

ARTICLES

DEMOGRAPHIC CHANGE IN THE EURO AREA: PROJECTIONS AND CONSEQUENCES



Projected demographic dynamics for the euro area, as for many other industrialised economies, are characterised by decreasing total and working age population growth and a gradual, but dramatic, ageing of the population. These projected developments are generally the result of low fertility rates combined with increasing life expectancy and will have a deep and wide-ranging impact on the euro area economy. This article first presents the key characteristics of the most recent demographic projections prepared by Eurostat. It then provides an assessment of the possible consequences of the projected demographic developments for economic growth, labour markets, public finances and financial markets in the euro area over the medium to long term. Finally, the article describes the possible implications for monetary policy and underlines the critical need for structural reform to help offset the negative effects of demographic change in the euro area.

I INTRODUCTION

In the euro area, low fertility rates imply that population growth is slowing down. Indeed, in around 20 years, the total population of the euro area is expected to start to shrink in absolute terms. Furthermore, the proportion of older people in the population is projected to keep increasing, and after 2020 there will be one person older than 64 for every three people in the working age population. Taken together, these developments will have important consequences. For example, the composition of labour supply will change as the proportion of older workers increases and total labour supply may even fall as the working age population shrinks. This may exert downward pressure on average real GDP growth and real GDP-per-capita growth, with significant consequences for pay-as-you-go (PAYG) pension and health care systems. Population ageing may also prompt changes in the savings/investment balance of households, with possible implications, for example, for asset prices and capital flows.

The aim of this article is to outline the key characteristics of the projected demographic changes in the euro area and to provide an assessment of their possible economic impact. The article includes a preliminary assessment of the possible implications for monetary policy and underlines the important role of structural reform in helping to counteract the adverse effects of ageing populations. The main analysis undertaken considers the current 12 Member State composition of the euro area. Although the euro area is likely to enlarge before the end of 2050 (the time horizon considered), it is uncertain to what extent.

Moreover, the analysis below discusses a number of policy scenarios, although it is likely that some important policy changes will be introduced before 2050 which cannot be fully anticipated. The analysis presented in this article therefore aims to present an illustration of the possible future macroeconomic developments for the current euro area in the face of demographic change.

The remainder of this article is organised as follows. Section 2 reviews Eurostat's most recent demographic projections and their underlying assumptions for the euro area. These are compared with the demographic projections published by the United Nations (UN) for the United States. Section 3 uses a growth accounting framework to discuss the implications of the projected future population trends for economic growth in the euro area. The impact that an ageing population could have on public expenditures, particularly on pension and health care systems, is examined in Section 4. Section 5 discusses the linkages between population dynamics and financial market developments. A box provides a preliminary assessment of the possible implications for monetary policy. Section 6 outlines the role of structural reform in helping to compensate for some of the negative effects of the projected demographic changes in the euro area. Finally, Section 7 concludes.

2 DEMOGRAPHIC PROJECTIONS

Demographic projections from Eurostat point to a gradual decline in total population growth

in the euro area (similar to that in the EU) over the period up until 2050.¹ This decline is not balanced across age groups, but mainly reflects lower growth in the working age population (for simplicity defined here as persons aged 15 to 64, although in a number of countries policy initiatives are under way to increase the retirement age), the size of which is projected to start to decline after 2012 (see Chart 1). At the same time, the number of persons not of working age is expected to continue to increase. These two developments imply, ceteris paribus, a gradual rise in the overall dependency ratio (defined as the ratio of those people below 15 and above 64 to those of working age) in the euro area, which is projected to increase from the current levels of about 50% to levels close to 80% by 2050.

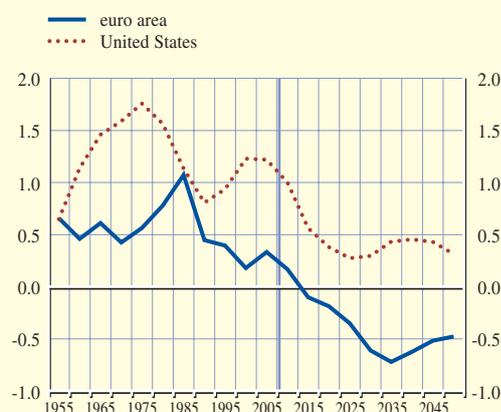
The rise in the overall dependency ratio is mainly due to a rise in the old age dependency ratio (defined as the ratio of those people older than 64 to those of working age), which is projected to continue to increase from the current level of about 26% to a level close to 55% by 2050 (see Chart 2). By contrast, after

having declined gradually from almost 40% in 1970, the young age dependency ratio (defined as the ratio of those people below 15 to those of working age) is expected to stabilise at current levels close to 24%.

Within this aggregate picture for the euro area, there are some significant differences in the magnitude and pace of demographic change for individual euro area countries. The key demographic developments over the period up until 2050 are summarised for individual euro area countries in Table 1. This shows that for some countries, such as Germany and Italy, sharp decreases in the total, youth and working age populations are projected, while some smaller countries, such as Ireland and Luxembourg, are expected to experience

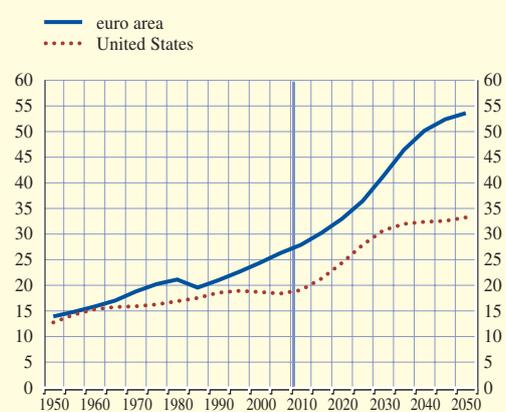
1 For the euro area, the main reference projections adopted are those prepared by Eurostat for the Ageing Working Group (AWG) of the Economic Policy Committee (EPC) of the EU and released in February 2006. For details of methodological aspects and underlying assumptions, see European Commission and Economic Policy Committee, "The 2005 EPC projections of age-related expenditure (2004-2050) for the EU25 Member States: underlying assumptions and projection methodologies" in European Economy Special Report 4/2005.

Chart 1 Working age population growth in the euro area and the United States – historical developments and projections
(average annual changes; percentages)



Sources: ECB calculations based on Eurostat and UN data.
Notes: The working age population is defined as the population aged between 15 and 64. The growth rate is the average annual rate of change calculated over five-year periods ending in the year indicated.

Chart 2 Old age dependency ratio in the euro area and the United States – historical developments and projections
(percentages)



Sources: ECB calculations based on Eurostat and UN data.
Note: The old age dependency ratio is defined as the number of persons aged 65 and above as a percentage of the working age population.

Table 1 Summary of aggregate population changes for euro area countries

(percentage change in levels; percentage point change in ratios)

	Total population	Young population (aged 0-14)	Working age population (aged 15-64)	Older population (aged 65 and over)	Old age dependency ratio	Young age dependency ratio
	% change from 2004 to 2050				Change in percentage points from 2004 to 2050	
Belgium	4	-11	-8	67	21	-1
Germany	-6	-22	-19	57	25	-1
Greece	-3	-18	-21	80	34	1
Spain	2	-19	-21	111	41	1
France	9	-7	-4	77	21	-1
Ireland	36	4	16	219	29	-2
Italy	-7	-25	-24	64	33	0
Luxembourg	42	26	30	124	15	-1
Netherlands	8	-9	-4	91	20	-1
Austria	1	-24	-15	95	30	-2
Portugal	-4	-21	-22	83	34	1
Finland	0	-14	-14	73	23	1
Euro area	0	-17	-16	75	28	0
United States	34	10	24	124	15	-4

Sources: ECB calculations based on Eurostat and UN data.

population gains. Generally speaking, relatively high (Ireland) or increasing (Luxembourg) fertility rates are the reason for these latter trends. However, one trend is common to all euro area countries, namely the expected significant rise in the population aged 65 and over and therefore a significant rise in the old age dependency ratio.

Projected demographic developments for the United States are different to those for the euro area in several respects (see Charts 1 and 2).² First, working age population growth is projected to decline gradually, but not to turn negative in the United States, falling from the current levels of about 1% per annum to about 0.5% per annum after 2020. Second, the dependency ratio is expected to increase in the United States overall, as in the euro area, but from around 50% to levels close to 60% after 2030. Similar to the euro area, developments for the United States result from divergent patterns in age-specific dependency ratios: the young age dependency ratio is anticipated to marginally decline, while the old age dependency ratio is expected to increase. However, the increase in the old age dependency ratio in the United States is projected to be significantly smaller than that in the euro area. Thus, the

main difference between the euro area and the United States is that, while both areas face a process of gradual ageing, in the euro area it is more dramatic.

The different projected demographic patterns between the euro area and the United States result from clear differences in all of the main underlying assumptions which govern the expected future developments in fertility, life expectancy and migration. Specifically, the fertility rate (defined as the average number of births per woman) is assumed to remain broadly unchanged at the current low level of about 1.5 children per woman (below the replacement rate of 2.1 children per woman) in the euro area. In the United States, fertility (currently at about 2.0 children per woman) is projected to remain significantly higher than in the euro area, although with a slight decrease over the coming decade (to 1.9 children per woman). Life expectancy at birth (defined as the average number of years a person can expect to live at birth, given the prevailing mortality rates in that area and period) is assumed to

² For the United States, the main reference demographic projections are the medium variant projections published by the UN (the UN's World Population Database, 2004 revision, published in February 2005).

increase over the projection period in both the euro area and the United States (by about six years for men and five years for women in the euro area). At the same time, life expectancy in the euro area is expected to remain above that of the United States. Net inward migration rates (defined as the number of immigrants minus the number of emigrants, for every 1,000 people of the total population) are assumed to slow down, but to remain positive, in both areas. However, in the United States, the net migration rate (projected to decline from 4.0 on average in the period 2000-2005 to about 2.8 in the period 2045-2050) is assumed to remain well above levels in the euro area (where a decline in the net migration rate is projected from a historically high level of almost 4.0 on average in the period 2000-2005 – due mainly to recent migration policy developments in Spain – to about 1.9 in the period 2045-2050). The different net migration rates across economic areas may also contribute to the difference in projected fertility rates and dependency ratios, since migrants tend to be young with higher average fertility.

Needless to say, demographic projections are uncertain. They are based on assumptions which may imprecisely capture future changes. Moreover, the policy stance of several countries, for example regarding migration, may change over time, making past projections obsolete. In the past, projection errors for demographic factors have been substantial, especially over long horizons.³ Nevertheless, these errors tend to affect mainly the magnitude of the projected changes, rather than the anticipated general patterns themselves, which are consistent across different projection sources.

3 IMPACT ON REAL GDP GROWTH AND LABOUR MARKETS

It is difficult to quantify the potential impact of demographic change on labour markets and economic growth. Estimations of this impact are based on a number of assumptions which cannot fully capture the likely interactions

among individual components of growth. Therefore, the simulations presented within this section should be interpreted with some degree of caution. Nevertheless, they represent a useful reference point for policy discussions on the impact of demographic change.

From an accounting perspective, real GDP-per-capita growth can be seen as resulting from increases in labour productivity (defined here as output per person employed), labour utilisation (defined here as the ratio of the number of persons employed to the working age population) and demographic factors, which are captured by the evolution of the various age groups of the population. Table 2 reports four simulations of the impact of alternative labour market developments and the demographic projections on real GDP growth and real GDP-per-capita growth in the euro area.

Among the alternative scenarios considered, Scenario 1 presents a baseline for the growth impact of the demographic projections, based on the assumptions of unchanged labour productivity growth, unchanged labour utilisation growth (which are both assumed to grow in line with the recent averages presented in row 1 of Table 2) and an unchanged retirement age. Even in the event that no substantial reforms are undertaken in labour markets or pension and health care systems, these assumptions appear optimistic in the medium run, since labour utilisation components could reach their natural limits (corresponding for example to the frictional level of the unemployment rate and the upper ceiling of 100% for the participation rate) towards the end of the time horizon considered.

Given the uncertainty that surrounds projections for labour productivity and labour utilisation growth, an alternative Scenario 2 calculates the growth impact of Eurostat's demographic projections, this time incorporating the assumptions for labour productivity and labour

³ See the evidence reported in A. Maddaloni et al., "Macroeconomic implications of demographic developments in the euro area", ECB Occasional Paper No 51, August 2006.

Table 2 Alternative scenarios for the impact of projected demographic developments on euro area economic growth

(average annual changes; percentages)

	Labour productivity	Labour utilisation	Working age population	Real GDP	Total population	Real GDP per capita
Past developments (1995-2005 average)						
1995-2005	1.0	0.8	0.3	2.1	0.4	1.7
Scenario 1: labour productivity and labour utilisation grow in line with 1995-2005 average						
2005-2010	1.0	0.8	0.2	2.0	0.4	1.6
2011-2030	1.0	0.8	-0.3	1.5	0.1	1.4
2031-2050	1.0	0.8	-0.6	1.2	-0.2	1.4
Scenario 2: projections by the European Commission ¹⁾						
2005-2010	1.1	0.8	0.2	2.1	0.4	1.7
2011-2030	1.8	0.2	-0.3	1.7	0.1	1.6
2031-2050	1.7	0.1	-0.6	1.2	-0.2	1.4
Scenario 3: requirements for labour productivity growth to keep real GDP-per-capita growth at 1995-2005 average						
2005-2010	1.0	0.8	0.2	2.1	0.4	1.7
2011-2030	1.3	0.8	-0.3	1.8	0.1	1.7
2031-2050	1.3	0.8	-0.6	1.5	-0.2	1.7
Scenario 4: requirements for labour utilisation growth to keep real GDP-per-capita growth at 1995-2005 average						
2005-2010	1.0	0.9	0.2	2.1	0.4	1.7
2011-2030	1.0	1.1	-0.3	1.8	0.1	1.7
2031-2050	1.0	1.1	-0.6	1.5	-0.2	1.7

Sources: ECB calculations based on Eurostat and European Commission data.

Notes: Labour productivity is measured in terms of output per person employed. Labour utilisation is measured in terms of the number of persons employed per head of the working age population (which is defined as the population aged 15 to 64).

1) See the main text on Scenario 2 below.

utilisation growth developed recently by the European Commission.⁴ These assumptions imply that labour productivity growth in the euro area will increase from its current level of 1.0% to 1.7% over the forecast horizon (see column 1 in Scenario 2) and that growth in labour utilisation will decrease from 0.8% to 0.1% due to changes in the size and composition of labour supply over the same period (see column 2 in Scenario 2). These assumptions therefore present a more optimistic projection for labour productivity growth (particularly given that the last three decades have seen a gradual decline in euro area labour productivity) and a more pessimistic projection for labour utilisation growth than Scenario 1.

The result of Scenario 1 predicts that annual average real GDP growth will decline from 2.0% in the period 2005-2010 to 1.5% in the period 2011-2030, and to 1.2% in the period 2031-2050. The outcome of Scenario 2 shows slightly higher economic growth in the medium term, but identical long-term developments. In both scenarios, real GDP-per-capita growth

would also gradually decline, from the recent average levels of about 1.7% to about 1.4% by 2050.

Scenarios 3 and 4 show developments that would avoid significant declines in the average pace of economic activity through the implementation of far-reaching measures to increase labour productivity and/or labour utilisation components. Table 2 reports the average changes in each of these components that would be needed to keep real GDP-per-capita growth at the average observed during the 1995-2005 period (assuming that other output growth components remain unchanged at their 1995-2005 average). It shows for example that if labour utilisation continues to grow at its current rate of 0.8% per year (Scenario 3), average annual labour productivity growth would have to increase to about 1.3% over the whole projection horizon. This would imply the need for a significant increase in the

4 See G. Carone et al., "The economic impact of ageing populations in the EU25 Member States", European Commission Economic Papers No 236, December 2005.

implementation of structural reforms to support labour productivity and improvements in the macroeconomic environment. Alternatively, if labour productivity growth were to remain at its current level of 1% (Scenario 4), labour utilisation growth would have to increase gradually from its current level of 0.8% to about 1.1% by the end of the projection horizon. Although further improvements in labour utilisation are possible, its natural limits (namely when all of the working age population is actively working) could be reached well before 2050. This would imply the necessity to extend working lives, e.g. through increases in the retirement age and/or average annual hours of work, in the medium to long run. Moreover, even if real GDP-per-capita growth rates are maintained, real GDP growth could decrease significantly over time.

All in all, the qualitative conclusions of the simulations are very similar. Namely, unless structural policy changes which increase both labour utilisation and labour productivity are stepped up significantly, projected demographic developments are likely to imply a significantly lower trend potential output growth (and also a lower trend potential output growth per capita) for the euro area over the medium to long term.

4 EFFECTS ON PUBLIC FINANCES

Population ageing will put pressure on public finances by driving up ageing-related expenditure as the ratio of the number of recipients to the number of contributors rises. The most important expenditure effects are projected for public pension systems and for spending on health and long-term care. A report by the EPC's Ageing Working Group and the European Commission⁵ provides projections by national institutions on the effect of demographic change on a number of areas of public expenditure, including pensions, health care, long-term care, education and unemployment benefits. These projections are based on commonly agreed assumptions regarding the future behaviour of demographic and key

macroeconomic variables and the application of national models for the projection of pension system developments. They reflect only enacted legislation, which may take account of any provisions to come into force over time, but not possible future policy changes. The projections are summarised in Table 3 and discussed in turn below.

Regarding the effects of demographic change on pension systems, most public pension systems in Europe are based on the PAYG principle whereby current contributions finance current expenditure. The rising number of pensioners will put these systems under considerable strain as a diminishing number of workers has to provide the pension benefits for a growing number of retirees. The Commission study calculates that demographic change will cause a cumulative increase of more than 3 percentage points in pensions expenditure as a percentage of GDP for most euro area countries, with particularly large increases for Spain, Luxembourg and Portugal over the projection period (see Table 3). Furthermore, this report shows that pensions expenditure will rise rapidly in the two decades after 2010.

While these projections give a useful quantitative indication of upcoming pressures on pension systems, uncertainty remains regarding the actual effects, which could be even larger. In particular, the projections are based on favourable assumptions regarding the development of future labour productivity (the same as in Scenario 2 in Section 3) which may not materialise, especially if necessary structural reforms are not undertaken. In addition, there is a risk that once the concrete effects of already approved pension reforms start to be felt, political pressure to reverse these sustainability-improving reforms may increase. Moreover, the underlying scenarios may not adequately reflect the negative impact

5 Economic Policy Committee and European Commission, "The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050)", European Economy Special Report 1/2006.

Table 3 Projected impact of ageing populations on public expenditures

(percentage points; changes from 2004 to 2030 and 2050 in expenditure as a percentage of GDP)

	Pensions		Health care		Long-term care		Unemployment benefits		Education		Total of all available items	
	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050
Belgium	4.3	5.1	0.9	1.4	0.4	1.0	-0.5	-0.5	-0.6	-0.7	4.5	6.3
Germany	0.9	1.7	0.9	1.2	0.4	1.0	-0.4	-0.4	-0.8	-0.9	1.0	2.7
Greece ¹⁾			0.8	1.7			-0.1	-0.1	-0.5	-0.4		
Spain	3.3	7.1	1.2	2.2	0.0	0.2	-0.4	-0.4	-0.7	-0.6	3.3	8.5
France ²⁾	1.5	2.0	1.2	1.8			-0.3	-0.3	-0.5	-0.5	1.9	2.9
Ireland	3.1	6.4	1.2	2.0	0.1	0.6	-0.2	-0.2	-0.9	-1.0	3.3	7.8
Italy	0.8	0.4	0.9	1.3	0.2	0.7	0.1	-0.1	-0.8	-0.6	1.0	1.7
Luxembourg	5.0	7.4	0.8	1.2	0.2	0.6	-0.0	-0.1	-0.5	-0.9	5.4	8.2
Netherlands	2.9	3.5	1.0	1.3	0.3	0.6	-0.2	-0.2	-0.2	-0.2	3.8	5.0
Austria	0.6	-1.2	1.0	1.6	0.3	0.9	-0.1	-0.1	-0.9	-1.0	0.9	0.2
Portugal ²⁾	4.9	9.7	-0.1	0.5			-0.1	-0.1	-0.6	-0.4	4.1	9.7
Finland	3.3	3.1	1.1	1.4	1.2	1.8	-0.4	-0.4	-0.6	-0.7	4.7	5.2
Euro area	1.6	2.6	1.0	1.5	0.2	0.5	-0.3	-0.3	-0.7	-0.6	1.9	3.7

Source: Economic Policy Committee and European Commission (2006).

Notes: These figures refer to the baseline projections for social security spending on pensions, education and unemployment transfers.

For health care and long-term care, the projections refer to "Ageing Working Group reference scenarios".

1) Total expenditure is not reported due to missing data.

2) Total expenditure does not include long-term care.

on labour supply and capital formation resulting from the need to finance higher pension expenditure.

Public health care expenditure is also set to rise with population ageing since the demand for health services tends to increase with age. However, while developments in the area of pension systems can be predicted with some degree of accuracy by modelling the mechanics of pension systems, forecasts for health expenditure are more problematic. This is because the development of health expenditures reflects the interaction of demand for and supply of health-related goods and services, which themselves depend on multiple factors, including specific incentive effects resulting from market structures, insurance arrangements and government regulation/intervention. Furthermore, as the entitlement to publicly financed health services is less precisely defined than in the area of pensions, discretionary policy changes can have a larger short-term impact on expenditure, adding to the difficulties of making accurate long-term forecasts.

Against this background, projections of health care developments are generally based on a mechanistic approach. In a first step, health and long-term care expenditure profiles are defined by age and sex on the basis of current observations. In a second step, the derived age and gender-specific expenditure levels are matched to demographic projections to generate total future expenditures. In addition, assumptions are made regarding the health status of older people in the future, which have an important impact on the projected expenditure pressures. On the one hand, projections of people's health status suggest that people will not only live longer, but they will also do so in better overall health. On the other hand, some costly chronic diseases, such as dementia, appear to be related to biological age and thus their prevalence could increase strongly with rising longevity. The report by the EPC and the European Commission adopts an intermediate baseline assumption which predicts that increased longevity is split equally between good and bad health.

With these assumptions, the projected increases in public expenditure for health and long-term

care as a percentage of GDP amount to between 1 and 3 percentage points by 2050 for most countries (see Table 3). However, this approach leaves out other effects that may be important. For example, the income elasticity of demand for health care is assumed to converge to unity, while estimates point to higher values than in the past, i.e. health care expenditure has tended to rise faster than income. In this regard, it has also been shown that it is the demand for quality, i.e. relatively expensive new medical technologies, which is driving expenditure, rather than an increase in the volume of existing medical procedures. Empirical studies suggest that technological progress has significantly contributed to past expenditure increases.

Some effects could in part offset the expenditure-increasing impact of demographic ageing. For example, with a declining number of children, expenditure on public education and on family allowances could decline as a percentage of GDP. Such offsetting effects, if any, are likely to be small, amounting to less than 1 percentage point in most countries (see Table 3). However, it should be noted that, with increasingly scarce labour due to low fertility rates, there may be higher pressure on governments to invest in all forms of education, including in particular lifelong learning, so that any decline in education expenditures may be smaller than expected.

Finally, the EPC and European Commission study presents estimates for the impact of ageing on unemployment expenditures, again using a mechanistic approach (see Table 3). The numbers are based on the same labour market assumptions as discussed above and thus should be considered with caution, but suggest that expenditure on unemployment benefits in the euro area as a percentage of GDP would decrease by 0.3 percentage point by 2030 and 2050.

Overall, current projections of the ageing-induced fiscal burden signal a clear and imminent need for policy action. Pension, health care and long-term care arrangements need to be adjusted to ensure their viability in

the face of demographic ageing. Public finances need to be put on a sound financial footing and budgetary flexibility needs to be ensured to reduce the vulnerability of public finances. Time is running short as the fiscal effects of demographic ageing will start to be felt within the next decade. Moreover, the above projections may even underestimate the upcoming pressures, calling for additional prudence in fiscal policies. In this regard, a further refinement of the methods to assess the fiscal effects of demographic ageing is warranted.

5 THE IMPACT ON FINANCIAL MARKETS

Population ageing affects financial markets through developments related to three main channels. First, population ageing affects the savings/investment balance of households, with possible implications for countries' external balances. Second, population ageing has an impact on how savings are actually invested, since it is likely that people belonging to different generations make different choices concerning the assets included in their portfolio. Third, policy-makers of economies where population ageing is already under way, such as the euro area, will carry out pension reforms which might implicitly affect financial markets.

With regard to the first channel, people belonging to different generations tend to make different choices concerning the balance between consumption and investment; thus, changes in the relative share of older versus younger people in the population can result in different GDP shares of consumption and investment. The impact of demographic changes on the savings/investment balance has been extensively researched using dynamic models based on the assumption that households smooth consumption over their lifetime and that the life cycle savings pattern is hump-shaped. Households are assumed to have higher saving rates during their working lives in order to fund their consumption while in retirement. Young people fund high levels of current consumption, possibly borrowing against their

human capital. Based on these assumptions, dynamic models, calibrated to fit the current ageing distribution in most developed countries, suggest that there could be a minor reduction in the *equilibrium real* interest rate (the long-term rate which balances savings and investment) over the next few decades, assuming that the retirement age remains constant at the current level (see box).

The impact of population ageing on the consumption/savings ratio also has implications for external balances. Countries in which the population is characterised by a high old age dependency ratio tend to support current account deficits and net capital inflows,⁶ because a relatively large population of dependent old people tends to have relatively lower aggregate saving rates.⁷

Turning to the second channel, demographic changes can affect the asset allocation chosen by investors, and thus asset prices, as individuals belonging to different generations are likely to choose a different mixture of assets in terms of risk, since the time horizon of their investment differs. Pensioners tend to be more risk-averse, as they cannot hedge financial risks through their salaries.

A large part of savings is invested in financial assets. As a result, an extensive discussion in the financial economics literature is taking place concerning the argument that developed countries with a shrinking workforce could in theory face a fall in securities prices (the “asset meltdown” hypothesis) when the currently active workforce (the baby boom generation) retires. Downward pressure on securities prices could materialise because a large elderly generation will sell financial assets to a smaller-sized middle-aged generation.⁸ At the same time, a possible reallocation of financial portfolios towards less risky assets could result in upward pressure on the prices of these assets, e.g. government bonds, making the overall impact on prices uncertain.

In general, the available empirical evidence based on historical data provides some supportive evidence of a link between demographics and financial asset prices.⁹ In quantitative terms, however, these estimated relationships suggest relatively limited scope for any sizeable effect of demographic changes on financial asset prices.

In addition, shocks to the supply of and demand for domestic financial assets could be absorbed by foreign demand and thus the “meltdown” in asset prices may be cushioned by capital inflows in search of higher expected returns. Recent work has shed some light on the empirical relationship between population ageing and international capital flows.¹⁰ Net equity inflows tend to increase with an ageing population as foreign investors are attracted by higher expected returns due to lower domestic savings. Conversely, net inflows in debt instruments (short and long-term debt securities) are negatively associated with the old age dependency ratio. This may stem from an increased demand for fixed income instruments, such as global government bonds, as older households shift their portfolio allocation towards less risky assets. Overall, these results suggest that the likelihood of a significant

6 From the balance of payments identity, net aggregate capital flows (= net inflows in FDI + net equity inflows + net debt instrument inflows + other net capital inflows) are equal to the current account deficit.

7 M. Higgins, “Demography, national savings and international capital flows”, *International Economic Review*, 39, pp. 343-69, 1998.

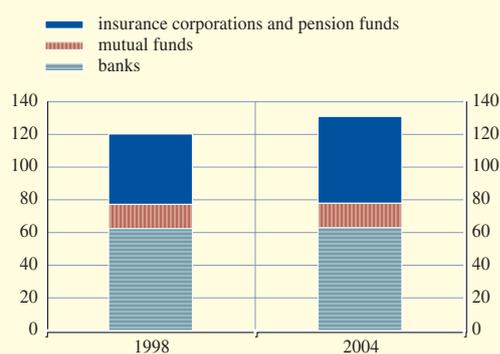
8 For a comprehensive analysis, see A. B. Abel, “Will bequests attenuate the predicted meltdown in stock prices when baby boomers retire?”, *Review of Economics and Statistics*, 83, pp. 589-95, 2001; A. B. Abel, “The effects of a baby boom on stock prices and capital accumulation in the presence of social security”, *Econometrica*, 71, pp. 551-78, 2003; and R. Brooks, “What will happen to financial markets when the baby boomers retire?”, IMF Working Paper No 00/18, 2000.

9 A. Ang and A. Maddaloni, “Do demographic changes affect risk premiums? Evidence from international data”, *Journal of Business*, 78, pp. 341-79, 2005, find that the change in the proportion of retired adults is a significant predictor of risk premia (see also E. P. Davis and C. Li, “Demographics and financial asset prices in the major industrial economies”, Brunel University Department of Economics and Finance Discussion Paper No 03-07, 2003).

10 R. A. De Santis and M. Lührmann, “On the determinants of external imbalances and net international portfolio flows: a global perspective”, ECB Working Paper No 651, 2006.

Chart 3 Allocation of financial assets to financial intermediaries by euro area households

(holdings as a percentage of GDP)



Source: ECB.

decline in equity prices when the current workforce generation retires is very low.

Third, savings are mostly channelled to the financial markets via financial intermediaries and in particular through pension funds. The rising percentage of households' savings invested in the capital markets by the baby boom generation has contributed to increasing market capitalisation in most developed countries. The value of financial assets held through financial intermediaries by euro area households was around 130% of GDP at the end of 2004, compared with 110% of GDP at the end of 1995.

The pension fund industry is largely underdeveloped in most euro area countries, notwithstanding a significant increase in the value of assets held by private pension schemes over the last few years. Euro area households have channelled more funds towards insurance corporations and pension funds than towards banks (i.e. monetary financial institutions) or mutual funds (i.e. other financial intermediaries) over the last few years (see Chart 3). However, there seems to be scope for additional growth, especially if ongoing pension reforms support a move towards fully or partially funded pension systems.

Looking ahead, the increase in the importance of institutional investors, particularly pension funds, raises financial stability concerns related to their ability to meet future pension obligations. These concerns have partly been addressed by stricter solvency requirements and by promoting the use of defined contribution plans.

Demographic developments are also having an impact on the financial instruments required by market participants. Pension fund managers already highlight the need for an increased supply of financial instruments aimed at managing market, inflation and longevity risks, such as long-term debt (of high quality and high liquidity) and inflation-indexed instruments.

Box

IMPLICATIONS OF DEMOGRAPHIC CHANGES FOR MONETARY POLICY

The general consequences of demographic changes on financial markets described in Section 5 entail some specific implications for central banks. This box develops the analysis of the main channels described in Section 5, including references to the relevant literature, to explore how monetary policy may be affected by demographic change.

The "slow burn" nature of demographic developments indicates that their effects on monetary policy are likely to be moderate.¹ Population ageing, per se, is not expected to create an economic environment where pronounced inflationary or deflationary pressures might suddenly appear. Therefore, substantial responses from central banks to cope with foreseeable changes

¹ C. Bean, "Global demographic change: some implications for central banks", Overview Panel, Federal Reserve Bank of Kansas City Annual Symposium, Jackson Hole, Wyoming, 2004.

in the demographic structure over the next decades are not to be foreseen. However, without reforms, productivity and labour supply growth might be undermined, while spending pressures related to public expenditure and social security systems would increase and higher taxes may exert additional pressures on prices and wages. Therefore, in the event that the necessary structural reforms are not undertaken, monetary policy may in certain episodes have to respond to higher inflationary pressures.

In general, central bankers should pay due attention to the impact of demographic factors, as the considerable persistence that characterises population developments could contribute to protracted changes in the way monetary policy decisions affect the economy. Moreover, financial markets may already be anticipating some of the effects of population ageing on asset prices, such as potential changes in the equilibrium real interest rate, which are of indisputable relevance for monetary policy-makers. Finally, an ageing society may not undertake sufficient structural reforms as the median voter becomes older, which implies that the central bank may have to operate within a relatively less flexible economic environment.

The following paragraphs briefly summarise some findings from the literature on the way demographic changes may affect a number of important central banking issues: (1) the equilibrium real interest rate; (2) the yield curve; (3) the monetary policy transmission mechanism; and (4) the demands on monetary policy in an ageing society.

1 The equilibrium real interest rate

Population ageing is expected to contribute to declines in both investment and saving rates over the next decades. This development leads to an ambiguous impact of ageing on the real interest rate: in models that assume a closed economy, if domestic investment falls below domestic savings (because ageing has made the production process more capital-intensive and the capital-to-labour ratio has risen, lowering the returns on investment), the real rate is predicted to fall, as it becomes difficult for savers to find profitable investment opportunities. Conversely, if domestic investment remains above domestic savings, the real rate would move upwards so as to reflect the relative scarcity of financial funds to undertake the available investment projects.

Researchers have used overlapping generation models, in which individuals are grouped into different age cohorts, in order to ascertain the consequences of ageing for the equilibrium real interest rate. In general, the evidence suggests that, in the absence of further reforms to the pension system, population ageing could contribute to a relatively minor reduction in the equilibrium real interest rate of 50-100 basis points over 25-50 years. For example, Miles (1999) simulates the effects of ageing in the EU, finding that demographic factors could lead to a fall in the real interest rate of around 50 basis points up to 2030, followed by a partial recovery after the passing of the baby boom generation. Batini, Callen and McKibbin (2006) estimated that ageing may contribute to a decline in the real interest rate in Europe of up to 100 basis points by 2050.²

2 D. Miles, "Modelling the impact of demographic change upon the economy", *Economic Journal*, 109, pp. 1-36, 1999, and N. Batini, T. Callen and W. McKibbin, "The global impact of demographic change", IMF Working Paper No 06/9, 2006. See also, among many others, P. Antolin, F. Gonand, C. de la Maisonneuve, J. Oliveira and K. Y. Yoo, "The impact of ageing on demand, factor markets and growth", OECD Economics Department Working Paper No 420, 2005; A. Börsch-Supan, A. Ludwig and J. K. Winter, "Ageing, pension reform, and capital flows: a multi-country simulation model", University of Mannheim Discussion Paper No 04-65, 2004; E. Canton, C. van Ewijk and P. J. G. Tang, "Population ageing and international capital flows", European Network of Economic Policy Research Institutes, Occasional Paper No 4, 2003; and A. De Serres, C. Giorno, P. Richardson, D. Turner and A. Vourc'h, "The macroeconomic implications of ageing in a global context", OECD Economics Department Working Paper No 193, 1998.

2 The yield curve

According to the expectations hypothesis of the term structure of interest rates, the equilibrium real interest rate that market participants anticipate to prevail in the long run is one of the key factors determining the level of rates at the long end of the yield curve. When the equilibrium real interest rate is expected to fall moderately due to population ageing, the long end of the yield curve could also experience a decline from the moment such expectations are priced into bonds.

The magnitude of such an effect on the yield curve depends on two factors. The first is the size of the reduction in the equilibrium rate, which is influenced by the speed of demographic change: larger changes in the equilibrium rate are likely to be accompanied by more pronounced variations in long-term rates. The second factor is the degree of forward-lookingness of financial markets: if markets are sufficiently forward-looking, they would be able to anticipate the expected decline in future real interest rates as populations age and the long end of the yield curve would fall, while the short end would presumably remain largely unaffected. In other words, ageing could contribute to a modest flattening of the yield curve, but the large degree of uncertainty over both the decline in the equilibrium rate and the degree of forward-lookingness of financial markets³ suggests that the magnitude of this impact is very difficult to predict and presumably rather small.

As outlined in Section 5, the role of some financial intermediaries is set to rise in the euro area over the next decades. This could have an effect on the prices observed in certain markets, including a possible increase in prices in the fixed income market, which could be temporarily affected by large portfolio reallocations of these financial intermediaries.

3 The monetary policy transmission mechanism

According to the life cycle theory, individuals accumulate wealth during their working lives to finance consumption during retirement.⁴ Therefore, populations whose average age is closer to retirement are expected to exhibit higher wealth-to-income ratios. At the same time, expected imbalances in publicly financed pension schemes might make it plausible to consider that, after pension reform, an increasing number of retirees will fundamentally rely on their own accumulated wealth, as opposed to public pension provision, to sustain their consumption levels. Furthermore, as Bean (2004) suggests, longer life expectancy after retirement will presumably reinforce this effect.

Consequently, Miles (2002) argues that monetary policy, which is partly transmitted via asset prices, may increase its power to stabilise macroeconomic fluctuations through an increasingly important wealth channel.⁵

4 The demands on monetary policy in an ageing society

As population ageing contributes to higher wealth-to-income ratios, depending on the reforms of existing PAYG systems, public demand for leaning against “boom-bust” cycles in asset prices

3 For some evidence supporting a limited degree of forward-lookingness of financial markets see, for example, S. Della Vigna and J. M. Pollet, “Attention, demographics, and the stock market”, NBER Working Paper No 11211, 2005.

4 R. Brumberg and F. Modigliani, “Utility analysis and the consumption function: an interpretation of cross-section data”, in K. K. Kurihara (ed.), *Post-Keynesian Economics*, pp. 388-436, Rutgers University Press, 1954.

5 D. Miles, “Should monetary policy be different in a greayer world?”, in A. Auerbach and H. Herrmann (eds.), *Financial Markets and Monetary Policy*, pp. 243-76, Springer, 2002.

might rise in parallel with old age dependency ratios: in an older society, a significant proportion of households' wealth could be accumulated in real estate and financial assets, increasing the exposure of their income to asset price fluctuations. For instance, Poterba (2004) suggests that households headed by someone over 65 years old will hold almost half of all corporate stocks and 64% of all annuity contracts in 2040 in the United States, up from 33% and 50% respectively in 2001.⁶ This increased exposure of the population to asset price fluctuations is likely to occur at a time when a relatively large proportion of the population (the "old") would presumably seek to sell their assets in order to finance consumption during retirement.⁷

Hence, increasing old age dependency and wealth-to-income ratios could strengthen the case for leaning against asset price misalignments or "bubbles" (i.e. deviations of asset prices from their fundamental values), as the welfare losses stemming from "boom-bust" cycles in asset prices would presumably be larger in an older society.

Additionally, to the extent that a growing proportion of wealth is invested in nominal assets (i.e. assets whose return is not indexed to inflation), the central bank's mandate to maintain price stability might become even more important so as to avoid individual old age financial provisioning being eroded over time by relatively high inflation rates. In this regard, Bean (2004) suggests that public support for consumer price stability will also tend to increase over the next decades.

6 J. M. Poterba, "The impact of population ageing on financial markets", NBER Working Paper No 10851, 2004.

7 See, among others, A. B. Abel, "The effects of a baby boom on stock prices and capital accumulation in the presence of social security", *Econometrica*, 71, pp. 551-78, 2003; and A. Börsch-Supan and J. K. Winter, "Population ageing, savings behavior and capital markets", NBER Working Paper No 8561, 2001.

6 POLICY MEASURES

To cope with the possible effects of demographic change, governments need to undertake further comprehensive reforms. Such reforms should aim to address specific problems in public pension and health care systems, reduce overall public debts, increase labour utilisation and strengthen the forces driving productivity and economic growth.

Projected demographic changes in the euro area make parametric reforms of existing public pension systems necessary, including increases in statutory retirement ages and reductions in replacement rates. It has been estimated that without further reforms pension contribution rates would need to more than double in some countries to above 40% of wages to keep these systems in balance; therefore, benefits from public pension systems would need to fall. However, the parametric reforms necessary to fully balance PAYG pension systems without the need for further increases in contribution

rates would probably be politically or economically unfeasible. They will therefore need to be complemented by systemic reforms to the financing of pension systems, for example, a move towards increased funding. This diversification may reduce the overall vulnerability of the pension arrangements ahead of the upcoming demographic changes. Furthermore, as the contribution of funded pension arrangements to overall pensions rises, the size of PAYG systems could be reduced to alleviate the fiscal burden over the long term.

The financing of such a transition may involve some burden-sharing between pensioners and contributors. One possible reform approach is to combine the introduction of partially funded pension arrangements with a transformation of PAYG systems into "notional defined contribution" (NDC) arrangements, which have been implemented in several EU countries outside the euro area. In essence, while maintaining the PAYG financing of pensions, such NDC schemes mimic the characteristics of

individually funded arrangements. Thus, the future individual pension depends exclusively on own-paid contributions into a “notional” pension account and a commonly applied accrual rate. As there is no intra-generational redistribution through the pension system, the perceived tax burden on labour should fall. This improves the incentives to work and can contribute to achieving higher employment rates. At the macro level, balance of the NDC scheme is ensured by limiting the interest rate received on the notional pension account to the rate of growth of the contribution base (e.g. the wage sum of the economy). As balancing these pension schemes generally requires considerable cuts in generosity compared with previous arrangements, current workers are required to build up pension claims by contributing to funded pension arrangements simultaneously. Regulations may need to be implemented to ensure the non-speculative character of retirement savings. Such regulation is also important from a public finance point of view as abrupt adverse asset price changes could force the government eventually to take over additional pension obligations.

In the area of health and long-term care, rising public expenditure pressures impose equally hard choices on many public health systems. To face the future burden, governments may have to raise contribution rates, streamline services and secure private financing and funding. In general, governments have found it difficult to curtail expenditure permanently by limiting access to some forms of (expensive) treatment. Thus, discussions in the relevant literature point to the importance of setting appropriate incentives for all participants. This may entail the introduction of patient co-payments, as already implemented in a number of countries. Strengthening market mechanisms in the relationship between patients, medical service providers and insurers can improve overall performance. Contracting and payment structures should reflect true resource costs and hard budget constraints to set the right economic incentives. Benchmarking of the performance of medical service providers can help to raise

transparency. Further integration of product and services markets in the EU could contribute to improving efficiency also in the health care sector.

Ageing populations in the euro area also make the implementation of labour market policies to increase labour market participation and employment all the more urgent. Participation and employment rates are particularly low for young people, women and older individuals, compared with the overall working age population, in many euro area countries. Furthermore, the overall level of average annual hours of work per worker in the euro area is low.¹¹ There is therefore a significant potential to increase the utilisation of the working age population through a rise in the number of people entering and working in euro area labour markets and longer working hours and/or lives.

To achieve this, a first important step is to further reduce the disincentives to work currently persisting within a number of euro area labour markets due to the interplay of taxes and benefits and the provision of early retirement schemes. Such systems create disincentives to work, particularly for second earners (which are often women) with a family, low-paid workers and the youngest and oldest workers. Policies to increase female labour market participation must aim to make it easier for women to combine family and work by increasing the flexibility of working hours and improving services for childcare and care of the elderly. Furthermore, it would be beneficial to improve incentives to continue working later in life, for example through gradual exit-from-work policies and increased provision of part-time or temporary positions for older workers, along with the necessary increases in the statutory retirement age. However, there must also be sufficient labour demand from employers

11 For more information on working hours in the euro area relative to the United States, see N. Leiner-Killinger, C. Madaschi and M. Ward-Warmedinger, “Trends and patterns in working time across euro area countries 1970-2004: Causes and consequences”, ECB Occasional Paper No 41, 2005.

to hire and/or retain older workers. Increased labour migration to the euro area offers a further potential avenue through which labour market participation and employment may be increased across all age groups. Policies to increase immigration should be supportive as outlined in the Integrated Guidelines for Growth and Jobs 2005-2008,¹² but most likely do not offer a solution to the demographic challenges due to the large number of working migrants that would be required.

The potential to increase labour productivity and economic growth will depend both on labour market policies to increase the overall skill levels of the workforce and on the rate at which technology advances in the euro area. The extension and deepening of the EU internal market and increased competition in EU services markets are among the policies needed to further improve the functioning of product markets to support labour productivity and job creation.¹³ Many countries will also need to embark on a sustained process of investment in human capital and research and development in order to offset the possible negative effects of population ageing on labour and total factor productivity. EU leaders adopted the European Youth Pact at the beginning of 2005, which endeavours to “improve the education, training, mobility, vocational integration and social inclusion of young Europeans” by, for example, monitoring policies for the integration of young people into the labour market and encouraging young people to develop entrepreneurship.¹⁴ It emphasises both the importance of raising the quality of education, which may help to offset the possible negative effects of population ageing on total factor productivity, and the importance of increasing the activity and employment rates of young people to help to offset the effects of demographic change on labour supply.

7 CONCLUSION

Projected demographic changes in the euro area are characterised by low fertility rates and

increasing life expectancy, which will lead to declining total and working age population growth and a gradual increase in the old age dependency ratio. The projections available from Eurostat suggest that the total euro area population will start to shrink in absolute terms in about 20 years, and by 2050 the old age dependency ratio will have reached almost 55% compared with 26% in 2006. Taken together, these developments will have important economic consequences. These include changes in the size and composition of labour supply in the euro area, as the proportion of older workers increases and fewer new workers enter the labour market to replace those leaving it. Under the assumption of unchanged labour utilisation and labour productivity growth, demographic trends imply a decline in average real GDP growth from its average 1995-2005 level of 2.1% to around 1% by 2050. Real GDP-per-capita growth will also decline. Implications for public expenditure include increases of above 3 percentage points in public spending on pensions and health care as a percentage of GDP for most euro area countries.

The projected ageing of the population may also have an impact on financial markets, enhancing the role played by institutional investors. This is likely to raise financial stability concerns, which are already being addressed by changes in the structure of pension plans and by stricter solvency requirements for institutional investors. In addition, these developments are likely to boost the role of governments in improving financial education and literacy in order to preserve households' savings.

The timely implementation of comprehensive and incentive-compatible reforms is needed to prepare for such possible consequences of

12 For more details on these Guidelines, see the box entitled “The Integrated Guidelines for Growth and Jobs 2005-2008” in the August 2005 issue of the Monthly Bulletin.

13 For further details, see “Competition, productivity and prices in the euro area services sector”, ECB Occasional Paper No 44, 2006.

14 For further details, see Annex 1 of the Presidency Conclusions of the Brussels European Council, 22 and 23 March 2005.

demographic change. Reducing public debt would contribute to improving fiscal sustainability and make public finances less vulnerable to the impact of ageing populations. Further adjustments to the structure of pension contributions and benefits are also needed. Regarding labour markets, increasing labour utilisation through policies to support higher labour market participation and employment rates, and increasing labour productivity growth through investment in human capital and completion of the internal market would help to counteract the dampening effects on output growth in the medium run in the euro area. Over a longer time horizon, increases in the statutory retirement age and/or average annual hours of work will also be necessary. Individual euro area countries are responsible for the design of their policies on employment and productivity within the framework of the Lisbon strategy¹⁵ and the Integrated Guidelines for Growth and Jobs 2005-2008. These Guidelines offer a broad range of suggested policies, which in the face of demographic change will need to be appropriately tailored to the relevant target groups.

The “slow burn” nature of demographic developments implies that their immediate effects on monetary policy are likely to be moderate. However, in the absence of sufficient implementation of the needed structural reforms detailed above, monetary policy could be indirectly affected. First, inflationary pressures could be influenced as labour becomes scarcer and there is pressure to raise taxes to finance ageing-induced increases in government spending. Second, to the extent that a growing proportion of wealth is invested in nominal (non-inflation-indexed) assets, the central bank’s mandate to maintain price stability might become even more important so as to avoid individuals’ retirement provisions being eroded over time by relatively high inflation rates.

In summary, the adverse demographic developments discussed in this article underline the urgent need for policy-makers to implement structural reforms which have the ability to promote the macroeconomic flexibility and dynamism of the euro area.

15 See the article entitled “The Lisbon strategy – five years on” in the July 2005 issue of the Monthly Bulletin.