt easily to changing working methods. However, there is no hard empirical evidence to support this claim.

Some scenario-based projections (Jorgenson, Ho, and Stiroh 2004; Jorgenson and Motohashi 2004) speculatively attempt to quantify the effect of ageing on productivity. This "commonsense" view may, however, be questioned as innovation also depends closely upon the organisation of work, which could be reformed so as to better exploit the innovative potential of older workers.

2.3 Indirect effects of ageing on the economy via the budgetary effects of ageing

Financing future age-related expenditures is an economic as well as budgetary challenge

There are also indirect channels through which an ageing population can affect economic growth. The sharp projected increase in pension spending and other age-related expenditure may require considerable rises in taxes and social security contributions, which to some extent will distort economic decisions and thus impact on GDP growth. Therefore, as stressed by Ehrlich and Kim (2005), the funding of age-related expenditure is not only a budgetary problem but also a crucial economic issue.

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[15] Unlike the effect of education and age quality of labour input, which are to disappear in the steady state, the adverse impact on innovation is meant to be dynamic, affecting not only productivity levels and the standard of living in the medium/long run but also the long-term growth in productivity in the steady state.

Adverse effects of rising age-related levies on employment

Many papers focus on the effect of pension systems on labour supply (e.g. Stock and Wise, 1990, Börsch-Supan 2000, French, 2003). The rise in labour taxes to finance age-related spending may cause unemployment and inactivity traps that affect the labour supply (see Carone and Salomäki 2005). An increase in employees' social security contributions could indeed bring net wages below the reservation wage for some categories of workers, such as young people. From a labour demand perspective, rising indirect labour costs (i.e. social security contributions and payroll taxes) borne by disadvantaged groups may reduce their employability. The effect of the increase in the tax burden would of course partly depend on how the social security contributions are perceived, either as a pure tax or as income deferral at retirement. A survey carried out in Germany, France, Italy and Spain suggests that European workers do not seem to consider pay-as-you-go social insurance as a "fair" insurance system (Boeri et al. 2002).

The impact on the participation rates of older workers might be stronger as their decision to withdraw from the labour force through retirement is directly affected by the parameters of the tax and old-age pension systems, e.g. parameters which determine the implicit rate of taxation of pensions (Börsch-Supan 2000, Duval 2003), the statutory exit age and the existence of early retirement schemes (e.g. Blundell, Meghir and Smith, 2002). While budgetary sustainability problems may lead governments to take measures to raise effective retirement ages and to phase out early retirement schemes, their benefits could be offset if a rise in pension contributions leads to an increase in the implicit marginal taxes on continued work[16]. Conversely, the respect of the actuarial equivalence principle, implemented through the introduction of funded systems or of a "notional defined contribution" (NDC) for pay-as-you-go schemes, would remove the disincentives to work longer[17].

Negative effect of age-related budgetary burden on capital accumulation

Feldstein (1974) and OECD (2004) stressed that raising taxes/levies on workers to finance pensions reduces the total amount of physical capital that can be accumulated. This will cut the level of income reached by the economy in the steady state. Using an overlapping generations model, Fehr et al. (2005) show that, when excluding China from the projection, the hikes in payroll and income tax rates necessary to finance the pensions and health care benefits of an ever-older population bring about a sharp fall in capital per unit of human capital, with a negative impact on productivity and wage levels. They also argue that the privatisation of public pension schemes would more than double the long-run ratio of physical capital to labour, raising long-run real wages by around a quarter.

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[16] A rise in the implicit marginal taxes on continued work in old-age pension systems could occur for instance as a result of pension contributions increasing at a faster pace than the decrease in pensions.

[17] The wealth effect can also influence a person's retirement decision. Indeed, the boom and bust in the stock market over the past decade could potentially have significantly altered the retirement behaviour of older workers in funded pension regimes. However, the data show that this did not occur: Coile and Levine (2004) find no evidence that changes in the stock market drive aggregate trends in labour supply.

The financing of social security systems may in turn have a feedback on demographic developments

More speculatively, Ehrlich and Kim (2005) suggest that pay-as-you-go (PAYG) social security systems may have generated negative effects on demographic factors. On the basis of a comprehensive endogenous-growth model where human capital is the engine of growth, family choices affect human capital formation and family formation itself is a choice variable, they show that social security taxes and benefits can bring about adverse incentive effects on family formation and subsequent household choices. They find that PAYG tax measures explain a sizeable part of the downward trends in family formation and fertility worldwide.

2.4 Overall conclusions

Overall, the impact of ageing on productivity is uncertain, although the effect is suspected to be negative. Conversely, the effect on potential labour supply is less controversial, unambiguously negative and it is expected to be of a greater magnitude. For example, European Commission (2002) estimated that the EU15 GDP per capita growth per annum would be about 0.4 percentage points lower than that of the US over the period of 2000-2050 due to the decline in the working-age population, while in the US demographic developments will continue to sustain growth. A similar result was also obtained by a more recent study by the OECD concerning some large countries. It estimated that the ageing-induced drag on GDP per capita in France and Germany (and Japan) would be on average -0.2 to -0.3 percentage points of growth per annum during the next half century. As a result, the gap in living standards relative to the US will widen from around 25% currently to over 30% by 2050.

3. How will ageing affect employment and growth in the EU? A projection for EU Member States up to 2050

3.1 Introduction and caveats

In this section, the economic impact of ageing is explored on the basis of a projection for employment and GDP growth potential covering all EU25 Member States up to 2050. This is based on the set of assumptions and projections recently computed by the Ageing Working Group attached to the EPC for the purpose of making age-related expenditure projections.[18] The projections are made using a common demographic projection and common macroeconomic assumptions and on the basis of "no policy change", i.e. only reflecting enacted legislation but not possible future policy changes (although account is taken of provisions in enacted legislation that enter into force over time). The analysis presented here is focused on the main channels of demographic developments through which ageing populations can affect economic growth, and mainly aims at illustrating the challenge stemming from the demographic-driven reduction in labour input.

The projections presented in this section are not forecasts and thus should be interpreted with caution. They do not capture all the direct and indirect channels through which ageing can influence economic growth as illustrated on Graph 1 in section 2.1. For example, the feedback

[18] EPC and European Commission (2005a) explains the different projections used as a base for the budgetary projections in a comprehensive manner. Carone (2005) describes the participation and labour supply projections and Carone, Denis, McMorrow, Mourre and Röger (2006) the productivity projections.

effect of increased pension spending, the individual-age profile of productivity, the specific effect of the life cycle on savings and the international balances of interest rates have not been modelled explicitly, as they require specific calibrations associated with a great deal of uncertainty as well as a general equilibrium framework, which is not practicable for dealing with the EU25.

3.2 What is the nature and scale of the ageing challenge facing Europe: demographic prospects for the EU25 up to 2050[19]

Fertility rates well below replacement levels

One of the main reasons for ageing in the EU is the low fertility rate. Fertility rates were 1.5 for the EU25 in 2004, and in all Member States were well below the natural replacement rate of 2.1 children per woman needed to stabilise population size (see Graph 2 and Table 1). There are structural reasons for the decline in fertility rates, notably birth control, higher female educational attainment and participation in the labour force, changes in family formation patterns and attitudes with respect to the role of women and men in society. Eurostat projects a limited recovery to 1.6 for the EU25 by 2030, with the largest rebound in the EU10 countries where fertility slumped during the economic transition of the 1990s.[20] These projected increases are modest compared with fertility rates in other developed countries such as the US, and point to the prospect of a sustained fall in the size of the European population.

There is substantial divergence in fertility rates between neighbouring EU countries with similar levels of economic development, e.g. 1.9 children per woman in France compared with 1.3 in Germany and Italy. If sustained over the very long run, these gaps will lead to very different population prospects. While many countries have public policies to support families, the majority have not considered explicit strategies to increase fertility. However, the interaction of a variety of public policies (labour market, education, and housing) may inadvertently constrain choices on childbearing, and there is an emerging interest at EU level as to whether public interventions (e.g. childcare availability, flexible working time and leave arrangements) can affect fertility patterns.

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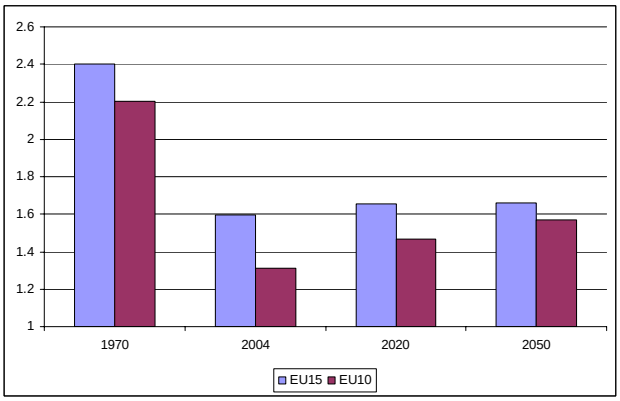
[19] Unless otherwise stated, the population projections presented in this paper are those agreed upon by the Ageing Working Group attached to the EPC for the purpose of making age-related expenditure projections. The population projection was prepared by Eurostat and full details are provided in EPC and European Commission (2005a). It is based on, but is not identical to, the EUROPOP2004 projection released by Eurostat in May 2005. 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, whereas for the EU15 the assumptions on life expectancy are based on the AWG scenario. 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.

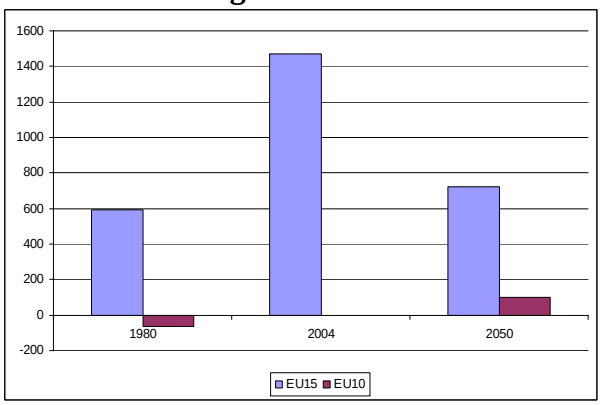
[20] This recovery is explained by the fact that past declines in fertility rates have in part been due to women postponing childbearing and not just the choice to have fewer children. Once this postponement effect wears off, fertility rates should recover somewhat.

Graph 2 - Past and projected fertility rates



Source: EPC and European Commission (2005).

Graph 3 – Past and projected annual net migration flows



Source: EPC and European Commission (2005).

Table 1- Overview of assumptions on demographic drivers

	Fertility rate		Life expectancy at birth				Life expectancy at 65				Migration			
			males		*females*		*males*		*females*		*(000's)*		*% of population*	
	2004	2050	2004	2050	2004	2050	2004	2050	2004	2050	2004	2050	2004	2050
BE	1,6	1,7	75,5	82,1	81,6	87,5	15,8	20,3	19,7	24,1	24	19	0,2	0,2
DK	1,8	1,8	75,2	81,4	79,6	85,2	15,2	19,3	18,0	21,9	8	7	0,1	0,1
DE	1,4	1,5	76,1	82,0	81,7	86,8	16,1	20,1	19,5	23,4	270	200	0,3	0,3
GR	1,3	1,5	76,4	81,1	81,4	85,9	16,4	19,6	18,5	22,3	43	35	0,4	0,4
ES	1,3	1,4	76,6	81,7	83,4	87,3	16,7	20,0	20,7	23,7	508	102	1,2	0,3
FR	1,9	1,9	76,2	82,3	83,4	87,9	17,0	20,5	21,3	24,5	64	59	0,1	0,1
IE	2,0	1,8	75,5	82,2	80,7	86,8	15,4	20,2	18,6	23,4	16	12	0,4	0,3
IT	1,3	1,4	77,3	82,8	83,2	87,8	16,7	20,4	20,6	24,1	150	150	0,3	0,3
LU	1,7	1,8	75,0	81,8	81,4	86,7	15,7	19,9	19,6	23,4	3	3	0,6	0,4
NL	1,8	1,8	76,2	81,1	80,8	85,2	15,4	18,9	19,0	22,1	21	31	0,1	0,2
AT	1,4	1,5	76,2	82,8	82,1	87,2	16,2	20,4	19,7	23,6	25	20	0,3	0,3
PT	1,5	1,6	74,2	81,2	81,0	86,7	15,6	19,9	19,0	23,1	42	15	0,4	0,2
FI	1,8	1,8	75,3	81,9	81,9	86,6	15,7	20,0	19,5	23,3	6	6	0,1	0,1
SE	1,7	1,9	78,1	82,6	82,4	86,6	16,7	20,0	19,8	23,0	28	21	0,3	0,2
UK	1,7	1,8	76,4	82,4	80,9	86,7	16,1	20,4	19,0	23,3	139	98	0,2	0,2
CY	1,5	1,5	76,3	81,9	80,8	85,1	16,2	19,9	18,3	21,7	6	5	0,8	0,5
CZ	1,2	1,5	72,4	79,7	78,8	84,1	13,8	18,4	17,0	20,9	4	20	0,0	0,2
EE	1,4	1,6	65,5	74,9	76,9	83,1	12,4	17,3	16,9	20,9	1	2	0,1	0,2
HU	1,3	1,6	68,5	78,1	76,8	83,4	13,1	18,6	16,7	21,1	15	20	0,1	0,2
LT	1,3	1,6	66,5	75,5	77,6	83,7	13,3	17,9	17,4	21,5	-6	4	-0,2	0,2
LV	1,3	1,6	64,9	74,3	76,2	82,5	12,3	17,5	16,6	20,7	-2	3	-0,1	0,1
MT	1,7	1,6	76,2	81,8	80,7	85,0	15,2	19,2	18,3	21,6	3	3	0,6	0,5
PL	1,2	1,6	70,5	79,1	78,5	84,4	13,7	18,8	17,4	21,5	-28	34	-0,1	0,1
SK	1,2	1,6	69,7	77,7	77,8	83,4	12,9	17,6	16,5	20,4	-2	5	-0,0	0,1
SI	1,2	1,5	72,6	79,8	80,2	85,1	14,3	18,7	18,4	22,0	6	7	0,3	0,4
EU25	*1,5*	*1,6*	*75,4*	*81,6*	*81,5*	*86,6*	*16,3*	*20,2*	*19,9*	*23,6*	*1343*	*879*	*0,3*	*0,2*
EU15	*1,5*	*1,6*	*76,4*	*82,1*	*82,2*	*87,0*	*13,5*	*18,5*	*17,2*	*21,2*	*1347*	*778*	*0,4*	*0,2*
EU10	*1,2*	*1,6*	*70,1*	*78,7*	*78,2*	*84,1*	*15,9*	*19,9*	*19,5*	*23,3*	*-3*	*101*	*-0,1*	*0,2*

Source: EPC and European Commission (2005).

Continuous increases in life expectancy of more than one year per decade

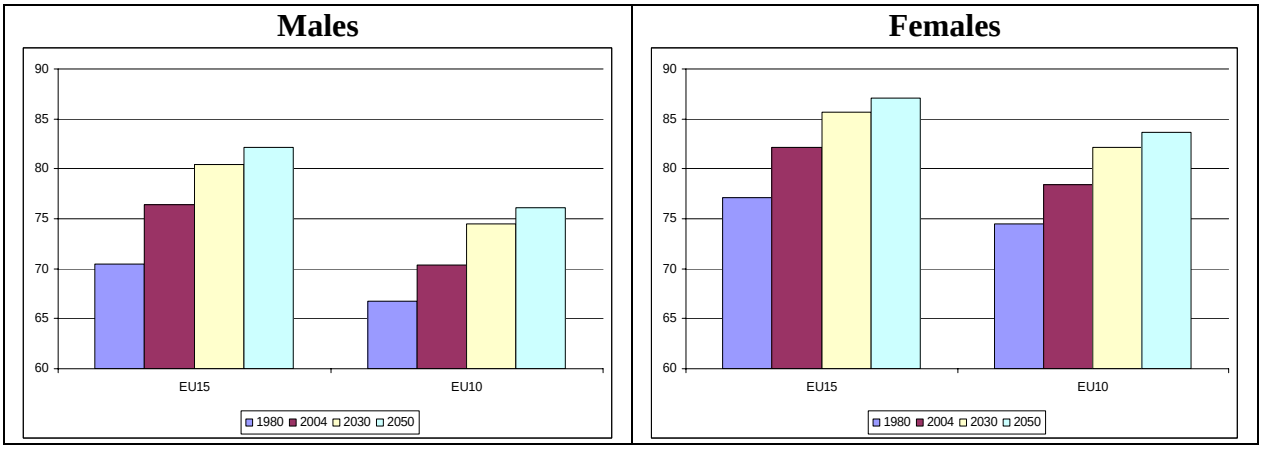
Life expectancy at birth increased by some 8 years in EU countries between 1960 and 2000, equivalent to a gain of close to 3 months per annum, see Graph 4. Eurostat projects these increases to continue in the decades to come, albeit at a somewhat slower pace. Life expectancy at birth is projected to rise by 7 years for men to 80.5 years in 2050, and by more than 5 years for women, to 85.6. Despite some convergence, female life expectancy in 2050 is projected to remain 5 years higher than that of males. From an economic policy perspective, the following findings are particularly important:

- much of the projected gain in life expectancy will result from lower mortality rates in older age brackets. Life expectancy at 65 for the EU 25 is projected to increase by about 4 years between now and 2050. This is especially relevant when considering pension policy as it influences the duration of retirement relative to work;

- although life expectancy at birth is expected to increase, what is not so clear is whether the extra years of life will be spent in broadly good health and free of disability, and whether the share of life spent in good health will alter (see Box 1 for a review of the debate on this question). This matters, not only for the general well-being of older persons, but also because of its repercussions for health care policy and the debate on extending working lives;

- life expectancy projections are subject to considerable uncertainty. Past projections from official sources have regularly underestimated the gains in life expectancy, and a look at current literature suggests that this could also be a risk for current population projections. Until recently, 'demographic risk' of larger-than-expected gains in life expectancy has mostly been borne by governments, and higher-than-expected gains in life expectancy have translated into additional costs for pension systems. The uncertainty over life expectancy has led to a number of interesting technical and policy responses. To begin with, demographers are trying to improve understanding of trend developments and to develop stochastic population projections attaching probabilities to future possible outcomes. In addition, some Member States have, through different instruments, linked pension benefits to changes in life expectancy at retirement age, thus sharing the demographic risk between the government and pension beneficiary.

Graph 4 - Life expectancy at birth

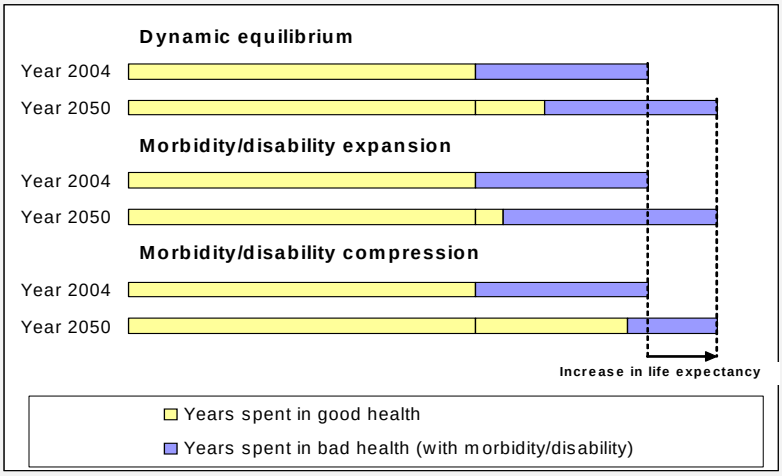


Source: EPC and European Commission (2005a).

BOX 1 - Healthy life expectancy – will the extra years of life be spent in good health and free of disability?

There is debate on the extent to which, as life expectancy increases, the health status (or morbidity) of the population may change. Traditionally, a decrease in mortality rates was considered to reflect an improvement in the health status of the population, i.e. a decrease in morbidity. However, when reliable empirical evidence (life-tables, precise data on mortality, disability and morbidity) became available, it did not support this assumption. Three main hypotheses have emerged from the literature, illustrated in Graph 5 below (for an overview of existing theories, see Nusselder (2003).

Graph 5 - Different hypothesis for the evolution of healthy life expectancy



Source: European Commission, DG ECFIN

The ***dynamic equilibrium hypothesis*** was proposed by Manton et al. (1995). It posits that an increase in longevity is accompanied by a parallel postponement of morbidity and/or disability. Consequently, the number of years in good health (the lighter shade in Graph 5) increases by the same amount as life expectancy at birth: hence, the total period spent in bad health during a lifetime is unchanged. The term 'dynamic equilibrium' is meant to capture the overall changes in life expectancy and severe disability, and this hypothesis is a simplified version of a more sophisticated theory proposed earlier by Manton (1982), which argued that the longer people survive into old age, the more years they may spend in bad health. However, the time spent with severe morbidity and disability remains approximately constant due to the fact that medical treatments and improvement in lifestyles reduce the rate of progression of chronic diseases. Thus, not everybody will enjoy the full extent of the gain in life expectancy in full health. Rather, part of the gain in life expectancy may be spent in moderate health and the prevalence of chronic illness may increase, while severe disability, which is the costliest part of health care services, may be postponed to the final phase of life (meaning that old-age-related disability rates could decline).

The expansion of morbidity hypothesis was proposed by Gruenberg (1977), Verbrugge (1984) and Olshansky et al (1991). It posits that as life expectancy increases, older people become more vulnerable to chronic diseases and spend more time in ill-health (represented by the dark shaded area on Graph 5 showing that most of the additional gains in life expectancy are spent in bad health). In other words, a higher proportion of people with health problems survive to an advanced age. This relationship works mainly through three mechanisms:

- chronically ill people are surviving longer, thanks to better medical care, but not necessarily in better health;
- more people are vulnerable to chronic disease in the first place because they are living longer; moreover, there are more people with disabilities caused by non-fatal diseases – as opposed to those caused by fatal diseases which prevailed in the past – again because this is more prevalent in older age cohorts;
- and these chronic diseases can in themselves act as a risk factor for other illnesses, thus leading to higher

levels of morbidity and disability – but not necessarily mortality.

The compression of morbidity hypothesis, proposed by Fries (1980, 1983, 1989, 1993), posits that as life expectancy increases, the onset of disability will be postponed to a later stage in life thanks to improved living conditions, healthier lifestyles and the fact that more and more chronic diseases may be curable. According to this hypothesis, humankind has a genetically determined — albeit individually variable — limit to the lifespan and while life expectancy is increasing, it is approaching that limit (a hypothesis rejected later by several authors including Oeppen and Vaupel 2002, Robine and Vaupel 2002, Robine et al. 2005). Accordingly, morbidity and disability will be gradually compressed at very old age (into the last years of life) and the number of years spent with diseases or disabilities will decrease over time. Thus, healthy life expectancy grows by more than life expectancy at birth.

Recent studies have not provided strong evidence in favour of any of the above hypotheses. Results have differed significantly not only across countries, but also between the sexes. However, Batljan and Lagergren (2000) found that even though the existing state of research does not allow for any conclusive statements, the empirical data tends to support the compression of morbidity hypothesis.

Net inward migration to the EU projected to continue

Annual net migration inflows to the EU25 currently amount to 1.3 million people, that is 0.35% of the population (see Graph 3). The bulk of these inflows go to EU15 countries, while some EU10 countries, by contrast, are actually experiencing outward migration. Eurostat projects a reduction in inflows to some 800 000 people by 2015 (0.2% of the population) and a stabilisation around that level up to 2050. These net inflows cumulate to close to 40 million people by 2050. Migration is high on the political agenda on account of its potential to offset some of the economic effects of ageing. From an economic policy perspective, the following factors are particularly worth noting:

- data on migration flows are sketchy, making projections extremely difficult. A static snapshot of net inflows fails to capture the complexity of the situation: not only does it neglect gross flows (both inwards and outwards), but the effect of migration on the population of the host country is dynamic rather than static. Thus, account needs to be taken of factors such as family reunification, the extent to which migrants return to their home country, and whether the fertility and mortality patterns of migrants' offspring and subsequent generations converge to that of the host country;

- migration flows are also uncertain due to the influence of a variety of push and pull factors in both host and home countries, over which the EU may have little or no influence. Natural disasters, war and political instability play a role, but they are too uncertain to project. However, over the long run, the major determining factors of migration are relative income disparities and public policy towards migrants, and they can be analysed more systematically. For the EU, the accession of new Member States is an additional important policy determinant, given the Treaty provisions on the free movement of workers;

- official agencies have strikingly diverse approaches to modelling migration flows. This suggests that there may be scope for developing better collaboration at EU level on analysing migration flows, and in particular for quantifying the repercussions of relevant policy decisions, see Howe and Jackson (2005).

An older and, eventually, smaller population

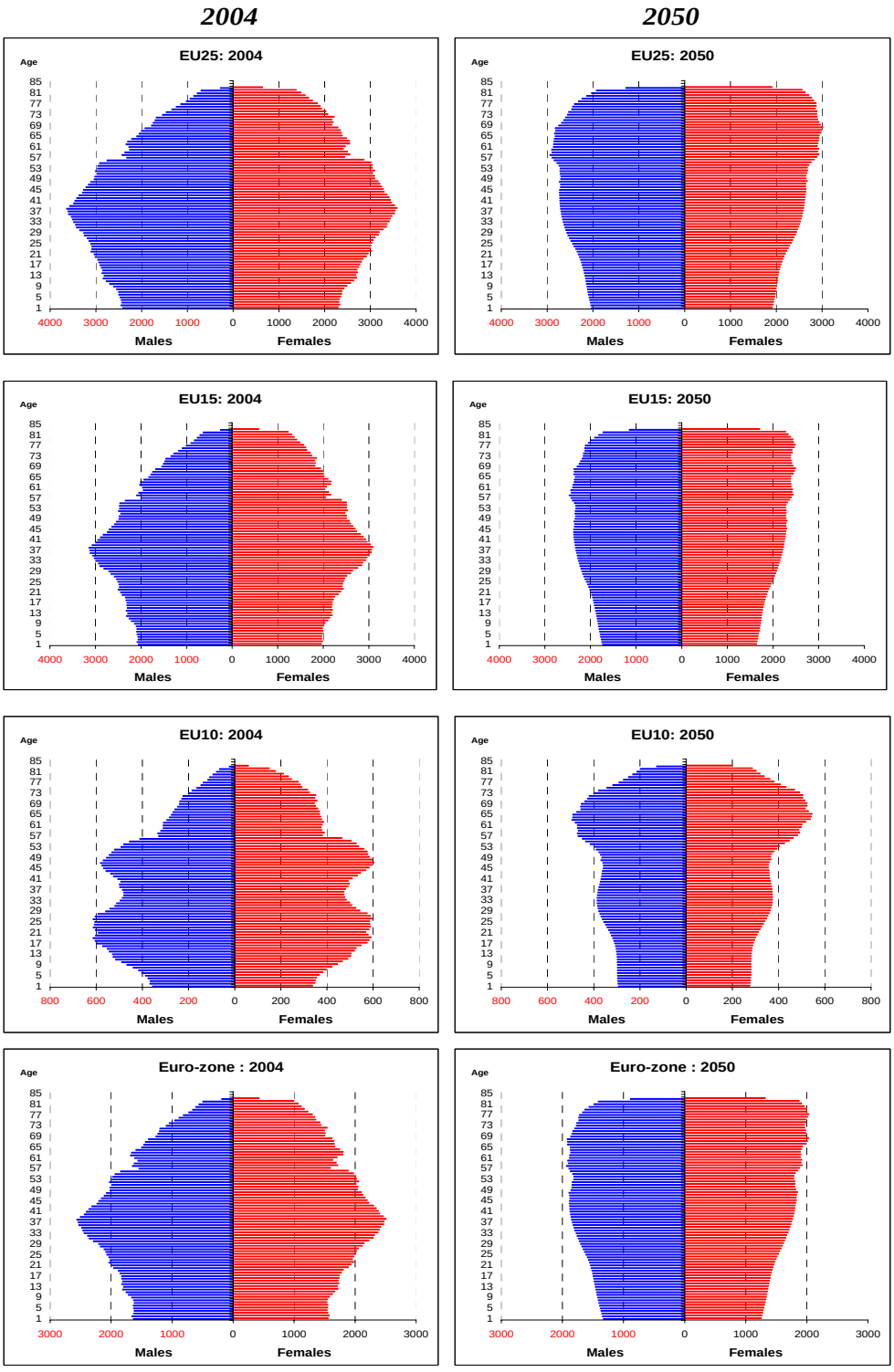
According to the Eurostat projections, in 2050 the population in the EU25 will be both smaller and older (see Table 2 and Graph 6**)** as a result of the abovementioned projected trends in the main demographic drivers. It is projected to rise from 457 million in 2004 to a peak of 471 million in 2027, and thereafter to decline to 454 million in 2050. This aggregate picture hides sharp divergences between individual countries. Whereas the total population is projected to increase in some Member States (e.g. Belgium:+4%, France:+9%, Sweden:+13%, UK:+8%), significant falls are projected in others (Germany:–6%, Italy:–7%, Poland:–12%).

Table 2 - Projected changes in the size and age structure of the populations of EU Member States, 2004 - 2050

	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*
Euro area	*308.6*	*308.4*	*0*	*48.9*	*40.8*	*-17*	*206.5*	*174.2*	*-16*	*53.3*	*93.4*	*75*	*13.0*	*36.3*	*180*
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***:** EPC and European Commission (2005)

Graph 6 - Age pyramids for EU25 population, 2004 and 2050



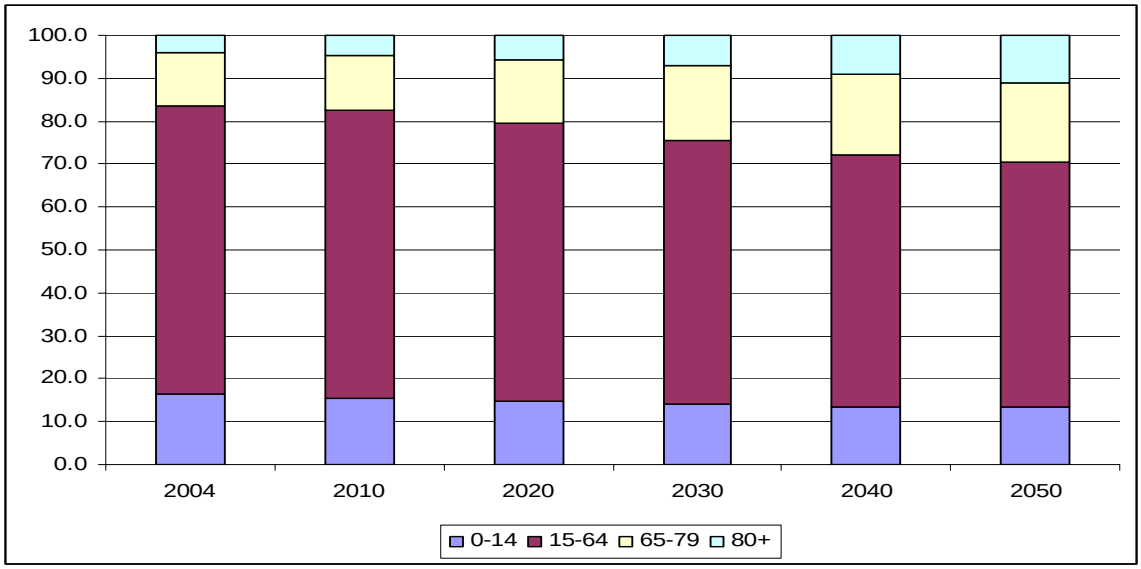
Source: For EU15, Eurostat AWG variant scenario. For EU10, Eurostat EUROPOP2004 baseline scenario

Source: EPC and European Commission (2005)

Changes that are even more dramatic are projected to occur in the age structure of the population. The population pyramids in Graph 6 above provide a snapshot contrast of the EU25 population in 2004 and 2050. In 2004, the large bulges represent people of working age, with the most numerous age cohort being that of 39-year-olds. By 2050, an inverted cone shape appears, reflecting the passage of baby-boomers into their retirement years in parallel with life expectancy increasing and the effects of prolonged low fertility rates taking hold.

As shown in Graph 7, the share of very young people (aged 0-14) in the total population is projected to decline, and their overall number in the EU25 will drop by 19% (-30% in EU10, see Table 2). However, from an economic perspective, the most significant change concerns the working-age population (15-64). This will start to fall from 2010 in the EU25 (sooner in some countries), and will have dropped by 48 million or 16% by 2050. Divergences between Member States are wide, with declines of more than 20 percentage points projected in 13 countries (Germany, Greece, Spain, Italy, Portugal, the Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia and Slovenia). In contrast, the elderly population aged 65+ will rise sharply, by 58 million (or 77%), by 2050. The fastest growing segment of the population will be the very old (80+), the number of whom will rise by almost 32 million, an increase of 174%.

Graph 7 - Changes in the age structure of the EU25 population



Source: EPC and European Commission (2005)

Europe's population is ageing faster than the world as a whole

The EU is projected to face an ageing, and possibly declining, population in the coming decades, which needs to be seen in the context of very different trends at a global level (see Table 3). The United Nations (2004) project an increase in the world population from 6.1 billion in 2000 to 9.1 billion in 2050, with some of the largest increases in countries neighbouring or close to the EU borders. Africa is projected to experience the largest growth in total population size of all continents (+138%), followed by Latin America (+50%). Overall population growth is also projected to be high in Asia (+42%); however, a much lower increase is projected for China (+9%), due to its lower fertility rate, than India (56%). The lack of population growth in the EU25 contrasts with the prospects for other

industrialised countries such as the US (+39%), Canada (+40%) and Australia (+47%). EU Member States are not the only countries projected to experience a fall in population size, however: the population of Japan is projected to fall by 12% and that of the Russian Federation by 24%.

These population changes will have geopolitical repercussions. According to the UN (2004), the share of the population of what is the EU25 today has halved over the last half-century, from close to 14% of the world population in 1950 to over 7% in 2000, and is projected to drop below 5% in 2050, despite the net inward migration flows projected. Asia's share of the population is projected to stabilise at around 60% of the world population though China's share is projected to fall by some 5 percentage points. Overall, Africa is projected to experience the largest growth, rising from 13% of world's population in 2000 to 21% by 2050.

What is also evident from Table 3, however, is that although its total population continues to rise, the world is getting older, and the challenges of ageing now facing Europe are in prospect for most countries, including developing ones. The old-age dependency ratio for the world is projected to rise from 9% in 2004 to 25% in 2050, and applies to most regions and countries. In level terms, the old-age dependency ratio for the EU in 2050 at 49% (51% according to Eurostat projections) will be amongst the highest of any country or region (including the US and most industrialised countries) with the notable exception of Japan (71%). One of the most striking aspects of the projections is the very dramatic projected increase in the old-age dependency ratio for China, from 9% in 2000 to 39% in 2050. According to this indicator, China will have an age structure similar to that of most industrialised countries and above that of the US four decades from now.

Table 3 - Global population projections

	Population size				% of world population				Old-age dependency ratio			
	1960	2000	2050	2000-50	1960	2000	2050	2000-50	1960	2000	2050	2000-50
		millions		*% change*				*change p.p.*				*% change*
Africa	282	812	1937	*138*	9,3	13,4	21,3	*8,0*	6	6	10	*67*
Morocco	12	29	46	*59*	0,4	0,5	0,5	*0,0*	5	7	25	*257*
South Africa	17	46	49	*7*	0,6	0,7	0,5	*-0,2*	7	6	14	*133*
Asia	1396	3676	5217	*42*	56,2	60,4	57,5	*-2,9*	7	9	27	*200*
China	657	1274	1392	*9*	21,7	20,9	15,3	*-5,6*	9	10	39	*290*
India	442	1021	1593	*56*	14,6	16,8	17,5	*0,8*	6	8	22	*175*
Japan	94	127	112	*-12*	3,1	2,1	1,2	*-0,9*	9	25	71	*184*
Indonesia	96	209	285	*36*	3,2	3,4	3,1	*-0,3*	6	8	27	*238*
Korea	25	47	45	*-5*	0,8	0,8	0,5	*-0,3*	6	10	65	*550*
Saudi Arabia	4	21	49	*130*	0,1	0,4	0,5	*0,2*	6	4	17	*325*
UN Europe	604	728	653	*-10*	35,6	19,8	12,5	*-7,3*	14	22	48	*118*
EU25	372	448	445	*-1*	12,3	7,4	4,9	*-2,5*	15	22	49	*125*
EU15	315	378	387	*2*	10,4	6,2	4,3	*-1,9*	16	23	49	*108*
EU10	57	70	57	*-17*	1,9	1,1	0,6	*-0,5*	13	20	51	*156*
Iceland	0	0	0	*32*	0,0	0,0	0,0	*-0,0*	14	18	42	*133*
Norway	4	5	5	*21*	0,1	0,1	0,1	*-0,0*	18	24	41	*71*
Russian Federation	120	147	112	*-24*	4,0	2,4	1,2	*-1,2*	10	18	38	*111*
Switzerland	5	7	7	*1*	0,2	0,1	0,1	*-0,0*	15	22	49	*123*
Turkey	28	68	101	*48*	0,9	1,1	1,1	*-0,0*	6	8	26	*225*
Latin America	167	523	783	*50*	12,9	14,2	15,0	*0,8*	7	9	29	*222*
Brazil	73	174	253	*46*	2,4	2,9	2,8	*-0,1*	5	8	31	*288*
Mexico	37	100	139	*39*	1,0	1,6	1,5	*-0,1*	8	8	34	*325*
Northern America	172	315	438	*39*	6,8	5,2	4,8	*-0,4*	15	19	34	*79*
United States	186	284	395	*39*	6,2	4,7	4,4	*-0,3*	15	19	33	*74*
Canada	18	31	43	*40*	0,6	0,5	0,5	*-0,0*	13	18	44	*144*
Oceania	13	31	48	*54*	7,3	5,9	6,1	*0,2*	12	15	31	*107*
Australia	10	19	28	*47*	0,3	0,3	0,3	*-0,0*	14	18	40	*122*
New Zealand	2	4	5	*25*	0,1	0,1	0,1	*-0,0*	15	18	39	*117*
World	3024	6086	9076	*49*					9	11	25	*127*

Source: UN World Population Prospects: 2004 Revision

3.3 The impact of ageing on the labour market

A new labour force projection taking account of trends by age and gender[21]

On the basis of the population projection described in the previous section, a labour force projection has been made where developments are explicitly modelled by gender and age group: this approach is justified as past trends and future prospects differ for each group. The main results of the cohort approach used (which extrapolated forward the trends observed in the past 5 years), can be summarised as follows (see Table 4):

- *young people (15-24):* whilst in some EU countries the youth employment rate has risen, in many others it has been falling, especially in the EU10. This is a result of more people completing secondary education and enrolling in tertiary studies – a positive trend which enhances human capital formation and future potential labour productivity. Some EU15 countries, meanwhile, are actually considering measures to reduce the length of time spent in third-level education so as to facilitate earlier entry into the labour market while at the same time improving the efficiency of education systems;

- *women*: the projections show female employment rates rising from just over 55% in 2004 to almost 65% by 2025 and remaining stable thereafter. This increase, which would enable the 60% Lisbon employment target to be reached in 2010, can be attributed to the gradual replacement of older women with low participation rates by younger women who have a much stronger attachment to the labour force. A trend of rising employment rates among women has been observed for several decades, and is largely explained by rising educational attainment and changing socio-cultural factors. Whether the projected increases in female employment rates materialise in practice, or are even exceeded, may in part depend on supportive public policies or collective agreements being put in place, such as policies to promote access to affordable childcare, to reconcile professional and private lives and to achieve gender equality.[22]

- *older workers:* the employment rate of older workers aged 55 to 64 is projected to increase sharply, by 19 p.p., from 40% in 2004 for the EU25 to 47% by 2010 and 59% in 2050: this is well in excess of the 50% Lisbon target, which is projected to be reached by 2013. The projection reflects the observed increase in employment rates of

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[21] The labour force projection is based on the age-cohort methodology developed by the OECD and by DG ECFIN and the Ageing Working Group attached to the EPC (see Carone 2005). The methodology explicitly takes into account 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 observed 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. Moreover, the methodology captures the effects of demographic change on the labour force. To move from labour force projections to employment projections, account must be taken of unemployment. As regards unemployment, it was agreed that unemployment rates converge to their structural level, or NAIRU, by 2008 (2015 for a group of countries with high unemployment rate in 2003), and that they remain constant thereafter. The European Commission-DG ECFIN estimates for the NAIRU agreed upon in the Output Gap Working Group of the EPC were used. See European Commission-EPC (2005) and Carone, Denis, McMorrow, Mourre and Röger (2006).

[22] See chapter 3 in European Commission (2004). Moreover, the rise in female participation may have an impact on fertility rates and working hours, although the magnitude of such effects and the sense of causality remain uncertain.

older workers in recent years (up by 4.4 p.p. since 2000). It also incorporates the expected (albeit uncertain) positive effects of enacted pension reforms. These reforms have, *inter alia*, curtailed access to early retirement schemes, raised statutory retirement ages (including minimum ages when pension income can be drawn) and strengthened financial incentives to remain in the labour force. Note that the increase in the employment rates for older males (by 15 p.p., from 50% to 65%) is less than the projected increase for older females (by 23 p.p., from 30% to 53%). The difference arises from a stronger cohort effect for females. The increase in the participation rate due to pensions is some 10 p.p. for both male and females, whereas the cohort effect for females is almost 13 p.p. compared with 6 p.p. for males.

Table 4 - Projected employment rates in EU Member States, 2004 to 2050

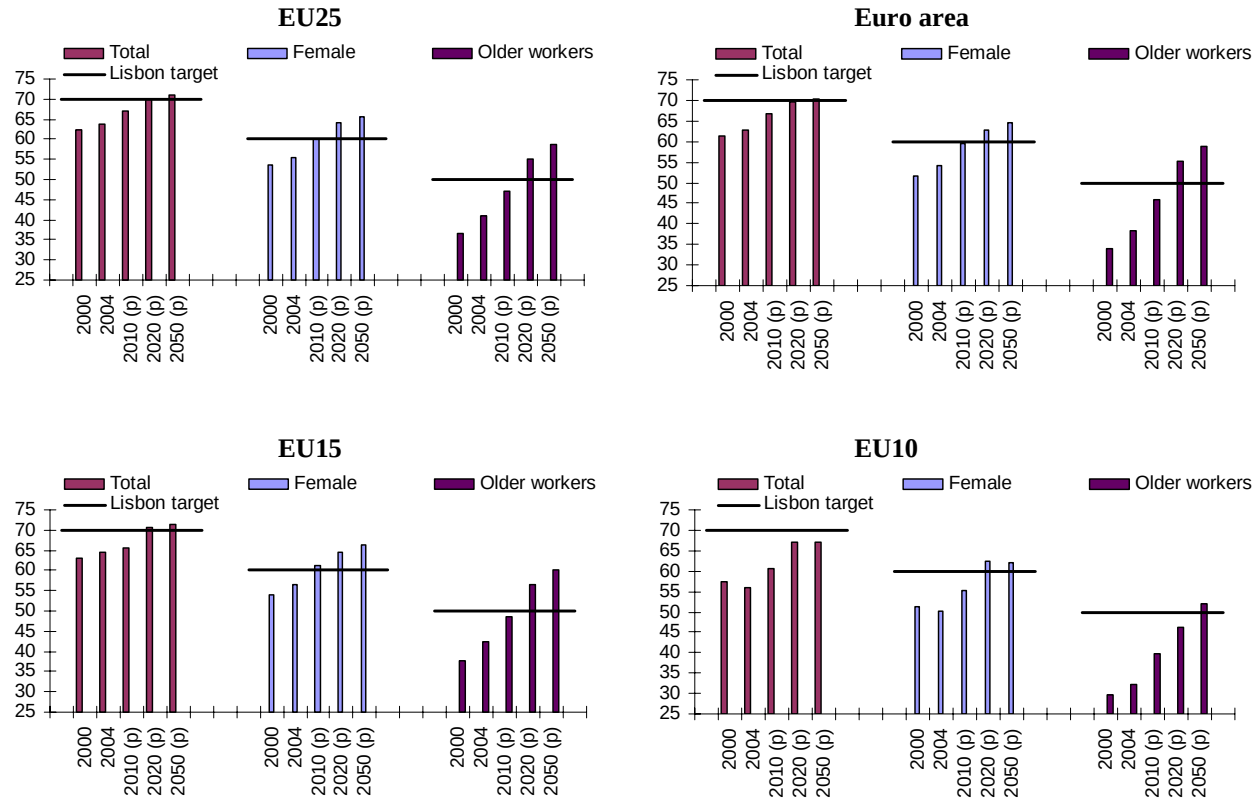
	Total (15-64)				**Females (15-64)**				**Older workers (55-64)**			
	2003	**2010**	**2025**	**2050**	**2003**	**2010**	**2025**	**2050**	**2003**	**2010**	**2025**	**2050**
BE	59.6	62.1	64.7	65.5	51.8	56.0	60.3	61.0	28.1	33.2	42.8	44.4
DK	74.9	76.4	77.3	77.9	70.2	72.0	72.7	73.3	59.8	61.5	65.6	66.7
DE	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*
Euro area	*62.9*	*66.9*	*69.4*	*70.5*	*54.1*	*59.4*	*63.1*	*64.6*	*37.4*	*46.0*	*56.5*	*58.8*
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: EPC and European Commission (2005)

The Lisbon employment targets will be met, but behind schedule, especially in the euro area

Graph 8 shows the projected employment rates relative to the Lisbon employment target groups[23]. It indicates that the situation is not even across areas within the Union. For instance, the Lisbon target for overall employment is projected to be reached by 2015 in the EU15 but by only 2035 in the euro area[24], while the EU10 will not reach the target at all, because after attaining a peak at 69.5 in 2025, the employment rate is projected to go down to only 67% in 2050. The relative delay in the euro area is mainly due to the relative poor prospects for youth employment. For the EU10, the projected failure to reach 70% employment will be due to relatively poor employment prospects for prime-age males; the Lisbon target for females will still be reached by 2017 and that for older workers by 2027.

Graph 8 - Projected employment rates and Lisbon targets



Note: *(p) means projected figure; actual figures are given for 2000 and 2004.*
*Source***:** EPC and European Commission (2005). DG ECFIN calculations.

[23] At the Lisbon European Council of March 2000, Heads of State and Government set targets of raising the overall EU15 employment rate to 70% overall and 60% for women by 2010. The Stockholm European Council (March 2001) added one additional target – raising the employment rate of older workers to 50% by the same date – and two intermediate targets to be achieved by the mid-term point of 2005: an overall employment rate of 67% and a rate of 57% for women.

[24] For a more focused analysis on the impact of ageing on the euro area, see the December 2005 edition of the Quarterly Report on the Euro Area (European Commission 2005d).

The impact of ageing on labour supply and employment

The projected increases in the employment rates of women and older workers would, as illustrated in
Graph 9 below, temporarily cushion the effects of ageing on the labour force.

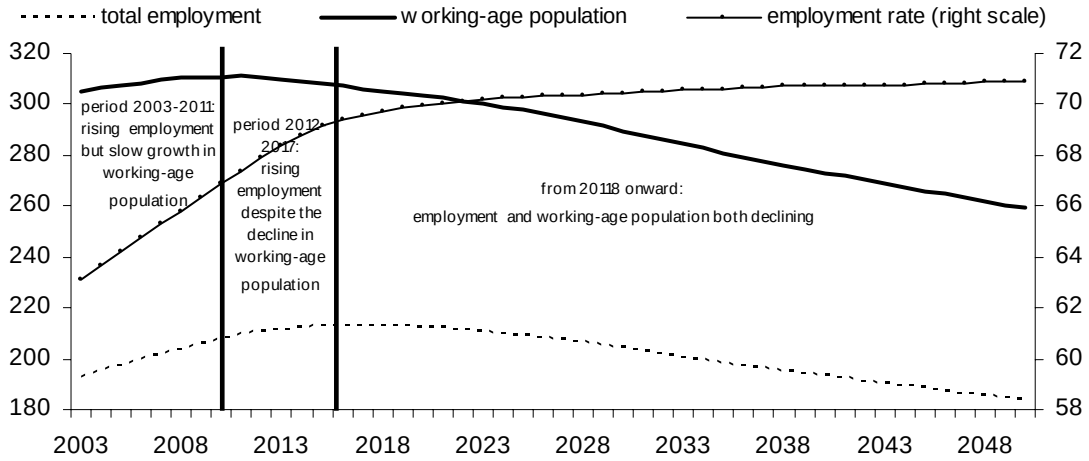
At the aggregate EU25 level, three distinct time periods can be observed:

- *2004-2011 – window of opportunity when both demographic and employment developments are supportive of growth:* both the working-age population and the number of persons employed increase during this period. However, the rate of increase slow down, indicating that the effect of an ageing population is starting to take hold even if it is not yet visible in aggregate terms. This period can be viewed as a window of opportunity, since both demographics and labour force trends are supportive of growth. Conditions for pursuing structural reforms may consequently be relatively more favourable than in subsequent years;

- *2012-2017 – rising employment rates offset the decline in the working-age population:* during this period, the working-age population will start to decline as the baby-boom generation enter retirement. However, the continued projected increase in the employment rates of women and older workers will cushion the demographic factors and the overall number of people employed will continue to increase, albeit at a slower pace. From 2012 onwards, the tightening labour market conditions (lower labour force growth together with unemployment down to NAIRU) may increase the risk of labour market mismatch;

- *the ageing effect dominates from 2018:* the trend increase in female employment rates will broadly have worked itself through by 2017, with only a very slow additional increase projected in the period 2018-2050. In the absence of further pension reforms, the employment rate of older workers is also projected to reach a steady state. Consequently, there is no counter-balancing factor to ageing, and thus both the size of the working-age population and the number of people employed are on a downward trajectory. Having increased by some 20 million between 2004 and 2017, employment during this last phase is projected to contract by almost 30 million, i.e. a fall of nearly 10 million over the entire projection period of 2004 to 2050.

Graph 9 - Projected working-age population and total employment, EU25



Source: EPC and European Commission (2005).

Table 5 below provides more information on the peaks and troughs as regards the size of the working age population and the numbers of persons employed per Member State.

The broad trends described above are common to many countries, but they are not uniform. As shown also in Graph 10, five, mostly smaller, Member States (Cyprus, Ireland, Luxembourg, Sweden, Malta) are projected to experience a pronounced rise in employment between 2003 and 2050, while the change in employment in four EU15 Member States (France, Netherlands, Belgium and UK) is projected to be slightly positive or stable. Eleven Member States are projected to see falls in employment that are well above the EU25 average of -4.6% (DE, GR, IT, PT, CZ, EE, HU, LT, LV, SK, SI). These can be grouped into the EU15 Mediterranean countries and the EU10 Member States that have undergone the transition to a market economy, plus Germany.

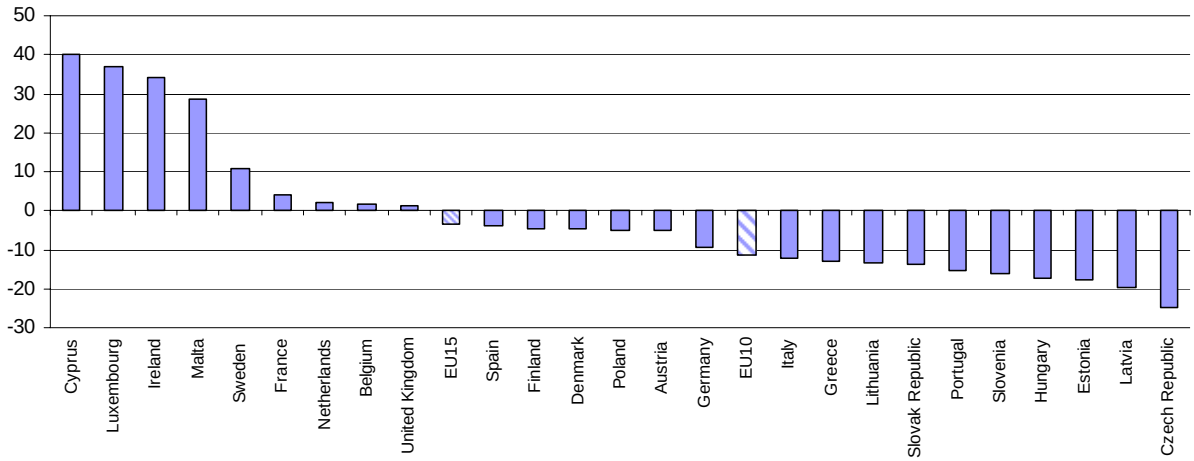
Table 5 - Peaks and troughs for the size of the working-age population and the number of persons employed (aged 15-64)

	Working-age population (15-64)			Employment (15-64)		
	peak year	% change 2003-peak	% change peak-trough	peak year	% change 2003-peak	% change peak-trough
BE	2011	2.9	-10.0	2017	10.3	-7.8
DK	2008	0.7	-9.8	2009	2.4	-8.1
DE	2003	0.0	-19.2	2015	10.7	-18.0
GR	2010	1.2	-22.2	2015	10.8	-21.6
ES	2010	6.3	-24.3	2020	24.1	-22.5
FR	2011	3.3	-6.6	2015	7.3	-3.1
IE	2035	23.1	-4.4	2035	39.8	-4.1
IT	2004	0.7	-23.9	2018	8.6	-19.0
LU	2050	30.9		2050	36.8	
NL	2011	2.5	-7.2	2019	6.0	-4.8
AT	2012	2.3	-16.2	2019	11.1	-14.7
PT	2008	1.6	-22.7	2013	7.9	-21.4
FI	2010	1.3	-14.5	2011	5.3	-9.6
SE	2050	4.3		2050	10.9	
UK	2011	3.8	-6.7	2018	7.8	-6.1
CY	2043	26.3	-2.9	2041	44.2	-2.8
CZ	2007	0.8	-30.7	2013	3.4	-27.3
EE	2006	0.2	-26.9	2011	7.2	-23.1
HU	2003	0.0	-25.4	2011	5.5	-21.5
LT	2006	0.1	-26.1	2016	12.7	-23.1
LV	2003	0.0	-30.3	2012	10.5	-27.3
MT	2041	14.5	-0.8	2037	29.8	-0.9
PL	2011	2.4	-28.6	2025	20.0	-21.0
SK	2010	2.7	-29.5	2020	17.4	-26.6
SI	2011	0.9	-24.7	2012	9.0	-23.0
EU25	*2011*	*1.9*	-16.7	*2017*	*10.6*	-13.8
EU15	*2011*	*2.1*	-14.6	*2017*	*10.2*	-12.4
Euro area	*2011*	*1.7*	-16.6	*2016*	*11.0*	-14.3
EU10	*2009*	*1.3*	-27.5	*2015*	*13.1*	-21.8

Note: The trough for the size of the working-age population is the last year of projection, that is 2050, for all countries except DK (2044) and NL (2039). Trough for number of persons employed is 2050 for all countries except DK (2041) and NL (2041).

Source: EPC and European Commission (2005), DG ECFIN calculations.

Graph 10 - Employment projections (change in % of people employed aged 15-64 between 2003 and 2050) for the EU25 Member States



Source: EPC and European Commission (2005)

3.4 Productivity and potential growth rates

3.4.1 Productivity

Productivity assumed to converge to the long-term trend observed in the past three decades

As labour supply is expected to shrink over the next fifty years, labour productivity will have to play a major role in maintaining adequate aggregate economic growth. As explained in section 2, the theoretical and empirical literature does not reach a firm conclusion about the impact of ageing on aggregate productivity. Although there is some presumption that average productivity levels may differ across age groups, robust data on the age profile of workers productivity are simply not available.

In developing the macroeconomic assumptions to be used to make age-related expenditure projections, the EPC and European Commission (2005) used a production function approach for projecting labour productivity, a conservative approach that is consistent with the long-run historical trends.[25] Thus, the baseline productivity assumption is a useful starting point for analysis on the economic impact of ageing, but it is not a prediction of future trends. A first key working assumption was to allow Total Factor Productivity (TFP) to converge to 1.1% by 2030 across Member States. This rate was chosen as it is broadly in line with trend TFP growth observed in the US and the EU over the past three decades. This approach, in turn, assumes that there will be a convergence in productivity growth rates (but not in levels). A longer period of convergence to the common 1.1% rate of TFP growth was provided for the EU10 countries to allow for more real catch-up. The assumptions, which are not model-based,

[25] Labour productivity growth is estimated with the 'production function approach' (see Carone et al. 2005). Labour productivity (output per worker) is derived from the calculations based on the labour input projections, the assumptions concerning Total Factor Productivity (TFP) and the investment scenario. This approach aims to shed some light on the reasons behind productivity developments and obtain a richer medium-term dynamic including the effect of population growth on labour productivity in the medium run through the change in capital intensity. Combining employment and productivity projections provides GDP and living standard projections.

when combined with a convergence of capital deepening towards its steady-state level[26], yield an average labour productivity growth rate of some 1.7% in the EU15 for the period up to 2050. Regarding the time profile, productivity growth rates are projected to temporarily pick up in the period 2011-2030 due to the capital deepening that is induced by the decline in labour resources combined with the slow adjustment of capital stock. As regards EU10 countries, a much higher productivity rate is projected, on average 3.1% for the period 2011-30 and 1.9% between 2031 and 2050.

Productivity assumptions need to be interpreted with caution

The productivity projections are very likely the most uncertain of all the projections presented here, since they are based on assumptions. Some may claim that they are over-optimistic. Indeed two caveats apply:

- The productivity projections do not take into account the negative effect of changing demographic structure on productivity and TFP, the magnitude of which is still being debated in the economic literature (see section 2). On the other hand, they also do not take account of the potentially strong positive effect of the European economies' catch-up in ICT towards the US economy. However, the use of these long-term trends which smooth out the recent ICT-driven productivity rise seen in the US since the second half of the 1990s means that a potential parallel ICT boom in Europe does not appear in the projections.

- The assumptions *de facto* lead to projections with some real convergence for EU10 countries. However, the experience of the so-called "cohesion countries" (Greece, Ireland, Spain and Portugal) illustrates that the growth path of lagging countries covers the full range between success stories and stagnation. Real convergence is not an automatic outcome of EU membership, and can be affected by the policy-setting or other structural dimensions, which can accelerate, slow down or even block the catching-up process. More generally, the projections are based on the assumption that real convergence is achieved in growth rate rather than in level, except for the "convergence club", i.e. the countries characterised by a very low productivity level (Barrell, 2005). This is consistent with the literature on "conditional convergence" – though the debate about how it is achieved is still going on in the academic community.

3.4.2 Projected GDP growth rates

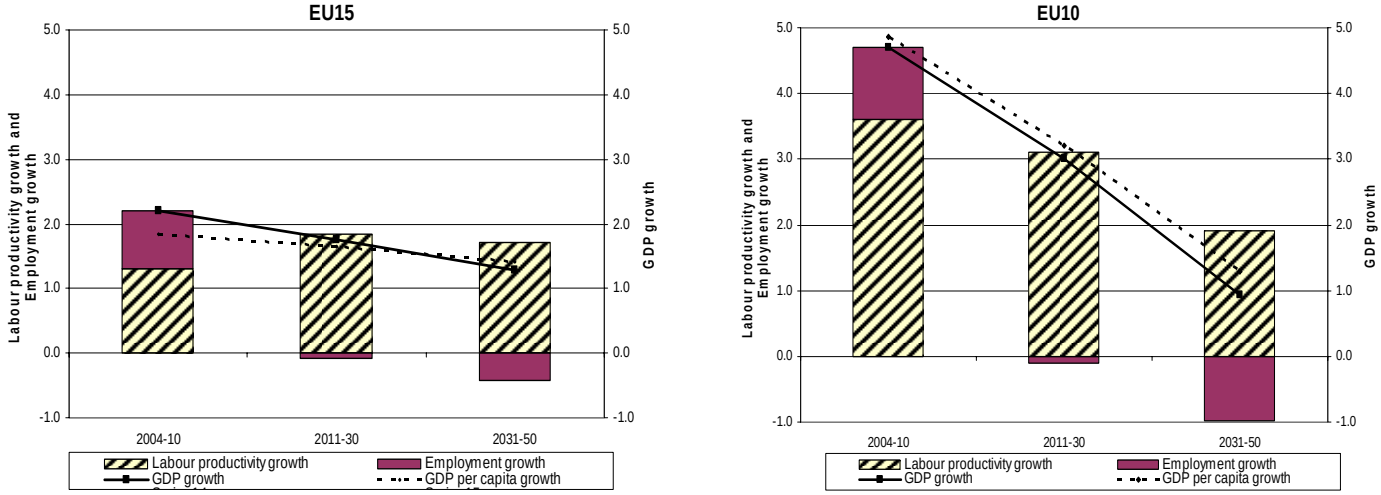
Lower GDP growth rates as the employment contribution turns negative

By combining the employment and productivity projections, it is possible to obtain a projection for potential GDP growth rates up to 2050, see Graph 11,
Table 6 and Table 7). For the EU15, the annual average GDP growth rate is projected to decline from 2.2% in the period 2004-10 to 1.8% % in the period 2011-30, and to 1.3% between 2031 and 2050 (see solid line in Graph 11). An even steeper decline is foreseen in the EU10, from 4.7% in the period 2004-10, to 3% in the period 2011-30 and 0.9% between 2031 and 2050.

[26] For details see Carone, Denis, McMorrow, Mourre and Roeger (2006).

In addition to falling GDP growth rates, the sources of growth will alter dramatically. Employment will make a positive contribution to growth in both the EU15 and EU10 up to 2010, but will become neutral in the period 2011-2030 and turn significantly negative thereafter. Over time, productivity will become the dominant source of growth. The projected fall in GDP growth rates is much higher in the EU10 than in the EU15 (see Graph 11). This is partly due to even less favourable demographic developments there, but also to the completion of the convergence process where productivity growth rates become close to those of EU15 countries.

Graph 11 - Projected (annual average) GDP growth rates in the EU15 and EU10 and their determinants (employment/productivity)

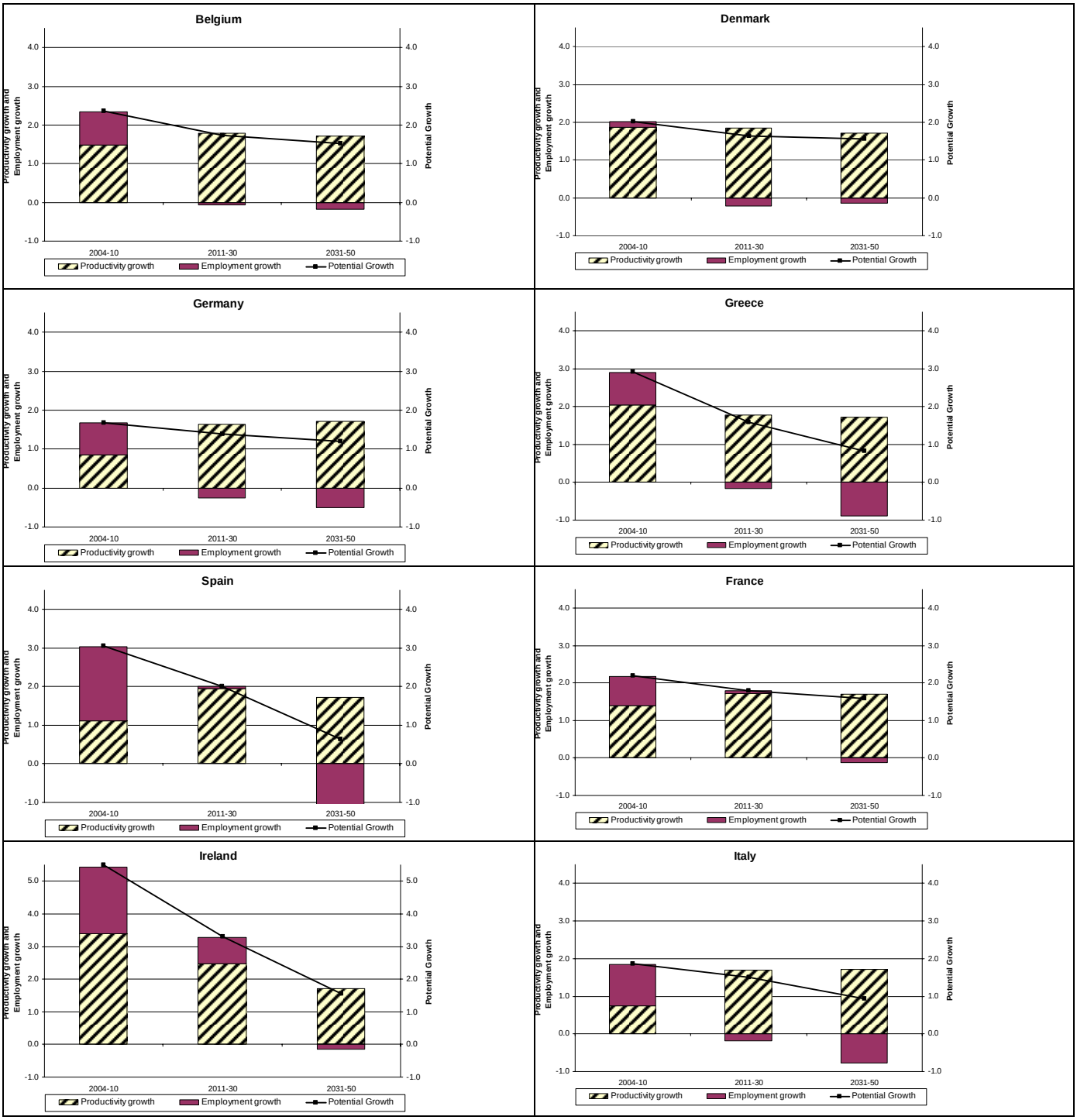


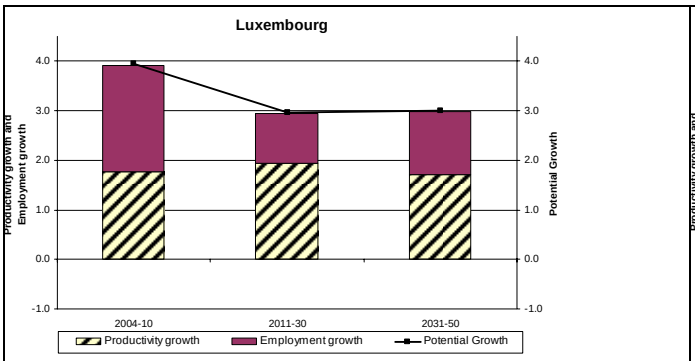
Source: EPC and European Commission (2005)

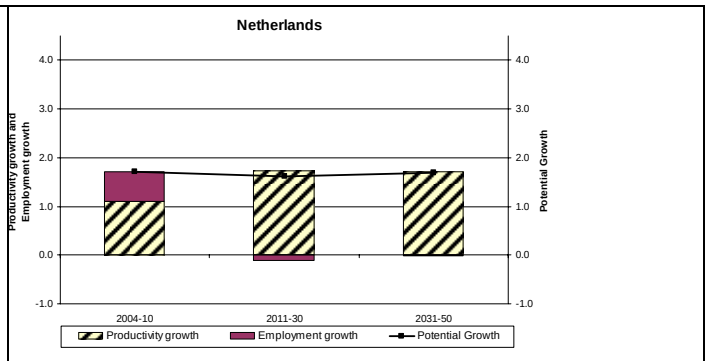
Large differences in the projections across countries

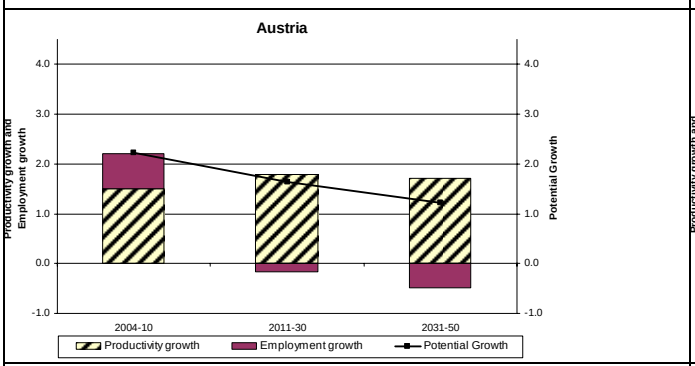
The dynamic profile of projected potential GDP growth rates for all countries over the period 2004-2050 are shown in Graph 12 and Table 7. Almost all countries are projected to experience a steady decline. It will start to become apparent from 2010, and will be most significant in countries with the highest starting point, notably the EU10. In many countries, annual GDP growth rates will have dropped to close to, or below, 1% during the period 2031 to 2050. Over the whole period, only a few small countries (Luxembourg, Latvia, Cyprus, Ireland, Lithuania and Estonia) are projected to enjoy an average growth rate higher than 2.5%, while Germany, Greece, Italy, Austria and Portugal are expected to grow at a rate of or lower than 1.5%.

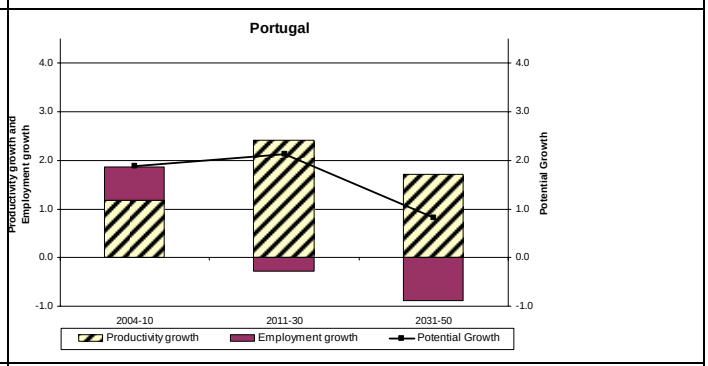
Graph 12 - Projected (annual average) GDP growth rates in each EU25 countries and their determinants (employment/productivity)

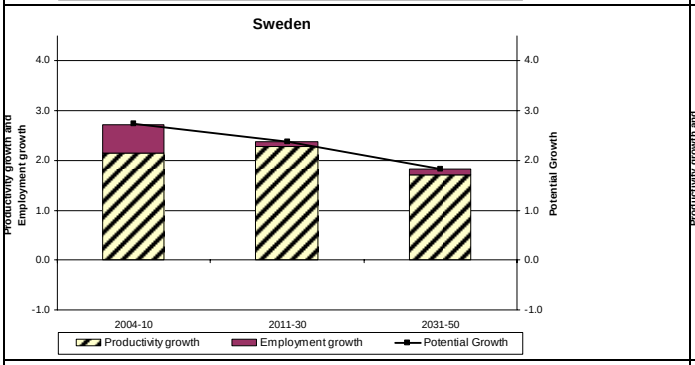


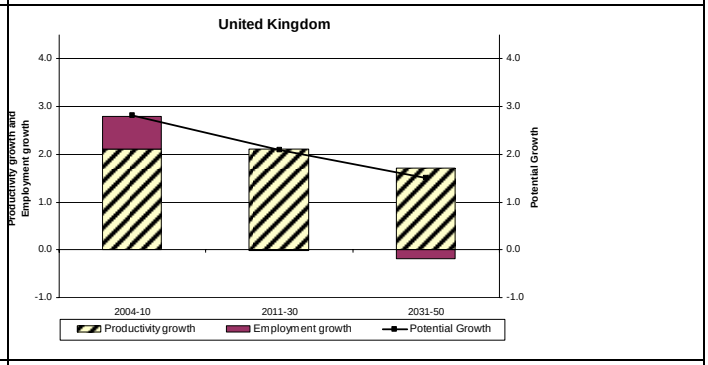

Luxembourg
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth

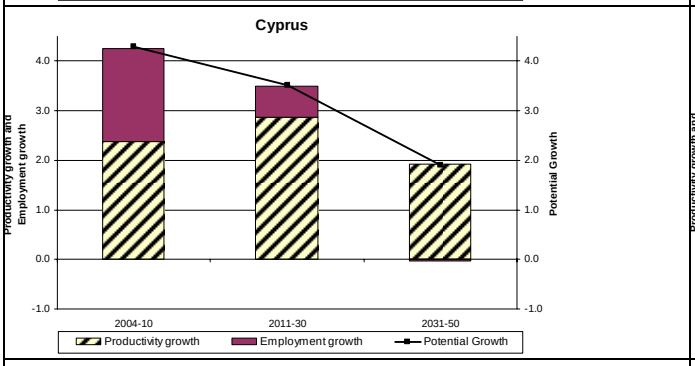

Netherlands
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth

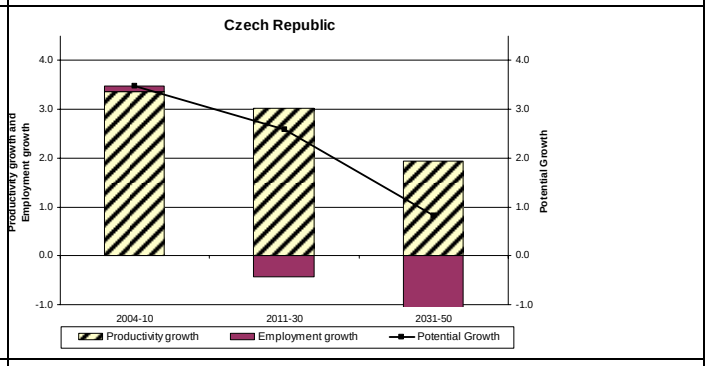

Austria
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth

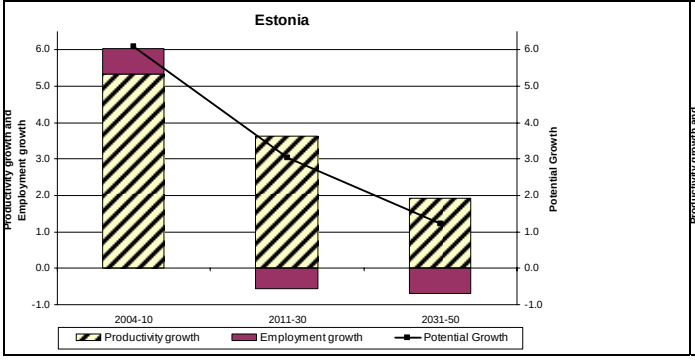

Portugal
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth

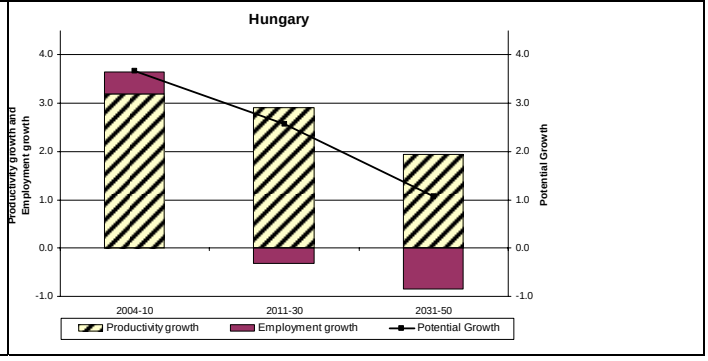

Sweden
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth

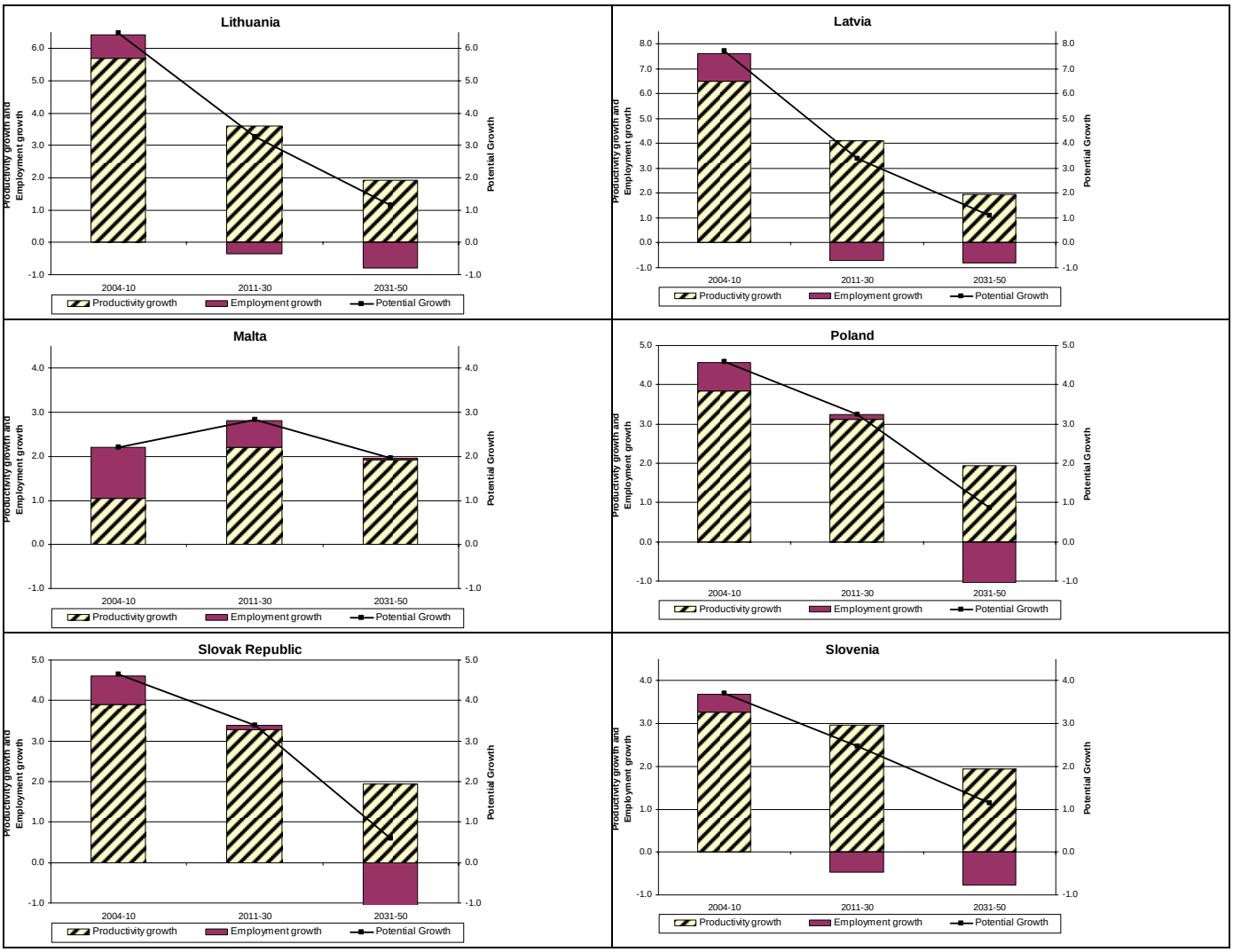

United Kingdom
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth


Cyprus
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth


Czech Republic
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth


Estonia
Productivity growth and Employment growth
Potential Growth
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth


Hungary
Productivity growth and Employment growth
Potential Growth
4.0
3.0
2.0
1.0
0.0
-1.0
2004-10
2011-30
2031-50
Productivity growth
Employment growth
Potential Growth



Source: DG ECFIN calculations

A more in-depth decomposition of the projected sources of growth

Table 6 uses the standard accounting framework to assess the relative contribution to GDP growth of its two main components, labour productivity and labour utilisation. It can be seen that an increasing employment rate (which on average contributed 0.2 p.p. to average GDP growth in the EU25 and EU15, 0.3 p.p. in the euro area and 0.4 p.p. in the EU10 over the entire projection period) compensates for the decline in the share of the working-age population (which is a negative drag on growth by an average of -0.3/-0.4 p.p.).

Table 6 - Projected GDP growth rate in each EU25 Member States, its sources and GDP per capita growth (annual average 2004-50)

		Due to growth in:							
	GDP growth in 2004-2050	***Productivity*** *(GDP per person employed)*	*TFP*	*Capital deepening*	***Labour input***	*Total population*	*Employment rate*	*Share of Working age population*	**GDP per capita growth in 2004-2050**
	1=3+6	**3=4+5**	*4*	*5*	**6=7+8+9**	*7*	*8*	*9*	**10=1-7**
BE	**1.7**	**1.7**	1.1	0.6	**0.2**	0.1	0.3	-0.3	**1.6**
DK	**1.7**	**1.8**	1.1	0.6	**-0.1**	0.0	0.1	-0.2	**1.6**
DE	**1.3**	**1.6**	1.1	0.5	**-0.2**	-0.1	0.3	-0.3	**1.5**
GR	**1.5**	**1.8**	1.0	0.8	**-0.1**	-0.1	0.4	-0.5	**1.5**
ES	**1.6**	**1.7**	1.0	0.7	**0.0**	0.1	0.4	-0.5	**1.5**
FR	**1.8**	**1.7**	1.1	0.6	**0.1**	0.2	0.2	-0.3	**1.6**
IE	**2.9**	**2.3**	1.5	0.8	**0.6**	0.7	0.3	-0.3	**2.2**
IT	**1.3**	**1.6**	1.0	0.5	**-0.2**	-0.1	0.3	-0.4	**1.5**
LU	**3.1**	**1.8**	1.1	0.8	**1.3**	0.8	0.7	-0.2	**2.4**
NL	**1.7**	**1.6**	1.1	0.6	**0.0**	0.2	0.1	-0.3	**1.5**
AT	**1.5**	**1.7**	1.1	0.6	**-0.1**	0.0	0.2	-0.4	**1.5**
PT	**1.5**	**1.9**	1.2	0.7	**-0.5**	-0.1	0.0	-0.4	**1.6**
FI	**1.8**	**1.9**	1.4	0.5	**-0.1**	0.0	0.2	-0.3	**1.8**
SE	**2.2**	**2.0**	1.4	0.6	**0.2**	0.3	0.1	-0.2	**1.9**
UK	**2.0**	**1.9**	1.2	0.7	**0.0**	0.2	0.0	-0.2	**1.8**
CY	**2.9**	**2.4**	1.4	1.0	**0.7**	0.7	0.3	-0.2	**2.3**
CZ	**2.0**	**2.6**	1.4	1.2	**-0.7**	-0.3	0.1	-0.5	**2.3**
EE	**2.7**	**3.2**	1.7	1.4	**-0.5**	-0.4	0.2	-0.3	**3.1**
HU	**2.1**	**2.5**	1.4	1.1	**-0.4**	-0.3	0.2	-0.3	**2.4**
LT	**2.8**	**3.2**	1.8	1.4	**-0.3**	-0.4	0.4	-0.2	**3.2**
LV	**3.1**	**3.5**	1.9	1.6	**-0.5**	-0.5	0.3	-0.3	**3.5**
MT	**2.4**	**1.9**	1.1	0.8	**0.5**	0.5	0.3	-0.3	**1.8**
PL	**2.4**	**2.7**	1.7	1.0	**-0.2**	-0.3	0.5	-0.4	**2.7**
SK	**2.4**	**2.8**	1.7	1.1	**-0.3**	-0.3	0.4	-0.4	**2.7**
SI	**2.1**	**2.6**	1.4	1.2	**-0.4**	-0.1	0.2	-0.5	**2.2**
EU25	**1.7**	**1.8**	1.2	0.6	**-0.1**	0.0	0.2	-0.3	**1.7**
EU15	**1.6**	**1.7**	1.1	0.6	**-0.1**	0.0	0.2	-0.3	**1.6**
Euro area	**1.5**	**1.6**	1.1	0.6	**-0.1**	0.0	0.3	-0.4	**1.5**
EU10	**2.4**	**2.7**	1.6	1.1	**-0.3**	-0.3	0.4	-0.4	**2.6**

Source: DG ECFIN calculations based on EPC and European Commission (2005a).

Table 7 - Time profile of projected GDP growth rate and its sources in each EU25 Member states (average annual growth rates)

	Potential Growth			Labour productivity growth			Employment growth		
	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	1.2	0.0	-0.2
DK	2.0	1.6	1.6	1.9	1.8	1.7	0.4	-0.2	-0.1
DE	1.7	1.4	1.2	0.9	1.6	1.7	0.8	-0.2	-0.5
GR	2.9	1.6	0.8	2.1	1.8	1.7	2.3	-0.1	-0.9
ES	3.0	2.0	0.6	1.1	1.9	1.7	2.9	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	2.2	0.9	-0.1
IT	1.9	1.5	0.9	0.7	1.7	1.7	1.3	-0.2	-0.8
LU	4.0	3.0	3.0	1.8	1.9	1.7	2.3	1.0	1.3
NL	1.7	1.6	1.7	1.1	1.7	1.7	0.2	-0.1	0.0
AT	2.2	1.6	1.2	1.5	1.8	1.7	1.1	-0.1	-0.5
PT	1.9	2.1	0.8	1.2	2.4	1.7	0.1	-0.3	-0.9
FI	2.7	1.7	1.5	2.1	2.0	1.7	0.7	-0.3	-0.2
SE	2.7	2.4	1.8	2.2	2.3	1.7	0.8	0.1	0.1
UK	2.8	2.1	1.5	2.1	2.1	1.7	0.3	0.0	-0.2
CY	4.3	3.5	1.9	2.4	2.9	1.9	3.4	0.7	0.0
CZ	3.5	2.6	0.8	3.4	3.0	1.9	-0.5	-0.4	-1.1
EE	6.1	3.0	1.2	5.3	3.6	1.9	0.5	-0.5	-0.7
HU	3.7	2.6	1.1	3.2	2.9	1.9	0.9	-0.3	-0.9
LT	6.5	3.3	1.1	5.7	3.6	1.9	1.3	-0.3	-0.8
LV	7.7	3.4	1.1	6.5	4.1	1.9	1.3	-0.6	-0.8
MT	2.2	2.8	2.0	1.0	2.2	1.9	1.6	0.7	0.0
PL	4.6	3.2	0.9	3.8	3.1	1.9	1.6	0.2	-1.1
SK	4.6	3.4	0.6	3.9	3.3	1.9	1.4	0.2	-1.4
SI	3.7	2.5	1.1	3.3	3.0	1.9	0.9	-0.5	-0.8
EU25	*2.4*	*1.9*	*1.2*	*1.5*	*2.0*	*1.7*	*1.0*	*0.0*	*-0.5*
EU15	*2.2*	*1.8*	*1.3*	*1.3*	*1.8*	*1.7*	*1.0*	*0.0*	*-0.4*
Euro area	*2.1*	*1.7*	*1.2*	*1.1*	*1.8*	*1.7*	*1.2*	*-0.1*	*-0.5*
EU10	*4.7*	*3.0*	*0.9*	*3.6*	*3.1*	*1.9*	*1.1*	*0.0*	*-1.0*

Source: DG ECFIN calculations based on EPC and European Commission (2005a)

Useful to also consider growth in GDP per capita

At this stage, it is worth drawing attention to the difference in GDP growth rates and GDP per capita growth rates. The effects of an ageing population on living standards can more closely be observed by looking at growth rates in terms of GDP per capita. Given the effects of ageing on the ratio of active to inactive people, GDP per capita growth rates in both the EU15 and EU10 are projected to fall (see dotted line in Graph 11) but by less than the projected fall in GDP growth rates. Hence, living standards should hold up better than the trend in headline GDP growth rate suggests. Indeed, the growth in GDP per capita depends on the change in the age structure of total population (i.e. share of working age population over total population), while potential growth hinges not only upon the latter but also upon the change in the total population size, which is projected to decline from 2025.

In addition to the overall decline in living standard growth, a shift could occur in the relative income position of different age cohorts. This points to the core of the ageing challenge facing policy makers. Ageing raises the complex issue of the role of public transfers in achieving an appropriate distribution of resources between a smaller active population and a larger inactive retired population.

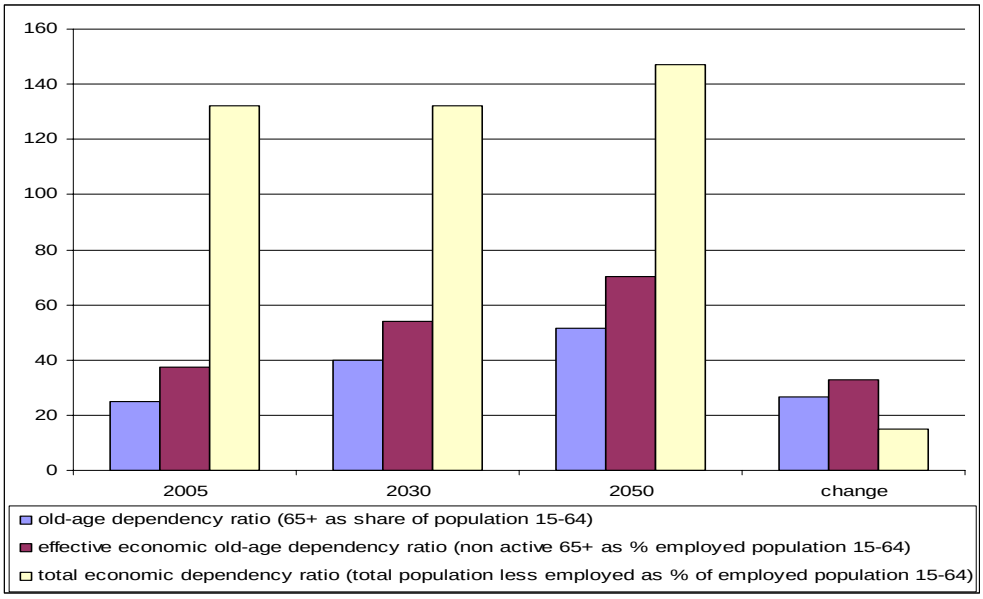
4. Policy implications

Comparing trends in demographic and economic dependency ratio: significant, but not insurmountable, policy challenges lie ahead

The projections point to pressing economic policy challenges for the EU as a result of ageing. From an economic perspective, potential growth rates will fall to levels below those observed in recent decades: however, living standards (at least in the EU15) as measured by GDP per capita should hold up somewhat better than the trend in headline GDP growth rate suggests. Fiscal challenges will come from both sides of the budgetary equation. Pressure for increased public spending will result from having a higher share of the total population in older age cohorts that require larger public transfers (e.g. pensions) and services (health care, long-term care). The financing side may also be affected, with a decline in the support ratio of contributors to beneficiaries.

These developments can best be viewed by comparing the economic dependency ratios reported in Table 8 and Graph 13. Over the next decades, the old-age dependency ratio, that is, the number of people aged 65 years and above relative to those between 15 and 64, is projected to double, reaching 51% in 2050. This means that we will go from the current situation of having four people of working-age for every elderly citizen to a ratio of 2 to 1 (even higher in some countries). The 'effective economic old-age dependency' ratio is also shown in Table 8: this is the number of non-active persons aged 65 and above as a percentage of employed persons aged 15 to 64. As expected, this ratio is higher than the old age-dependency ratio, and is projected to rise sharply for the EU25, from 37% in 2003 to 48% in 2025 and 70% in 2050, raising complex issues relating to the role of public transfers in achieving an appropriate distribution of resources between a smaller active population and a larger inactive retired population.

Graph 13 - Projected demographic and economic dependency ratios for the EU 25



Source: EPC and European Commission (2005a)

The total economic dependency ratio 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. For the EU25, this ratio actually falls from 136% in 2003 to 125% in 2025, but thereafter increases to 147% by 2050. 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 will reduce 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 steeper.

Table 8 - Projected changes in demographic and economic dependency ratios

	Old-age dependency ratio (population aged 65 and above as a percentage of the population aged 15-64*)				**Effective economic old-age dependency ratio** (non active population aged 65 and above as a percentage of employed population aged 15-64)				**Total economic dependency ratio** (total population less employed as a percentage of employed population aged 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 calculations based on EPC and European Commission (2005a).

Some positive developments are under way, in part due to reforms already carried out

There are some positive indications that emerge from the analysis:

- first, employment rates and levels are projected to continue rising for at least a decade, which will temporarily offset the decline in the size of the working-age populations and provides a window of opportunity to undertake necessary reform measures.

- secondly, the projections confirm the validity of the approach adopted by the EU in the Lisbon strategy. They already incorporate the achievement of the overall Lisbon employment targets (although only by 2020 for the EU25), and also confirm the need for policies to raise productivity potential. Higher levels of investment in physical and human capital, together with efforts to strengthen innovation and R&D activities, could yield substantial productivity gains over the long run, especially against a

background of a knowledge-based society. There is strong evidence that higher educational attainment leads to enhanced labour productivity and adaptability to a knowledge-based economy. The higher enrolment rates in second- and third-level education observed in many countries, coupled with a greater focus on quality and efficiency, may contribute to improved productivity in the future, albeit with a lag of several years, or even decades. The interaction between labour market and product reforms is worth highlighting in this context, as more flexibility in these markets facilitates resource reallocation to more innovative and productive activities.

- the projections illustrate the effects of successful structural reforms, and show that policy action can make a big difference to the capacity to meet the challenge of ageing. The projections indicate that pension reforms already enacted by Member States could lead to a 10 p.p. increase in the employment rate of older workers to levels well above the Lisbon employment targets.

Are the Lisbon employment targets ambitious enough in the face of ageing?

A comprehensive set of policy actions will be needed to ensure that Europe's economies can meet the ageing challenge. Government budget positions need to rapidly improve and debt needs to be set on a steady downward trajectory. Pension systems may need to be reformed further in some countries so as to ensure their financial sustainability whilst retaining the core goals of access and adequacy. Health care and long-term care systems need to be adapted to the changing needs and aspirations of an ageing society, with a better alignment of incentives facing medical staff and patients on the rational consumption of scarce resources.

The labour market is the key to successful policy adjustment, since ultimately it is the economic output of a country that determines its capacity to sustain high quality welfare systems. The EU may therefore need to look beyond the current Lisbon employment goals targets and not stop short at the existing targets or deadlines. Even if the EU as a whole achieves the Lisbon employment targets (albeit later than the original target date of 2010), this will not be sufficient to offset the effects of demographic change. Moreover, substantial unused labour capacity will remain in many Member States:

- the average number of hours worked per person employed is low in some countries in Europe, especially compared with the US. Although this might partly reflect a stronger preference for leisure in Europe, it may also be caused by institutional distortions which could be removed with appropriate policies;

- many countries will still have wide gender employment gaps, suggesting further scope for increasing female employment rates. In addition, the better integration of migrants, measures to tackle the grey economy, the tightening of access to disability schemes, and efforts to address social exclusion, which leads to lasting inactivity, could further raise the labour supply;

- it should be borne in mind that reaching the 60% employment target for older workers in 2020, while certainly representing a dramatic turnaround compared with the trend of recent decades towards ever earlier retirement, will only bring the EU up to the level of older-worker employment observed in the US today. A significant number of people will continue to withdraw early from the labour force despite increasing life expectancy and improving health at older ages.

Raising the employment rates of older workers and increasing effective retirement ages remains a priority

Raising the employment rates of older workers, including those aged over 65, will remain a critical policy objective for EU Member States. Achieving the necessary extension in working lives will not be easy. It not only requires that tax/benefit and wage systems provide financial incentives for people to remain economically active and invest in building their own human capital, but also means that there must be job opportunities for older people with appropriate skill sets. Policies to tackle age-discrimination and to promote life-long learning, flexible retirement pathways and healthy work conditions also need to be considered.

Perhaps the most challenging aspect of efforts to raise effective retirement ages is the need to change the expectations and behaviour of employers and employees alike. Moreover, the concept of ageing is evolving, and with life expectancy projected to continue rising, retirement behaviour may also need to adjust continuously.

The old-age dependency ratio illustrates one of the main sources of the financing problem facing pension schemes. Despite the fact that life expectancy is projected to increase by some 6 years between 2004 and 2050 (having already increased by some 8 years from 1960), the threshold for categorising a person as being of working-age (15-64) and as older (65+) remains unchanged. This is not simply a matter of ensuring constancy in a statistical indicator. It is reflected in public policies: for example, statutory retirement ages in most countries are fixed at 65. It is also reflected in the expectations and behaviour of citizens as demonstrated by the effective retirement age, which is closer to 60. While people appear to have adjusted their life course at younger ages in response to increased longevity (e.g. longer period spent in education; later entry into the labour market, family formation and birth of first child), the same does not appear to have occurred with respect to what is considered a 'normal' age to retire. Current financing problems to a large extent stem from the failure of contribution/entitlements parameters in public pension schemes to adjust in the face of increased life expectancy. There is an incompatibility between the continuous gains in life expectancy, the apparent demand for early withdrawal from the labour force and the desire for adequate and secure retirement income. Viewed this way, public pension schemes do not so much face an ageing challenge, but a retirement one.[27] Flexible retirement ages adapting to higher life expectancy could be an efficient policy response to this challenge.

Table 9 neatly illustrates the ever-evolving nature of the retirement challenge. Notwithstanding recent pension reforms aimed at increasing the average age of retirement, the percentage of adult life spent in retirement is projected to increase in all Member States, with the exception of Slovenia (for both males and females) and Poland and Slovakia (for females). This is the combined result of the projected significant gains in life expectancy, which outweigh the prospected increases in the average age of exit from the labour market. In order to keep the percentage of adult life spent in retirement constant, some countries need to postpone the exit age by a substantial number of years. Table 9 suggests that the exit age

[27] For illustrative purposes, DG ECFIN has calculated an adjusted old-age dependency ratio which adjusts the age at which one is considered older in line with projected gains in life expectancy. The threshold for being classified as elderly would rise from 65 in 2004 to 69 in 2050. Instead of doubling from 24% in 2004 to 51% in 2050, the 'life expectancy adjusted' old-age dependency ratio would increase to 36%. In other words, one half of the demographic ageing effect would 'disappear' if expectations of being elderly and taking retirement adjusted in line with gains in life expectancy. In practice, effective retirement ages would not need to rise by the same number of years as life expectancy in order to keep pension schemes in financial balance. Rather, a less than proportionate increase is needed – one which maintains the ratio of years in work relative to years in retirement.

should be put off by almost 2 years for males in the EU15, euro area and the EU10, and by just over 2 years for females in the EU15 and the euro area (but only one year in the EU10). The situation appears particularly critical in a number of specific countries such as Greece, Portugal, UK and Hungary (although these are countries that start from a relatively lower percentage of age spent in retirement), where the average exit age should be deferred by 3-4 years in order to keep constant the percentage of adult life spent in retirement. However, *a priori*, there is no economic rationale for favouring a constant share of adult life spent in retirement, and indeed a preference for a longer period of leisure time in retirement could be justified on the basis of rising living standards. However, it must be economically and financially viable. Achieving a rising share of adult life spent in retirement could be an interesting challenge for retirement policy in the future.

Table 9- Percentage of adult life spent in retirement: projected levels

	Males							Females						
	Average exit age		Life expectancy at retirement		% of adult life spent in retirement		Years of exit deferral to keep the % of life spent in retirement constant	Average exit age		Life expectancy at retirement		% of adult life spent in retirement		Years of exit deferral to keep the % of life spent in retirement constant
	2003	2050	2003	2050	2003	2050		2003	2050	2003	2050	2003	2050	
BE	59.3	60.2	21.5	25.3	32.7	35.9	2.3	59.3	60.4	25.4	29.4	36.5	39.3	2.1
DK	63.3	63.5	17.0	20.1	26.0	29.3	2.3	62.9	62.4	20.1	23.1	29.6	32.8	2.2
DE	62.7	63.7	18.4	21.4	27.8	30.5	1.9	62.0	62.3	22.5	26.2	32.3	35.6	2.4
GR	65.2	62.5	16.1	21.8	24.3	31.5	5.0	64.2	62.1	19.4	24.2	28.2	34.0	4.1
ES	63.0	63.3	18.7	21.8	28.1	31.1	2.1	62.3	62.3	23.3	26.9	33.0	36.3	2.4
FR	60.6	61.7	21.4	24.4	32.0	34.3	1.6	60.5	61.4	25.7	29.3	36.1	38.7	2.0
IE	63.7	64.3	16.6	21.0	25.4	29.9	3.1	64.4	64.6	19.2	23.9	27.9	32.5	3.4
IT	59.7	62.3	22.0	23.5	33.0	33.1	0.1	60.7	61.3	24.9	28.5	35.2	38.1	2.2
LU	58.7	59.7	22.0	25.2	33.5	36.0	1.8	59.7	59.3	25.0	29.3	35.8	39.8	2.9
NL	62.1	62.3	18.3	20.4	28.0	30.1	1.4	60.8	61.0	23.2	24.9	33.6	35.1	1.1
AT	60.1	62.2	21.1	23.7	31.9	33.4	1.1	58.8	60.8	25.9	28.2	37.2	38.1	0.7
PT	64.5	64.2	16.1	20.6	24.6	29.5	3.4	61.1	63.4	22.9	24.5	33.2	33.6	0.3
FI	61.6	63.4	19.1	21.6	29.0	30.8	1.3	60.6	62.5	23.9	25.8	34.4	35.3	0.6
SE	63.5	64.6	18.2	20.4	27.3	29.1	1.3	62.7	63.9	22.0	23.8	31.6	32.8	0.9
UK	63.8	63.8	17.3	22.0	26.2	31.1	3.5	62.7	63.2	21.3	25.1	30.8	34.2	2.5
CY	64.6	65.3	16.5	19.6	25.0	28.1	2.1	61.0	61.7	22.3	24.9	32.6	34.8	1.5
CZ	62.0	63.1	16.8	20.3	26.3	29.7	2.3	60.0	61.0	22.0	24.9	32.9	35.1	1.6
EE	61.8	63.0	15.6	19.3	25.0	28.7	2.5	61.0	62.1	20.9	23.8	31.2	33.5	1.6
HU	61.5	62.2	16.6	21.4	26.4	31.3	3.4	62.0	61.0	19.7	25.0	29.5	35.2	4.1
LT	63.1	63.5	15.2	19.4	24.0	28.6	3.2	63.3	62.0	19.1	24.5	28.3	34.3	4.2
LV	61.6	63.1	15.7	19.3	25.2	28.7	2.4	60.9	61.9	20.8	23.8	31.2	33.7	1.8
MT	59.9	60.3	20.3	24.0	31.2	34.6	2.4	56.3	56.1	27.0	30.5	39.5	42.6	2.2
PL	60.5	62.7	18.2	21.1	28.6	30.6	1.4	57.1	59.9	25.3	26.6	37.6	37.2	-0.3
SK	60.6	61.6	17.4	21.0	27.6	31.0	2.3	56.5	59.5	25.0	25.9	37.6	36.7	-0.6
SI	57.6	62.0	21.7	21.7	33.7	31.6	-1.4	55.8	60.6	27.5	26.4	40.3	36.6	-2.6
EU25	61.9	62.9	19.0	22.1	28.8	31.6	1.9	61.1	61.9	23.3	26.6	33.6	36.2	1.9
EU15	62.1	63.0	19.3	22.4	29.0	31.8	1.9	61.6	62.1	23.3	26.7	33.3	36.2	2.1
EU10	61.0	62.7	17.6	20.9	27.6	30.5	1.9	58.7	60.4	23.5	25.9	34.9	36.3	1.0
Euro area	61.7	62.7	19.7	22.6	29.7	32.1	1.7	61.3	61.8	23.8	27.2	33.9	36.8	2.1

Note: *percentage of adult life spent in retirement is given by life expectancy at retirement/ retirement age plus life expectancy at retirement minus 15.*

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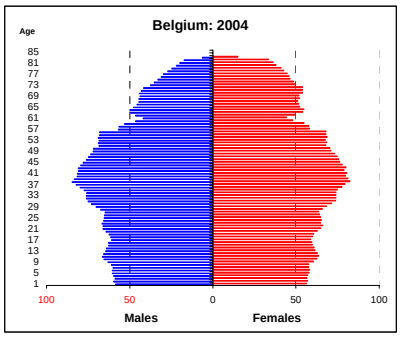
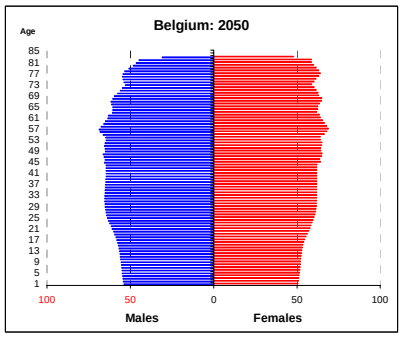
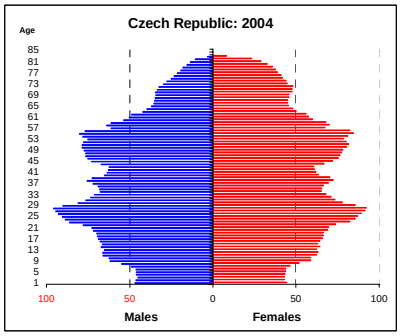
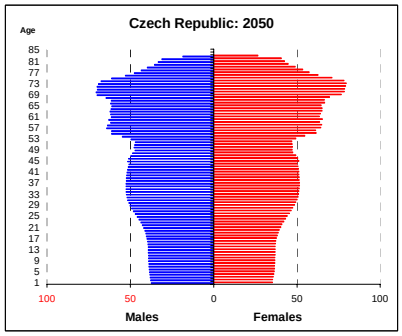
ANNEX 1 - Change in the age structure of the population between 2004 and 2050

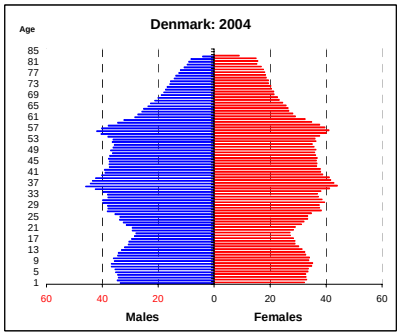
(thousands of persons)

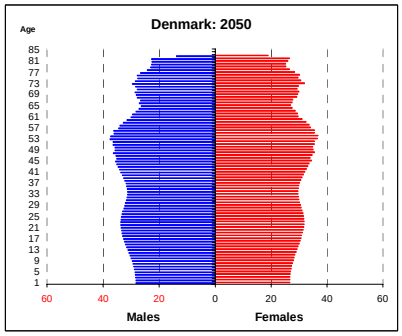


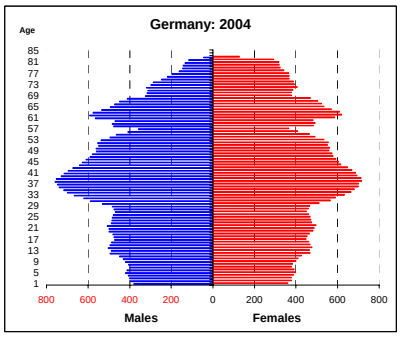


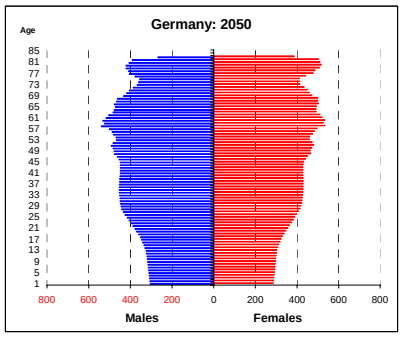


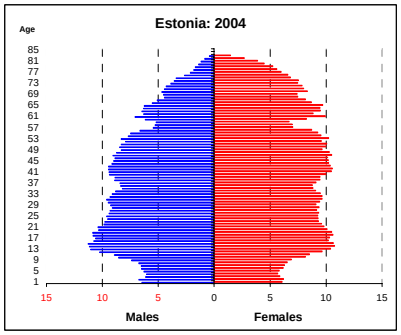


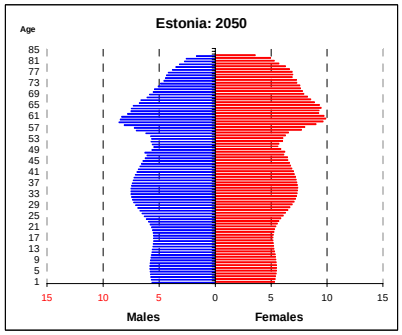


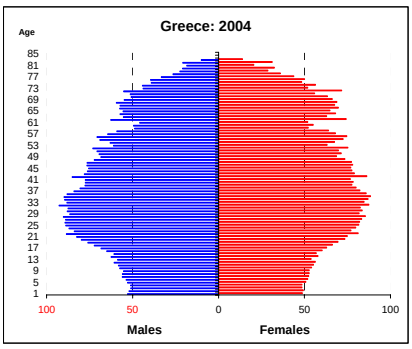











Greece: 2004
Age
85 81 77 73 69 65 61 57 53 49 45 41 37 33 29 25 21 17 13 9 5 1
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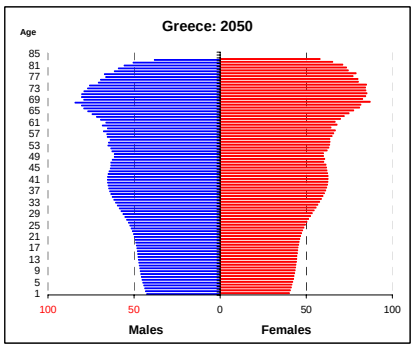
Males
Females


Greece: 2050
Age
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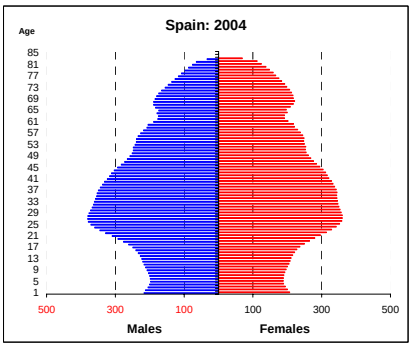
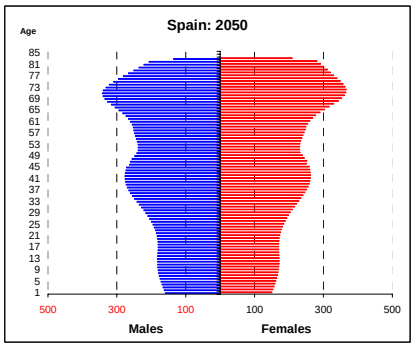
100 50 0 50 100
Males
Females


Spain: 2004
Age
85 81 77 73 69 65 61 57 53 49 45 41 37 33 29 25 21 17 13 9 5 1
500 300 100 100 300 500
Males
Females


Spain: 2050
Age
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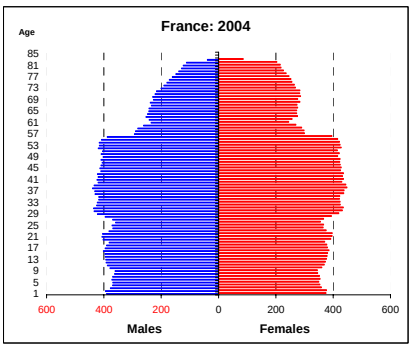
France: 2004
Age
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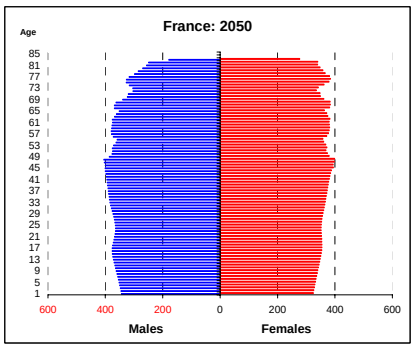
Males
Females


France: 2050
Age
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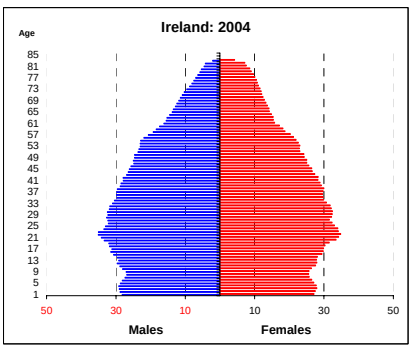
Ireland: 2004
Age
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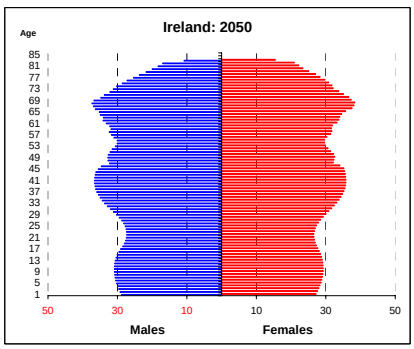
50 30 10 10 30 50
Males
Females


Ireland: 2050
Age
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50 30 10 10 30 50
Males
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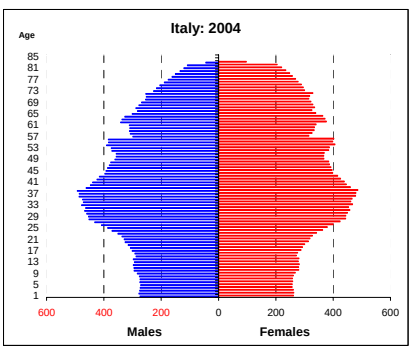
Italy: 2004
Age
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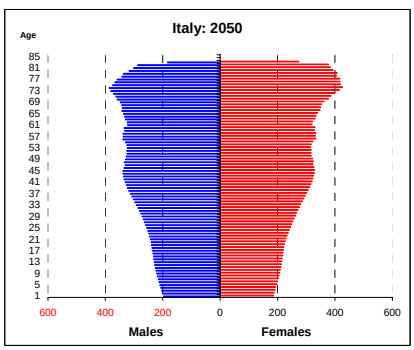
Males
Females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Age
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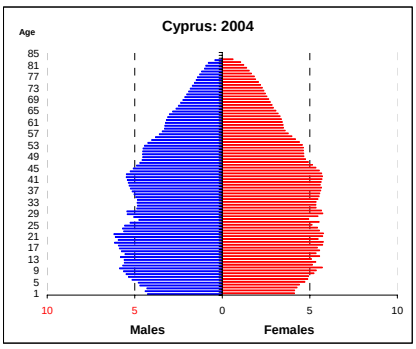
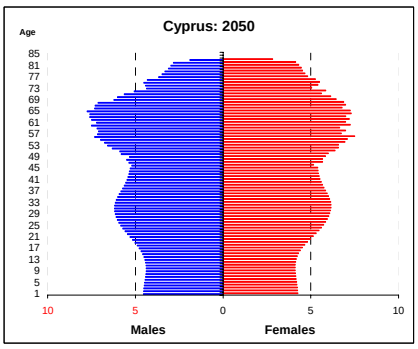
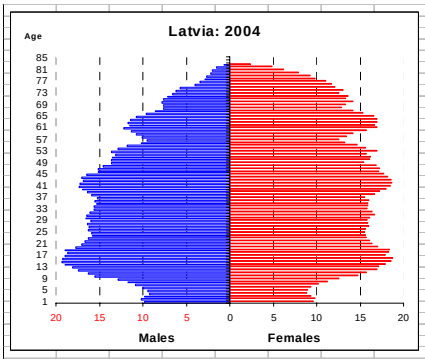
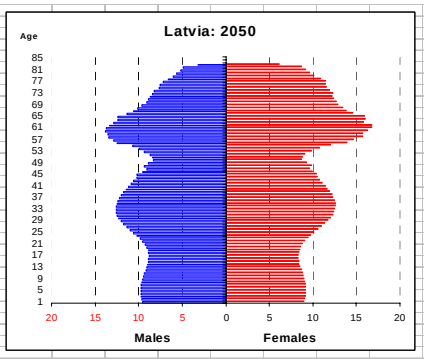
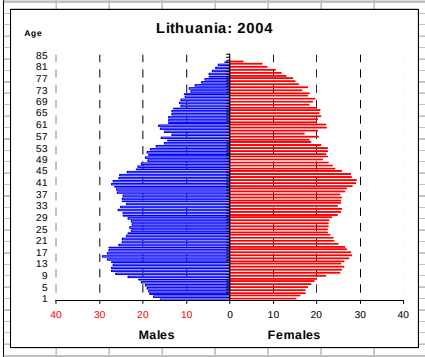
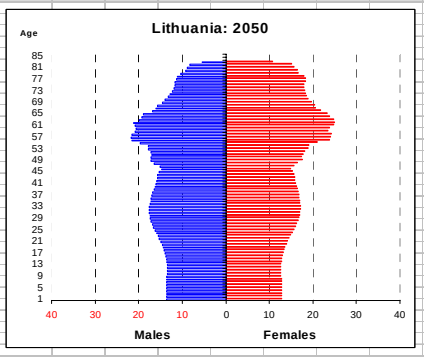

Cyprus: 2004
Age
Males
Females

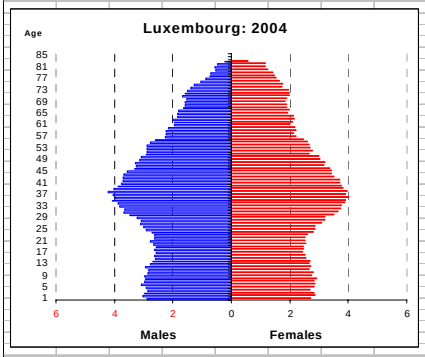

Cyprus: 2050
Age
Males
Females

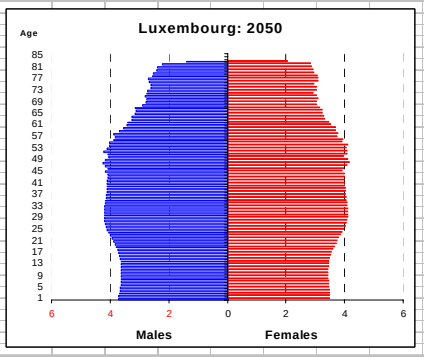

Latvia: 2004
Age
Males
Females

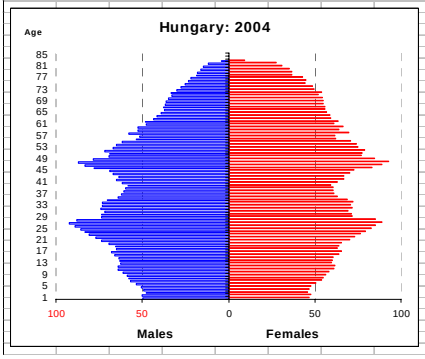

Latvia: 2050
Age
Males
Females

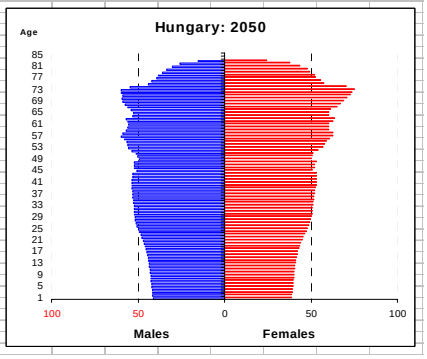

Lithuania: 2004
Age
Males
Females

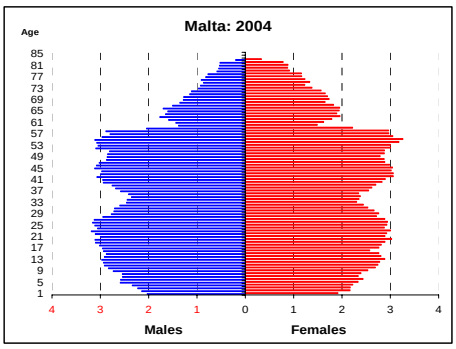

Lithuania: 2050
Age
Males
Females

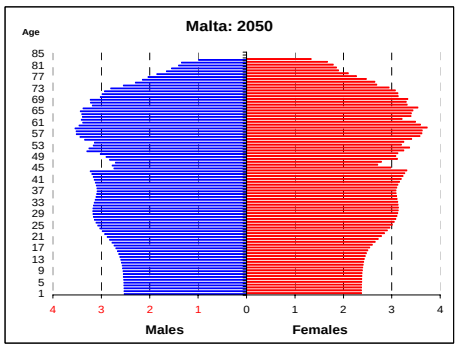

Luxembourg: 2004
Age
Males
Females

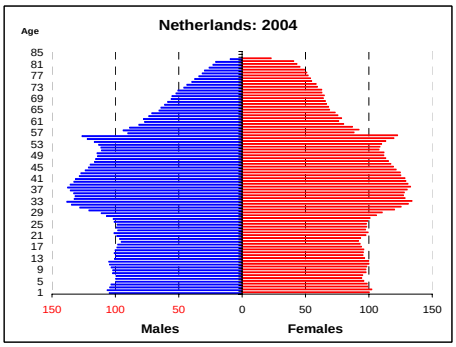

Luxembourg: 2050
Age
Males
Females

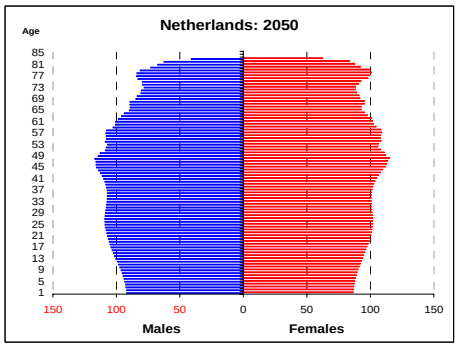

Hungary: 2004
Age
Males
Females

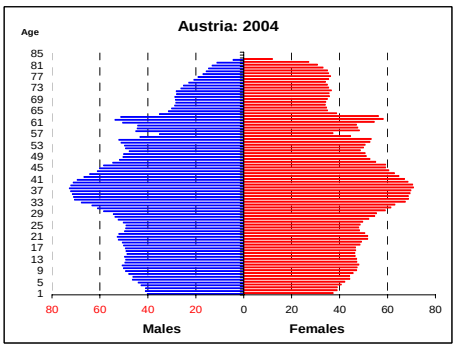

Hungary: 2050
Age
Males
Females

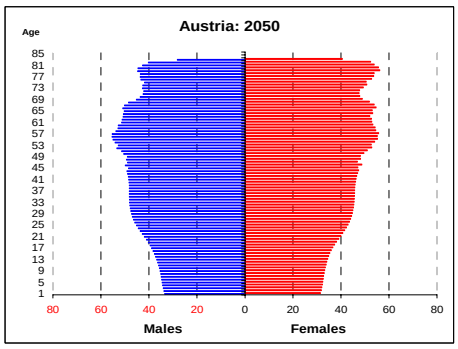

Malta: 2004
Age
Males
Females

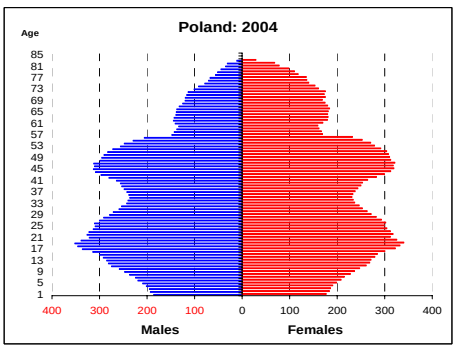

Malta: 2050
Age
Males
Females

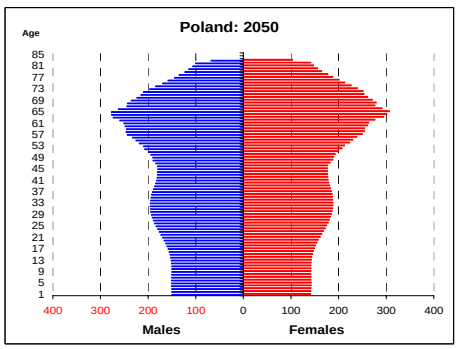

Netherlands: 2004
Age
Males
Females

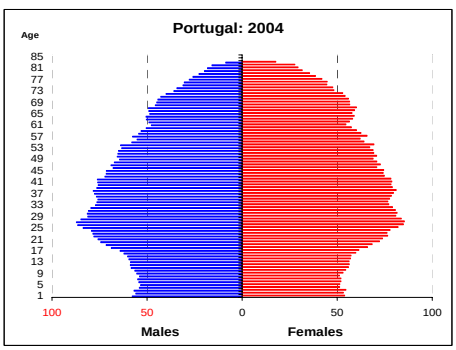

Netherlands: 2050
Age
Males
Females

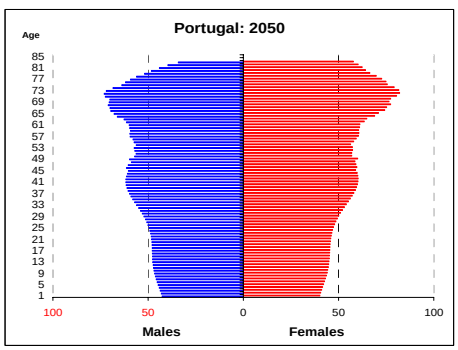

Austria: 2004
Age
Males
Females

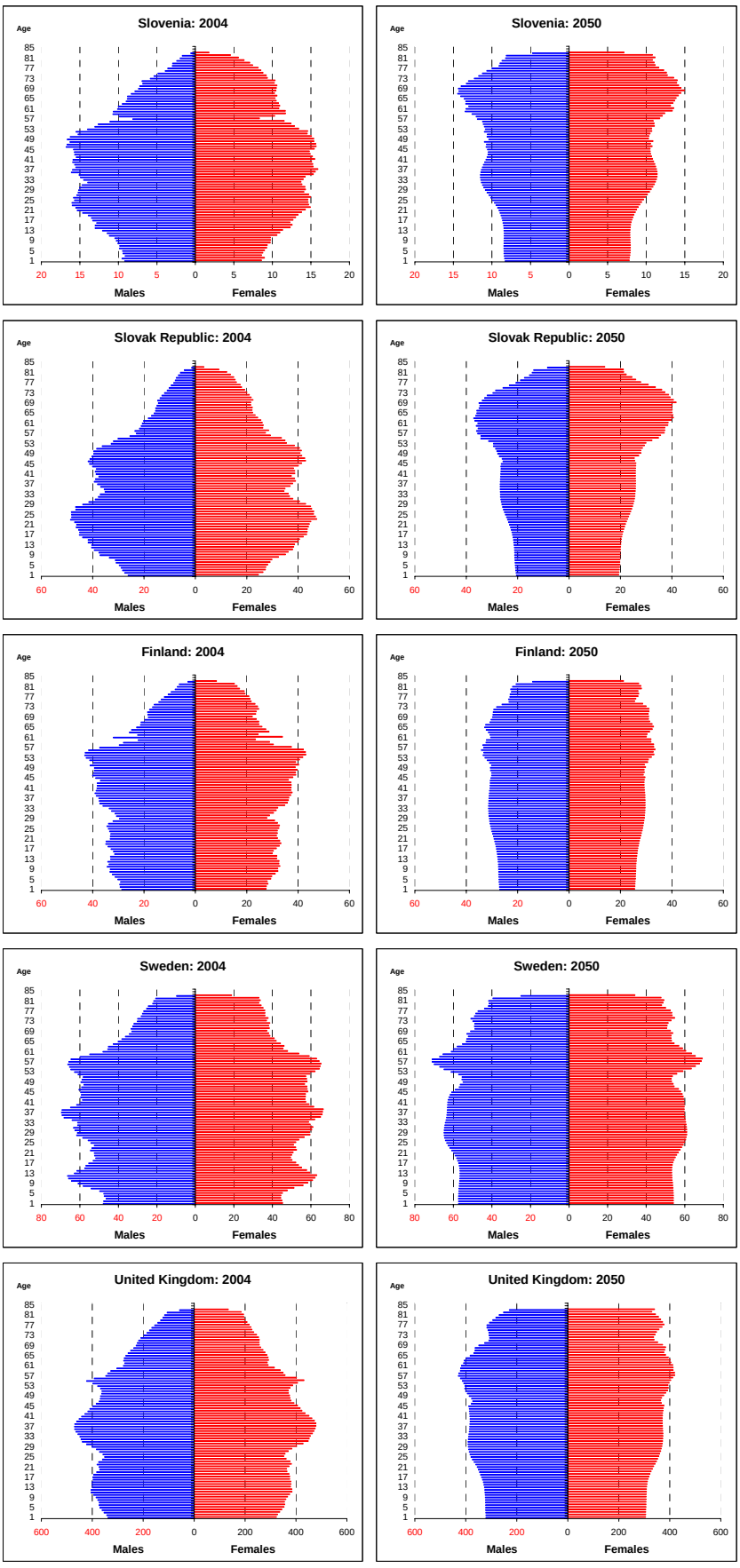

Austria: 2050
Age
Males
Females


Poland: 2004
Age
Males
Females


Poland: 2050
Age
Males
Females


Portugal: 2004
Age
Males
Females


Portugal: 2050
Age
Males
Females



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

ANNEX 2 - Projected trends in key macroeconomic variables

European Union (25 countries)

Main demographic and macroeconomic assumptions

(BASELINE SCENARIO)

Budgetary Projection: AWG variant population scenario

	2004	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Demographic assumptions											
Fertility rate	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Life expectancy at birth											
males	75.4	75.6	76.5	77.4	78.3	79.1	79.7	80.3	80.8	81.2	81.6
females	81.5	81.7	82.5	83.3	84.0	84.7	85.2	85.6	86.0	86.3	86.6
Life expectancy at 65											
males	15.9	16.0	16.6	17.2	17.7	18.2	18.7	19.0	19.4	19.6	19.9
females	19.5	19.6	20.2	20.8	21.3	21.8	22.2	22.5	22.8	23.0	23.3
Net migration	1.3	1.3	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9
Net migration as % of population	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Population (million)	456.8	458.4	464.2	467.8	470.2	471.4	471.2	469.4	465.9	460.6	453.8
Population aged 0-14 as % of total	16.4	16.2	15.5	15.2	14.9	14.5	14.1	13.8	13.6	13.5	13.5
Prime age population (25-54) as % of total	43.2	43.1	42.7	41.8	40.3	38.5	37.1	36.2	35.5	34.9	34.7
Working age population (15-64) as % of total	67.2	67.1	66.9	65.8	64.5	63.1	61.5	59.9	58.6	57.8	57.1
Elderly population aged 65+ as % of total	16.5	16.7	17.6	19.0	20.6	22.4	24.4	26.4	27.8	28.7	29.4
Very elderly population aged 80 and over as % of total	4.0	4.1	4.7	5.2	5.8	6.3	7.1	8.0	9.0	10.1	11.0
Elderly population aged 55+ as % of working age pop.15-64	299.8	302.2	314.3	334.5	357.6	380.8	402.0	419.5	432.7	439.9	441.5
Macroeconomic assumptions											
Real GDP (growth rate)	2.1	2.1	2.7	2.3	1.9	1.6	1.3	1.2	1.2	1.2	1.2
Labour input (growth rate)	0.8	0.7	0.9	0.3	-0.2	-0.3	-0.6	-0.6	-0.5	-0.5	-0.5
Labour productivity (growth rate)	1.3	1.4	1.8	2.0	2.0	1.9	1.8	1.7	1.7	1.7	1.7
TFP (growth rate)	0.8	0.9	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.1
Capital deepening (contribution to labour productivity growth)	0.5	0.5	0.6	0.7	0.8	0.7	0.6	0.6	0.6	0.6	0.6
GDP per capita (growth rate)	1.7	1.9	2.5	2.2	1.8	1.6	1.3	1.3	1.4	1.5	1.6
GDP in 2004 prices (in millions euros)	10247	10467	11828	13328	14691	15953	17084	18169	19368	20681	22068
GDP per worker	18.6	18.9	21.2	23.8	26.2	28.4	30.5	32.6	34.9	37.6	40.6
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Labour force assumptions											
Population growth (working age:15-64)		0.3	0.0	-0.3	-0.3	-0.4	-0.6	-0.6	-0.5	-0.5	-0.5
Labour force (thousands)	214506	216414	225401	228263	226895	222929	217420	211317	205876	200627	195527
Participation rate (15-64)	69.9	70.3	72.5	74.1	74.8	74.9	75.1	75.2	75.4	75.4	75.5
young (15-24)	46.3	46.6	47.8	48.2	47.4	47.3	47.3	47.6	48.0	48.1	48.0
prime-age (25-54)	83.7	84.1	86.1	87.4	88.1	88.5	88.7	88.7	88.7	88.7	88.7
older (55-64)	43.5	44.4	49.3	53.7	56.7	58.4	59.4	59.9	60.5	60.4	60.4
oldest (65-71)	7.8	8.0	8.8	10.2	10.2	10.5	10.9	10.9	11.1	11.2	11.1
Employment rate (15-64)	63.7	64.2	66.9	69.2	70.0	70.3	70.5	70.6	70.8	70.8	70.9
Employment rate (15-71)	58.7	59.1	61.6	63.2	63.3	63.2	62.8	62.5	62.7	62.8	62.8
Employment growth (15-64)		1.1	0.9	0.3	-0.2	-0.4	-0.6	-0.5	-0.5	-0.5	-0.5
Unemployment rate (15-64)	8.9	8.7	7.8	6.7	6.4	6.1	6.1	6.1	6.1	6.1	6.1
Dependency ratios:											
Share of older workers	10.4	10.7	12.5	14.2	16.0	17.4	17.9	17.8	17.9	17.9	17.8
Old-age dependency ratio (1)	24.5	24.9	26.2	28.8	31.9	35.4	39.7	44.1	47.4	49.7	51.4
Total dependency ratio (2)	48.9	48.9	49.1	51.3	54.3	57.6	61.7	66.2	69.9	72.6	74.8
Total economic dependency ratio	133.8	132.0	123.3	119.6	121.4	125.3	130.9	136.6	141.0	144.5	147.1
Economic old-age dependency ratio (15-64)	37.4	37.5	37.9	40.1	43.8	48.4	54.1	60.0	64.6	67.8	70.2
Economic old-age dependency ratio (15-71)	36.9	37.1	37.4	39.4	43.0	47.4	52.9	58.6	63.1	66.2	68.5

LEGENDA:

Share of older workers = Population aged 55 to 64 as % of population aged 15-64

Old-age dependency ratio (1) = Population aged 65 and over as a percentage of the population aged 15-64

Total dependency ratio (2) = Population under 15 and over 64 as a percentage of the population aged 15-64

Total economic dependency ratio= Total population less employed as % of employed population (15-64)

Economic old-age dependency ratio (15-64)=Inactive population aged 65+ as % of employed population (15-64)

Economic old-age dependency ratio (15-71)=Inactive population aged 65+ as % of employed population (15-71)

European Union (15 countries)

Main demographic and macroeconomic assumptions

(BASELINE SCENARIO)

Budgetary Projection: AWG variant population scenario

	2004	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Demographic assumptions											
Fertility rate	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Life expectancy at birth											
males	76.4	76.5	77.5	78.3	79.1	79.8	80.4	80.9	81.4	81.8	82.1
females	82.2	82.3	83.2	83.9	84.6	85.2	85.7	86.1	86.5	86.8	87.0
Life expectancy at 65											
males	16.3	16.5	17.0	17.6	18.1	18.6	19.0	19.3	19.6	19.9	20.2
females	19.9	20.0	20.6	21.2	21.7	22.2	22.6	22.9	23.2	23.4	23.6
Net migration	1.3	1.3	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Net migration as % of population	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Population (million)	382.7	384.3	390.8	395.2	398.4	400.2	400.6	399.7	397.5	393.6	388.3
Population aged 0-14 as % of total	16.3	16.2	15.7	15.4	15.0	14.5	14.1	13.8	13.7	13.6	13.6
Prime age population (25-54) as % of total	43.1	43.0	42.5	41.4	39.7	37.8	36.5	35.9	35.3	35.0	34.8
Working age population (15-64) as % of total	66.7	66.6	66.2	65.1	64.1	62.9	61.1	59.3	58.0	57.4	57.0
Elderly population aged 65+ as % of total	17.0	17.3	18.1	19.5	20.9	22.6	24.8	26.9	28.3	29.0	29.4
Very elderly population aged 80 and over as % of total	4.3	4.4	5.0	5.5	6.1	6.6	7.4	8.2	9.1	10.4	11.4
Elderly population aged 55+ as % of working age pop.15-64	256.7	259.3	271.2	288.2	307.8	328.1	347.4	363.1	374.0	378.0	377.1
Macroeconomic assumptions											
Real GDP (growth rate)	2.0	2.0	2.5	2.2	1.7	1.5	1.2	1.2	1.3	1.3	1.3
Labour input (growth rate)	1.0	0.9	0.8	0.3	-0.1	-0.4	-0.6	-0.5	-0.4	-0.4	-0.4
Labour productivity (growth rate)	1.0	1.1	1.7	1.9	1.9	1.8	1.7	1.7	1.7	1.7	1.7
TFP (growth rate)	0.7	0.8	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1
Capital deepening (contribution to labour productivity growth)	0.3	0.4	0.5	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6
GDP per capita (growth rate)	1.5	1.6	2.2	2.0	1.6	1.4	1.2	1.3	1.5	1.6	1.7
GDP in 2004 prices (in millions euros)	9772	9974	11211	12580	13820	14955	15968	16964	18107	19375	20719
GDP per worker	20.2	20.5	22.7	25.2	27.4	29.5	31.5	33.5	35.9	38.7	42.0
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Labour force assumptions											
Population growth (working age:15-64)		0.3	0.1	-0.2	-0.2	-0.4	-0.7	-0.6	-0.5	-0.4	-0.4
Labour force (thousands)	180443	182033	189477	192245	191766	188805	184170	179239	175392	171883	168393
Participation rate (15-64)	70.7	71.1	73.3	74.7	75.0	75.0	75.2	75.6	76.0	76.1	76.1
young (15-24)	48.7	48.8	49.8	49.8	49.0	49.0	49.2	49.5	49.8	49.8	49.6
prime-age (25-54)	83.7	84.1	86.1	87.2	87.9	88.3	88.5	88.6	88.6	88.6	88.6
older (55-64)	45.0	46.0	50.9	55.4	58.4	59.6	60.2	60.8	61.9	61.9	61.9
oldest (65-71)	7.9	8.2	9.1	10.5	10.5	10.9	11.2	11.1	11.3	11.5	11.5
Employment rate (15-64)	65.1	65.6	68.1	70.1	70.5	70.5	70.7	71.1	71.5	71.5	71.5
Employment rate (15-71)	59.9	60.3	62.6	64.0	63.9	63.5	62.8	62.6	63.2	63.6	63.6
Employment growth (15-64)		1.1	0.9	0.3	-0.2	-0.4	-0.6	-0.5	-0.4	-0.4	-0.4
Unemployment rate (15-64)	7.9	7.7	7.0	6.1	6.1	6.1	6.1	6.0	6.0	6.0	6.0
Dependency ratios:											
Share of older workers	10.9	11.2	12.7	14.4	16.6	18.3	18.5	17.8	17.7	17.7	17.6
Old-age dependency ratio (1)	25.5	25.9	27.4	29.9	32.6	35.9	40.5	45.4	48.8	50.5	51.6
Total dependency ratio (2)	49.8	50.0	50.8	52.9	55.4	58.2	62.6	67.8	71.8	73.9	75.3
Total economic dependency ratio	130.4	128.9	121.7	118.9	121.2	125.6	131.5	137.4	141.2	143.7	145.3
Economic old-age dependency ratio (15-64)	38.0	38.2	38.8	41.0	44.4	48.9	55.0	61.3	65.8	68.3	69.8
Economic old-age dependency ratio (15-71)	37.6	37.8	38.3	40.3	43.6	47.9	53.7	59.8	64.2	66.7	68.1

LEGENDA:

Share of older workers = Population aged 55 to 64 as % of population aged 15-64

Old-age dependency ratio (1) = Population aged 65 and over as a percentage of the population aged 15-64

Total dependency ratio (2) = Population under 15 and over 64 as a percentage of the population aged 15-64

Total economic dependency ratio= Total population less employed as % of employed population (15-64)

Economic old-age dependency ratio (15-64)=Inactive population aged 65+ as % of employed population (15-64)

Economic old-age dependency ratio (15-71)=Inactive population aged 65+ as % of employed population (15-71)

Euro area

Main demographic and macroeconomic assumptions

(BASELINE SCENARIO)

Budgetary Projection: AWG variant population scenario

	2004	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Demographic assumptions											
Fertility rate	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Life expectancy at birth											
males	76.3	76.5	77.4	78.3	79.1	79.8	80.3	80.9	81.3	81.7	82.1
females	82.5	82.6	83.4	84.2	84.8	85.4	85.9	86.3	86.6	86.9	87.2
Life expectancy at 65											
males	16.4	16.5	17.1	17.6	18.1	18.6	19.0	19.3	19.6	19.9	20.1
females	20.1	20.2	20.8	21.4	21.9	22.4	22.7	23.0	23.3	23.5	23.7
Net migration	1.2	1.1	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Net migration as % of population	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Population (million)	308.6	310.0	315.2	318.4	320.3	321.0	320.8	319.5	317.2	313.5	308.4
Population aged 0-14 as % of total	15.8	15.7	15.3	15.1	14.6	14.1	13.7	13.4	13.3	13.3	13.2
Prime age population (25-54) as % of total	43.5	43.4	42.8	41.7	39.7	37.7	36.4	35.6	35.0	34.7	34.6
Working age population (15-64) as % of total	66.9	66.7	66.2	65.2	64.2	62.9	61.1	59.1	57.7	56.9	56.5
Elderly population aged 65+ as % of total	17.3	17.5	18.5	19.7	21.2	22.9	25.2	27.5	29.0	29.8	30.3
Very elderly population aged 80 and over as % of total	4.2	4.3	5.0	5.7	6.3	6.7	7.5	8.4	9.4	10.7	11.8
Elderly population aged 55+ as % of working age pop.15-64	204.9	207.3	218.5	232.5	247.9	263.9	279.5	293.2	303.0	306.3	304.3
Macroeconomic assumptions											
Real GDP (growth rate)	1.9	1.9	2.4	2.1	1.6	1.4	1.1	1.1	1.2	1.2	1.3
Labour input (growth rate)	1.1	0.9	0.9	0.3	-0.2	-0.4	-0.6	-0.6	-0.5	-0.5	-0.4
Labour productivity (growth rate)	0.8	0.9	1.5	1.7	1.8	1.8	1.7	1.7	1.7	1.7	1.7
TFP (growth rate)	0.6	0.6	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Capital deepening (contribution to labour productivity growth)	0.2	0.3	0.4	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6
GDP per capita (growth rate)	1.3	1.5	2.1	1.9	1.6	1.4	1.2	1.2	1.4	1.5	1.7
GDP in 2004 prices (in millions euros)	7592	7738	8644	9650	10538	11345	12084	12792	13587	14464	15426
GDP per worker	19.9	20.2	22.2	24.5	26.7	28.6	30.5	32.4	34.6	37.3	40.4
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Labour force assumptions											
Population growth (working age:15-64)		0.2	0.0	-0.2	-0.2	-0.5	-0.7	-0.7	-0.6	-0.5	-0.4
Labour force (thousands)	143477	144787	151055	153237	152666	149912	145879	141462	137789	134356	131250
Participation rate (15-64)	69.5	70.0	72.4	73.8	74.2	74.2	74.4	74.9	75.2	75.3	75.3
young (15-24)	45.3	45.4	46.0	45.8	45.1	45.2	45.4	45.7	45.9	45.8	45.6
prime-age (25-54)	83.5	83.9	86.1	87.3	88.1	88.5	88.8	88.8	88.8	88.8	88.8
older (55-64)	41.3	42.5	48.4	53.4	56.8	58.2	59.1	59.8	60.7	60.6	60.5
oldest (65-71)	6.4	6.7	7.6	9.2	9.3	9.8	10.1	10.1	10.3	10.6	10.4
Employment rate (15-64)	63.4	64.0	66.9	69.0	69.4	69.4	69.6	70.0	70.4	70.4	70.5
Employment rate (15-71)	58.1	58.6	61.2	63.0	62.8	62.3	61.7	61.4	61.9	62.3	62.4
Employment growth (15-64)		1.1	0.9	0.3	-0.2	-0.4	-0.6	-0.6	-0.5	-0.5	-0.4
Unemployment rate (15-64)	8.7	8.5	7.6	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4
Dependency ratios:											
Share of older workers	10.1	10.3	12.2	14.2	16.6	18.3	18.6	18.1	18.0	17.8	17.4
Old-age dependency ratio (1)	25.8	26.3	27.9	30.2	33.0	36.5	41.3	46.4	50.2	52.4	53.6
Total dependency ratio (2)	49.2	49.5	50.7	52.8	55.3	58.1	62.6	68.0	72.5	75.2	76.9
Total economic dependency ratio	135.6	134.0	125.8	122.2	124.3	128.9	135.0	141.4	146.1	149.3	151.1
Economic old-age dependency ratio (15-64)	39.7	39.9	40.5	42.3	45.8	50.6	57.1	63.9	68.9	72.0	73.8
Economic old-age dependency ratio (15-71)	39.3	39.5	40.0	41.7	45.1	49.7	55.8	62.4	67.3	70.4	72.1

LEGENDA:

Share of older workers = Population aged 55 to 64 as % of population aged 15-64

Old-age dependency ratio (1) = Population aged 65 and over as a percentage of the population aged 15-64

Total dependency ratio (2) = Population under 15 and over 64 as a percentage of the population aged 15-64

Total economic dependency ratio= Total population less employed as % of employed population (15-64)

Economic old-age dependency ratio (15-64)=Inactive population aged 65+ as % of employed population (15-64)

Economic old-age dependency ratio (15-71)=Inactive population aged 65+ as % of employed population (15-71)

European Union (10 countries)

Main demographic and macroeconomic assumptions

(BASELINE SCENARIO)

Budgetary Projection: AWG variant population scenario

	2004	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Demographic assumptions											
Fertility rate	1.2	1.2	1.2	1.3	1.4	1.5	1.6	1.6	1.6	1.6	1.6
Life expectancy at birth											
males	70.1	70.4	71.6	72.8	74.0	75.2	76.2	77.0	77.6	78.2	78.7
females	78.2	78.4	79.2	80.1	80.9	81.7	82.4	83.0	83.4	83.8	84.1
Life expectancy at 65											
males	13.5	13.7	14.3	14.9	15.6	16.3	17.0	17.5	17.9	18.2	18.5
females	17.2	17.3	17.8	18.4	19.0	19.5	20.0	20.4	20.7	21.0	21.2
Net migration	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Net migration as % of population	0.0	0.0	0.0	-0.1	0.0	0.1	0.2	0.2	0.2	0.2	0.2
Population (million)	74.1	74.0	73.4	72.6	71.8	71.3	70.6	69.7	68.4	67.0	65.5
Population aged 0-14 as % of total	16.7	16.2	14.6	14.3	14.5	14.4	14.0	13.3	12.9	12.9	13.2
Prime age population (25-54) as % of total	43.7	43.8	44.0	43.6	43.4	42.5	40.7	38.2	36.1	34.6	33.8
Working age population (15-64) as % of total	69.7	70.0	71.0	69.5	66.8	64.5	63.5	63.2	62.1	60.0	57.7
Elderly population aged 65+ as % of total	13.6	13.8	14.5	16.2	18.8	21.1	22.5	23.5	25.0	27.1	29.1
Very elderly population aged 80 and over as % of total	2.6	2.8	3.4	3.9	4.3	4.6	5.6	7.2	8.4	8.6	8.7
Elderly population aged 55+ as % of working age pop.15-64	43.4	43.2	43.6	46.6	50.0	52.8	54.8	56.7	59.0	61.9	64.3
Macroeconomic assumptions											
Real GDP (growth rate)	4.8	4.4	4.6	3.5	2.9	2.7	2.1	1.1	0.7	0.6	0.6
Labour input (growth rate)	1.0	1.0	1.0	0.1	-0.2	-0.2	-0.6	-0.8	-1.1	-1.2	-1.1
Labour productivity (growth rate)	3.8	3.5	3.7	3.4	3.1	2.9	2.7	1.9	1.9	1.8	1.7
TFP (growth rate)	1.9	1.9	2.0	1.8	1.8	1.8	1.7	1.3	1.2	1.1	1.1
Capital deepening (contribution to labour productivity growth)	1.9	1.5	1.6	1.5	1.3	1.1	0.9	0.7	0.7	0.6	0.6
GDP per capita (growth rate)	3.7	4.0	4.8	3.7	3.1	2.8	2.3	1.4	1.1	1.1	1.1
GDP in 2004 prices (in millions euros)	475	493	617	748	871	998	1116	1205	1261	1306	1349
GDP per worker	10.1	10.5	13.3	16.3	19.3	22.3	25.1	27.5	29.3	30.9	32.6
Real interest rate	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Labour force assumptions											
Population growth (working age:15-64)		0.3	-0.1	-0.9	-1.0	-0.7	-0.4	-0.4	-0.9	-1.2	-1.3
Labour force (thousands)	34063	34382	35925	36018	35129	34124	33249	32077	30484	28744	27134
Participation rate (15-64)	65.9	66.4	69.0	71.4	73.2	74.3	74.1	72.9	71.7	71.5	71.8
young (15-24)	36.9	37.4	39.0	40.1	38.2	36.9	36.5	37.0	37.8	38.3	37.9
prime-age (25-54)	83.7	84.2	86.6	88.4	89.3	89.7	89.8	89.4	89.2	89.2	89.4
older (55-64)	34.9	35.3	41.7	45.1	47.4	50.3	53.9	55.0	53.7	53.1	52.8
oldest (65-71)	7.1	7.0	7.1	8.7	8.4	8.6	8.8	9.3	9.9	9.6	9.5
Employment rate (15-64)	56.6	57.2	60.7	64.2	67.2	69.4	69.2	68.1	67.0	66.8	67.1
Employment rate (15-71)	52.8	53.3	56.6	59.1	60.4	61.9	62.3	61.6	59.9	58.5	58.1
Employment growth (15-64)		1.2	1.0	0.1	-0.2	-0.2	-0.6	-0.8	-1.1	-1.2	-1.1
Unemployment rate (15-64)	14.1	13.8	12.0	10.0	8.3	6.6	6.6	6.6	6.6	6.6	6.6
Dependency ratios:											
Share of older workers	7.9	8.2	11.1	12.9	12.9	12.9	14.7	17.5	18.9	19.1	18.4
Old-age dependency ratio (1)	19.6	19.7	20.4	23.3	28.1	32.7	35.4	37.1	40.2	45.2	50.4
Total dependency ratio (2)	:	:	:	:	:	:	:	:	:	:	:
Total economic dependency ratio	153.4	149.9	132.1	124.0	122.9	123.6	127.4	132.5	140.3	149.5	158.2
Economic old-age dependency ratio (15-64)	33.5	33.5	32.7	34.9	40.2	45.5	49.5	52.9	58.0	65.2	72.6
Economic old-age dependency ratio (15-71)	33.2	33.2	32.4	34.5	39.6	44.7	48.7	52.0	56.8	63.6	70.7

LEGENDA:

Share of older workers = Population aged 55 to 64 as % of population aged 15-64

Old-age dependency ratio (1) = Population aged 65 and over as a percentage of the population aged 15-64

Total dependency ratio (2) = Population under 15 and over 64 as a percentage of the population aged 15-64

Total economic dependency ratio= Total population less employed as % of employed population (15-64)

Economic old-age dependency ratio (15-64)=Inactive population aged 65+ as % of employed population (15-64)

Economic old-age dependency ratio (15-71)=Inactive population aged 65+ as % of employed population (15-71)