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Population Ageing and its Challenges to Social Policies

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To my spouse and partner Eliane.
Without her, this work would never have started, let alone have
been accomplished.

Also to my colleagues Marc and Lieve.
Their determination and perseverance deserve our respect.

Table of contents

Preface

Prologue

1. Introduction

1.1. Scope and limitations of the study

1.2. Sources and used data sets

1.3. Outline of the study

2. Population ageing: a global phenomenon

2.1. Changes at world level and the specific position of Europe

2.2. Changes in the age structure in Europe, periods 1950-2000 and 2000-2050

2.3. Differences in the proportions of older persons in the member states of the Council of Europe

3. The economic and financial impact of population ageing

3.1. Evolution of the dependency ratio

3.2. A more realistic outlook by using employment rates

The effect of increased employment rates

3.3. The (in)compatibility of future GDP-levels with increasingly older population

A 'reliability' test

3.4. The unpopularity of some suggested changes: some results of the 'DIALOG' project

4. Two specific societal challenges: living arrangements and health expenditures

4.1. Living arrangements among older people at the turn of the 20th century

4.2. The age profile for public health expenditures and their implied cost

A summary of some earlier findings

Age profile for public health expenditures on health care

5. Some final comments and considerations

References

Annex

Preface

As was the case for the previous work undertaken for the European Population Committee (CAHP) (that resulted in Population Studies No. 47) it must be acknowledged that the present analysis would not have been possible without the support of many colleagues. I will not try to give all their names. However, I feel compelled to mention some of them.

My special thanks go to Michel Englert, Advisor of the Federal Planning Office in Belgium, for his willingness to remind me of the use and interpretation of some economic indicators and for drawing my attention to some important studies. Without his kind assistance (and patience), the part of the work dealing with the economic and financial impact of 'population ageing' would simply not have been possible (let it however be quite clear that the author is solely responsible for the nature of the simulations that eventually were used, for any possible shortcomings in their application, and for the conclusions that were drawn from the results).

I wish also like to thank François Bovagnet (ESTAT) and Georgia Karamountzou (Unit F1) of Eurostat for their understanding and help in making the data set of the *Community Programme of Population and Housing Censuses in 2001* available in due time. Without these data, paragraphs 3 and 4 would have been only half as complete.

Also my thanks go to Charlotte Höhn, Director of the *Bundesinstitut für Bevölkerungsforschung*, and co-ordinator of the DIALOG-project, for her permission to use some preliminary results of the DIALOG-project. The data allowed to put some outcomes of the simulation exercises into 'perspective'.

Finally, I would also like to thank the members of the CAHP for their renewed confidence and for having entrusted me with this work.

Prologue

"Viewed as a whole the problem of ageing is no problem at all. It is only the pessimistic way of looking at a great triumph of civilization."

Frank Notestein (1954)

The world population is increasingly getting older. 'Population ageing' can be considered to be the last 'leg' of what is commonly known as the 'demographic transition' — the transition of demographic regimes characterised by high fertility and mortality to regimes characterised by (very) low fertility and mortality.

Not all countries in the world have reached the same stage in the demographic transition. The European countries (as well as other industrialised countries) have reached an advanced stage in the transition trajectory. This explains why the highest proportions of older people are observed in these countries. The fact that not all countries have reached the same stage in the trajectory also explains the differences in the proportions of older people that can be observed between countries of the European area.

'Population ageing' implies that people live longer than ever before. As such, the phenomenon should be considered, to use the wording of Frank Notestein, an American demographer, as "a great triumph of civilization". All people in the world, regardless of their background, religion or civilisation strive to reach an old age. It is therefore rather remarkable that in general 'population ageing' is described as being a rather 'catastrophic' phenomenon, as a demographic process that will make impossible the payment of pensions as well as of public expenditures on health care, as a phenomenon that, in short, would destroy the sustainability of existing social policies.

There is no doubt that 'population ageing' will have far reaching consequences on society. One may however wonder whether the greatest consequences will be of economic or financial nature. Most likely the greatest consequences will concern social relationships. 'Population ageing' will lead to entirely new social fabrics: more generations will survive next to each other than ever before; intergenerational solidarity will take a different nature; individual life courses will change, both professionally and personally; in short, the entire societal structure and organisation will change — will need to change — to keep up with the new demographic reality.

However, the topic that today has the clearest attention of policy makers, the media and the public at large are the economic and financial impact of 'population ageing'.

The purpose of this study is to indicate that the economic and financial problems that are associated with the phenomenon are not unavoidable — or can at least be attenuated to a great extent when taking into account the likely industrial evolution of our societies. This is not to say that things will be easy. The needed changes — e.g., increased labour force participation — will be profound and their realisation will probably not happen without appropriate policy measures. But the results below indicate that the future is far from 'catastrophic' (although let it be clear from the start that the member states of the Council of Europe with the weakest economies are likely to face serious problems).

How did we proceed in showing the financial and economic impact of 'population ageing'. One and the other will be explained in detail in the introductory lines. Suffice to say at this point that, having a formal training in demography,⁴ our starting point was the demographic

evolution. The next step was to make the linkage with two economic parameters: labour force participation and productivity level, both crucial factors in determining the GDP-level. The second and final step was to make assumptions regarding the evolution of these economic parameters and to assess their impact on GDP-levels. According to these results, with these future GDP-levels it seems possible to cope with the expected effects of the demographic change.

1. Introduction

1.1. Scope and limitations of the study

To some extent the present study is the continuation of a previous analysis by the same author, on the subject "[The] demographic characteristics of the oldest old" (Schoenmaeckers, 2004b). One of its major results, the breakdown all Council of Europe member states into three broad statistical groupings, will be used throughout the present analysis. The breakdown consists of categorising the member states according to their proportion of 'oldest old', i.e. of persons aged 80 and more. The breakdown will be explained into more detail in figures 2.3 and 2.4 below.

The previous study focused on explaining the differences in the proportions of older persons in the member states; on the changing age and sex structures among older persons; on their living arrangements; and finally on some results regarding their health status and disabilities.

The present study rather focuses on the financial and economic implications of 'population ageing'. It will be shown that, *ceteris paribus*, the increasing numbers of older persons in the populations put a severe strain on the existing social systems. To the extent that older persons are in need of more health care it is feared that their increased number may provoke an explosion of the public expenditures on health care. On the reverse side, the declining numbers of persons of working-age (those aged 20-64¹) — the adult population to support the young (0-19) and the old (65 and more) — are considered a threat for economic performance, and as such may, among others, undermine the sustainability of the existing pension systems.

The main objective of the present study will be to show that demographic change is indeed an important determinant for economic performance but that it would be wrong not to take into account other factors and developments when discussing the future of our societies. As will be seen, increased labour force participation (of both men and women) and increased labour productivity — which can both be considered to be realistic future developments — could to a great extent ease the demographic strain. One and the other will be demonstrated by using simple simulation models in which are linked demographic forecasts to assumptions regarding labour force participation and labour productivity (and hence GDP output per capita).

It is, however, not the scope of the study to present detailed simulation results for each individual member state. Although the study does include the results for some individual countries (mainly selected on the basis of data availability), this is merely done to illustrate the differences between member states, and to indicate the reasons thereof. The nature of the simulation exercises is in no way comparable to those applied by the national planning offices

1 Ages 20-64 are the age boundaries used in the present study to determine the 'working-age' population or the population that is 'economically active'. The socio-economic significance of these boundaries is function of the average age young people finish their studies and of the legal age of retirement, and as such may vary between countries. Their use is however justified within the context of an international comparison.

or planning ministries, which main task is to enhance and forecast economic development, thereby using many more complex models. As such, the results presented below are no substitute for national economic forecasts (although, eventually, both seem to lead to similar conclusions).

Finally, although the study suggests ways to cope with the impact of 'population ageing' it in no way presents guidelines for their implementation. This is the work and responsibility of policy makers. Our goal is limited to contributing to the political and social debate.

1.2. Sources and used data sets

The main specificity of the present study is to link economic parameters to available demographic forecasts.

The demographic forecasts used stem from the *Population Prospects* that are elaborated by the United Nations Population Division. The *Population Prospects* is a biannual exercise and the results used here are those from *The 2002 Revision* (UN, 2003a).

As is common with population projections, also the *UN Population Prospects* are based on several variants regarding the future evolution of fertility and mortality. The results used here all correspond to the 'medium variant' or to the outcome that appears to be most plausible². In some instances the results of *The 2002 Revision* (in which the projections are limited until the year 2050) are complemented with results of long-range population projections (UN, 2003c, 2004).

One particular attraction of using the *UN Population Prospects* is that it comprises data on 43 member states of the Council of Europe³.

The second important data set used stems from Eurostat and concerns the *Community Programme of Population and Housing Censuses in 2001* (Eurostat, 2004a). Contrary to the

2 The assumptions used in population projections are always subject to criticism. In the case of the 'medium variant' fertility levels of 'low-fertility countries — mainly the European countries with fertility levels far below replacement fertility (2.1 children per woman) at the turn of the century — are assumed to increase after 2000 reaching 1.85 children per women by 2045-2050. To many demographers this is a rather 'optimistic' outlook to the extent that so far there are no signs of a sustained increase of completed fertility in the European area; at best, there could be a stabilisation of fertility, as, for example, in Belgium, at around 1.8 children for completed fertility (see Council of Europe, 2003). As such, the 'medium variant' is likely to produce (slightly) underestimated values for the proportions of older people (slightly, since the margin in which fertility may vary is at any rate rather small). However, as we will see in further detail below, in the long run, the main demographic parameter determining 'population ageing' is not fertility but rather mortality. The documentation note accompanying *The 2002 Revision* stipulates that "mortality is projected on the basis of the models of change of life expectancy produced by the United Nations Population Division. A medium pace of mortality decline is generally used to project future mortality levels." For 'Europe' this corresponds to an increase of life expectancy at birth (both sexes combined) from 74.2 years (for 2000-2005) to 80.5 years (for 2045-2050).

In some figures, countries are identified by their abbreviation. The abbreviation is the one used in the publications of the Council of Europe.

3 Anno 2003 the Council of Europe comprises in total 45 member states. The present study only comprises data on 43 member states. Andorra, Liechtenstein and San Marino are not included. The *UN Population Prospects* only provides information on demographic parameters of countries of 100,000 inhabitants and more (for countries with fewer inhabitants the data set only includes the population total). The combined population of Andorra, Liechtenstein and San Marino is less than 0.02% of the total population of all member states. It was however decided also to include, when appropriate, the data for Belarus (see, for example, figures 2.3 and 2.4). See also footnote 1 on page 16 of Schoenmaeckers (2004b).

UN Population Prospects, the *Community Programme of Population and Housing Censuses in 2001* of Eurostat is a new initiative bringing together for the first time census results of in total 28 European countries⁴. As the title suggests, the data set stems from the 2001 round of censuses.

The *Community Programme of Population and Housing Censuses in 2001* is the source for the 'economic activity' and 'employment' rates (paragraph 3) and for living arrangements of older persons (paragraph 5) at the turn of the 20th century.

A third important source of information has been the *Human Development Reports* (HDR) of the United Nations Development Programme (UNDP). The HDR-reports are an annual publication, which started at the beginning of the ninety-nineties. The HDR-reports include a series of economic, social and demographic indicators. As such it also provides information on GDP (Gross Domestic Product) and GDP per capita by country. Their use for the present study was justified because the GDP-estimates are expressed in US Dollar terms and of the availability of GDP-estimates for 2000 in PPP US Dollar equivalents (Purchase Power Parity⁵), which provides the basis for an international comparison as foreseen here. The information of the HDR-reports is used in combination with the data of the *Community Programme of Population and Housing Censuses in 2001* in paragraph 3.

Finally, use is also made of some scant and first results of the DIALOG-project (paragraph 3) and of information drawn from an EPC-report (European Policy Committee) (paragraph 4.2).

The DIALOG-project consists of several 'attitude' surveys implemented in the beginning of the 21st century in some 13 European countries. The project is carried out under the auspices of the 5th Framework Programme of the European Commission⁶. One module of the questionnaire deals with attitudes and opinions regarding 'population ageing' and the place of older persons in society⁷.

The EPC-report is in fact a report of the Working Group on Ageing of the Economic Policy Committee of the European Commission on the specific topic of 'Budgetary challenges posed by ageing populations: the impact on public spending on pensions, health and long-term care

4 By and large the countries included correspond to the 25 EU member states. Of the EU member states the data of Spain and Malta are missing; on the other hand, the data set also includes results for Bulgaria, Liechtenstein, Norway, Romania, and Switzerland. (The documentation map accompanying the data set is entitled 'Documentation of the 2000 Round of Population and Housing Censuses in the EU, EFTA and Candidate Countries'.)

The Community Programme of Population and Housing Censuses in 2001 is the end result of a joint initiative between Eurostat and the UNECE Statistics Division that started with the preparation of recommendations for the 2000 Round of censuses of population and housing in the ECE region. The data set that has been made available on CD-Rom is a provisional data set and is so far incomplete (for some countries, such as Belgium, some tables show missing data. As one can read in the introductory notes, "Eurostat is still waiting for data from several countries". According to Eurostat this is the result of "late censuses in some countries". A second, more complete edition is expected in the beginning of 2005.

5 "At the PPP rate, one dollar has the same purchasing power over domestic GDP that the US dollar has over the US GDP. [...] PPP rates allow a standard comparison of real price levels between countries, just as conventional price indexes allow comparison of real values over time; otherwise, normal exchange rates may over- or undervalue purchasing power" (UNDP, 1999: 255).

6 The 13 participating countries can be taken as a fairly 'representative sample' of the member states of the Council of Europe. They are: Austria, Belgium (or more precisely the Flemish Region in Belgium), the Czech Republic, Estonia, Finland, Germany, Hungary, Italy, Lithuania, the Netherlands, Poland, Romania, and Slovenia. At the time of writing, also Cyprus (Greek part) had joined the project, but data were not yet available.

7 In the present study use is made of only two questions (see figures 3.9 and 3.10).

for the elderly and possible indicators of the long-term sustainability of public finances' (EPC, 2000). The EPC working group was composed of representatives from several national planning offices and ministries of economic affairs, as well as of representatives of the European Commission and the OECD. The information on public health expenditure on health care (figure 5.4) is directly derived from data of this report ⁸.

1.3. Outline of the study

The first part of the study (paragraph 2) will deal with the evolution of the proportions of older people in the world and in Europe. One particular item will be to indicate the heterogeneity between the member states of the Council of Europe with respect to the proportion aged 60 and over and aged 80 and over.

The second part (paragraph 3) is on how 'population ageing' may have an economic and financial impact among member states in the next 50 years. The methodology for this is to link population prospects to assumptions regarding employment and growth of GDP (Gross Domestic Product). In the text the main outcomes of the simulations are given; the actual assumptions and the corresponding parameters are explained in more details in Annex.

The third part (paragraph 4) deals with two specific societal challenges: living arrangements and health expenditures. Neither topic has been analysed in depth. The reason for their inclusion was to illustrate that the effects of 'population ageing' on society largely encompass other domains than economy or finance.

The last paragraph (5) is entitled 'Some final comments and considerations'. As announced in the beginning (paragraph 1.1) the objective of the study is not to present 'solutions' to the problems related to 'population ageing'. (This would have been an impossible task to the extent that, as will become clear further below, solutions at the individual country level need to be tailor-made.) The objective of the study is to give 'food for thought' and as such contribute to the debate.

2. Population ageing: a global phenomenon

2.1. Changes at World level and the specific position of Europe

The world population is steadily getting older. In 1950 the number of persons in the world aged 60 and more was a mere 8 percent; by 2000 this value has grown to 10 percent and by 2050 it will be 21 percent (figure 2.1 and table 2.1). By 2200 close to one third (30.4%) of the world population at that time (8.97 billion ⁹), corresponding to roughly 2.7 billion persons, will be 60 and more.

'Population ageing' is indeed a global phenomenon. The trend has set in all over the world and there is no return. Very rightly, one of the chapters of the publication of the UN Population Division dealing with the long-range projections is entitled 'The unavoidable ageing of the population'.

⁸ We are especially thankful to mm. Howard Oxley and Stephane Jacobzone from the OECD for having made available the individual country data that constitute the basis of figure 5.4.

⁹ Note that the projected 2200 estimate of 8.97 billion is hardly more than the world population estimate for 2050 of 8.92 billion (+0.06%).

There are however striking differences in the proportions of older persons between major regions. Clearly, Europe (and also Japan) shows much higher proportions than those observed in the rest of the world. Around the turn of the century, the proportion of people aged 60 and more in Europe was about double that of the world average (20.2% vs. 10.0%). Although in relative terms the differences do get smaller, Europe is likely to continue having an older population structure during the next 100-200 years than the world average (figure 2.1 and table 2.1). To understand these differences one must go back in time and review the main characteristics of the 'demographic transition'.

In short, the 'demographic transition' refers to the transition of demographic regimes characterised by high fertility and mortality to regimes characterised by (very) low fertility and mortality. The first signs of changes in demographic regimes date from the second part of the 18th century and were observed in Northern and Western European countries (table 2.2). According to the 'theory' birth rates started to decline following lower mortality rates, the latter being the result of better living conditions. The successive decline of mortality and birth rates resulted in a 'new' demographic equilibrium characterised by low to moderate growth rates.

So far for the 'theory'. A closer look at the historical patterns reveals that the decline in fertility levels must certainly have had other causes next to the lower mortality rates; there are indeed but a few countries where the changes show a pattern that may be interpreted as a form of causality. In his study on the Belgian fertility decline — Belgium was, next to France, the first country on the European continent to show a decline of marital fertility — Lesthaeghe (1977) came to the conclusion that the secularisation of society must have played a crucial role in bringing changes in fertility behaviour¹⁰.

In the beginning of the 20th century there was the general belief that also the Less Developed Regions would in their turn experience some sort of demographic transition. Because of colonisation, societies had become more 'modern', there was better hygiene and medical treatment so that mortality rates would fall and hence — still according to the 'theory' — fertility would also decline. In general, life expectancy levels indeed increases — at least this is what can be derived from census results in the second part of the century (see, for example, Schoenmaeckers and Adognon, 1988) — but fertility levels did not decline, on the contrary they increased up to levels never heard of before. Demographers and the public at large were no longer concerned with the processes known as the 'demographic transition' but tried to grasp the importance of the 'population explosion' (see, for example, the publication 'The Limits to Growth' of the Club of Rome, Meadows et al, 1972). The highest fertility levels were recorded in Eastern Africa. In the ninety-sixties and ninety-seventies Kenya showed the highest fertility levels ever recorded, a total fertility rate of 8.12 children (UN, 2003), or a marital fertility of no less than 10 (Schoenmaeckers, 1984).

As was the case to explain the changes that were observed nearly two centuries earlier in Europe, one may seriously have underestimated the importance of the 'human factor' in trying to understand and forecast the demographic changes in less developed countries. We more specifically refer to the impact that 'modernity' may have had on existing traditions and practices (Page and Lesthaeghe, 1981)

In Asia and Latin America and the Caribbean fertility levels gradually started to decline in the

10 The use of 'marital fertility' as an indicator is of great significance in this respect because any change can be interpreted as a conscious change of individual fertility behaviour.

ninety-sixties; for Africa indications for a sustained fertility decline were not observed until the ninety-nineties. During the same years, also the demographic regimes in the European countries underwent serious changes. Until the ninety-sixties, Europe experienced a fertility of not less than 2.6 children per woman. These relative high levels (although only a fraction of those recorded in the less-developed regions at that time) were related to the 'baby-boom' following the Second World War. Many countries experienced a sudden drop in fertility. The drop was associated with —and in most cases the result of— the postponement of childbearing. The causes for the decline are several. One key element however is the changing position of women in society, more particularly longer schooling and higher labour force participation.

The behavioural changes did not only affect fertility. There were new forms of partnerships; people postponed marriage and married less; there was an increase in divorce rates; and in re-marriage rates; there was an increasing number of reconstituted families; and also of single mothers, The behavioural and societal changes were that profound that Lesthaeghe and Van de Kaa thought it justified to refer to them as the 'second demographic transition' (Lesthaeghe and Van de Kaa, 1986; van de Kaa, 1987; Lesthaeghe, 1995)¹¹.

In both the less-developed regions as in Europe the fertility decline has provoked the phenomenon that is now generally known as 'population ageing'. The fewer number of births has had as automatic effect to increase the relative importance of the people at older ages in the population structure. The areas show however serious differences in actual proportions of older persons. The reasons are the differences in demographic history between countries. Furthermore, declines in fertility are only part of the explanation. The other part concerns the differences in mortality levels.

Although life expectancy at birth increases in all countries, current levels are much higher in Europe (and in all industrialised countries in general) than in Less Developed Regions. The major cause for the increase is however not the same as some 150-200 years ago at the beginning of the (first) demographic transition. At that time, the major cause of the lowering of mortality rates was the decline of child and infant mortality — the risk for a new-born to die before ages 5 and 1, respectively. The major cause for the current (and future) increases in life expectancy is no longer lower rates of child mortality — although one continues to observed a sustained decline in especially infant mortality, also in the countries with the lowest rates¹² — but has rather become increased survival at older ages (ages beyond age 60). Clearly, the latter must have the greatest effect on the proportions of 'oldest old' in the population — of those aged 80 years and more.

It is precisely the lowering of mortality at older ages that makes 'population ageing' — to repeat once more the wordings of the UN Population Division — 'unavoidable'. In the population projections it is hypothesised that eventually, in all countries fertility will stabilise

11 A quite comprehensive account of the changes can be found in Coleman (1998 and 2004); for an overview (partly based on Coleman, 1998), see Schoenmaeckers (2000).

12 For example, in Belgium, Denmark, France, and Germany infant mortality decreased between 1990 and 2002 from 7.5 (median value) to 4.3 (idem) deaths per 1,000 live births. During the same period, in Iceland, Norway, and Sweden — the countries showing the lowest rates — infant mortality decreased from 6.0 to 3.3 deaths (median values) per 1,000 live births (Council of Europe, 2003).

By contrast, in spite of some improvements during the last decade, in 2003, less-developed regions still experience on average an infant mortality rate of no less than 61 deaths per 1,000 live births (UNFPA, 2003). In recent years, some African countries have even experienced an increase due to the AIDS-epidemic.

at around replacement level (2.1 children per women). This implies that in the long run fertility will play no role in 'population ageing'. On the other hand, although the actual limits are not known, and although one may question the validity of the levels used in the population prospects, based on recent trends one can accept the validity to assume a continued increase in life expectancy in the future¹³.

Calot and Sardon (1999) have demonstrated the fact that in the long run mortality becomes the determining factor of 'population ageing' on the basis of demographic analysis. Using a less sophisticated methodology, Schoenmaeckers (2004b) has illustrated that the differences that are observed mainly in the proportions of oldest old among the Council of Europe member states are the result of persisting differences with respect to life expectancy. With the exception of Turkey, Albania, Azerbaijan, and Armenia — and also in these countries fertility is declining rapidly —, all member states experience low to very low fertility levels, in most cases below replacement level (Schoenmaeckers, 2004b: figure 4.4). Around 2000, the highest life expectancy recorded (both sexes) among the member states was 80 years (Iceland, Sweden); the lowest 66 years (Russian Federation), a relative difference of 20 percent between the lowest and the highest value.

In summary, the differences in the proportions of older people that are observed between the European countries on the one hand and the less-developed countries on the other hand are in fact the result of different demographic trajectories in the past and of reaching different stages in the 'demographic transition'. To a certain extent the same reasons explain the differences that can be observed between European countries, more particularly among the member states of the Council of Europe (we will come back to this in more detail in sub-paragraph 2.3). It should however be kept in mind that, as outlined above, the differences between European countries are not that much the result of differences in fertility (this is, at least for the time being, the major source for the differences between more- and less-developed regions), but rather in mortality.

Looking at the issue from another angle, one may say that most less-developed countries have just recently started to show the changes related with the 'first' demographic transition. On the other hand, all European countries, also those with 'emerging new economies', have characteristics associated with the second demographic transition to the extent that all with few exceptions (see above) show very low fertility levels. However, there are still large differences with respect to mortality. Only the 'Western' European countries — grossly that are part of sub-group HIGH (see below) — have so far experienced significant improvements in survival rates above age 60. As we have argued elsewhere (Schoenmaeckers, 2004a), in formulating the theoretical framework of the 'second demographic transition' one has overlooked the significance of lower mortality¹⁴. To stress the latter a rephrased definition of the 'first' and

13 Regarding the long-range projections (UN, 2004: 2): "Life expectancy is assumed to rise continuously, with no upper limit, though at a slowing pace dictated by recent country trends. By 2100, life expectancy is expected to vary across countries from 66 to 97 years, and by 2300 from 87 to 106." Note that around 2000 life expectancy varied across countries from 34 to 81 years, and is in 2050 expected to vary across countries from 43 to 88 years (UN, 2003a). This implies from 2000 to 2300 an increase by 256% and 131% for the highest and lowest values, respectively, corresponding to diminishing the relative difference by 2 over the same period.

14 It must be recognised however that at the time that Lesthaeghe and Van de Kaa formulated their new theoretical framework (by the end of the ninety-eighties), the research community had not yet completely grasped the far-reaching importance of the decreasing mortality rates at older ages. It was only some years later that 'longevity' and the subsequent question on the 'theoretical life span' got the full attention from the research community; see, for example, the works of Vallin₁ (1989) and Vaupel and Lundström (1994). In his

'second' demographic transition could be that the 'first' is the transition of demographic regimes from high levels of mortality and fertility to *low to moderate* levels of mortality and fertility whereas the 'second' is the continued transition to *very low* mortality and *very low* fertility levels. Current rates show that so far only few European countries have reached very low fertility *and* very low mortality levels.

2.2. Changes in the age structure in Europe, periods 1950-2000 and 2000-2050

Before turning to the differences between Council of Europe member states, we will first have a look at the changing age structure in Europe. This is done with the use of two classical age pyramids as shown in figure 2.2.

The first age pyramid (A) reveals the changes by age group as observed from 1950 to 2000; the second one (B) those as projected from 2000 to 2050. Pyramid A clearly shows the effects of the declining birth rates during the period. From 1950 to 2000 the relative weight of those in age interval 0-4 decreases from 4.70 percent to 2.60 percent for men and from 4.50 percent to 2.46 percent for women¹⁵. This decrease in percentage values can be observed until age interval 20-24. In other words, there is a clear 'narrowing' of the base of the age pyramid between 1950 and 2000. At the same time, one observes a 'widening' of the top. For age interval 70-74, for example, percentages increase from 0.98 percent to 1.70 percent for men and from 1.43 percent to 2.51 percent for women.

The higher percentages for women reflect that fact that women indeed outlive men. In 2000, European women had a life expectancy at birth of 77.8 years and men of 69.6 years — a difference of a full 8 years. However, as discussed in Schoenmaeckers (2004b: 38), there are indications that the gap between women and men may be narrowing. So far, the number of countries showing the pattern is rather small: Denmark, Finland, Ireland, the Netherlands and the UK. Since recently a similar pattern can also be observed for the Flemish Region in Belgium¹⁶. The reasons for the change remain unclear. They may be related to the fact that more and more women have taken over the unhealthy life style of men.

Pyramid B shows the continued narrowing of the base. The greatest differences are this time not at the youngest age interval (the fertility decline has come to an end), but rather at the working-ages; the greatest decrease is observed for age interval 35-39 (percentage point difference of -1.0 for men and -1.1 for women).

The most importance changes are however at the top. The top of age pyramid clearly 'broadens' further, the result of increased survival at older ages. The 'pyramid' is increasingly becoming a 'rectangular'.

comprehensive work on "Longevity" Smith (1993) starts with the observation that during the twentieth century 25 years have been added to the mean life expectancy at birth in the United States.

One early and practical implication of taking into account the continuously increasing numbers of older people (including the number of centenarians) was to adapt the last and open-ended age interval in demographic tables, by replacing the category '85+' with '100+'. In the Population Prospects, this change was first made in the 1998 Revision.

¹⁵ Given percentages indicate the relative weight with respect to the entire population. Consequently the number of persons both sexes combined in age interval 0-4 represent 9.20% and 5.06% of the total population in 1950 and 2000, resp.

¹⁶ Since 1993 a reduction in the difference in life expectancy between men and women is also observed for Belgium. Between 1993 and 2002 the difference has been reduced from 6.8 to 6.1 years (personal communication Paul Willems, CBGS).

A population age pyramid reflects past and current trends in fertility and mortality (as well as migration, but for all European countries combined this effect appears negligible). With the stabilisation of fertility levels (or at any rate with fertility fluctuating in the narrow range between 1.6 and 2.1 children) the effect of fertility — or rather the effect of the *changes* in fertility — also gradually disappear. Eventually, the shape of the age 'pyramid' will be determined completely by the survival curve of the life table.

2.3. Differences in the proportions of older persons in the member states of the Council of Europe

Figure 2.3 gives the proportions aged 60 and over and aged 80 and over in 2000 for all member states of the Council of Europe. The countries are divided into three sub-groups: 'LOW', 'MIDDLE' and 'HIGH'. The designation refers to the relative importance of the number of 'oldest old'. The categorisation has been worked out in Schoenmaeckers (2004b). It has been achieved using straightforward EDA-techniques (Exploratory Data Analysis; Tukey, 1977)¹⁷.

As stated in the introductory paragraph, the scope of the study is not to present individual country results. The availability of three sub-groups helps however to indicate the heterogeneity between member states and to better assess the economic and financial impact of 'population ageing' relative to the actual proportion of older persons in the population.

The member state with the lowest proportion of individuals aged 60 and over is Turkey (8.04%) and the country with the highest proportion is Italy (24.06%). Concerning the proportion of those aged 80 and over, the ranking can be derived directly from figure 2.2: the lowest value is observed for Turkey (0.67%) and the highest value for Sweden (5.07%). In relative terms, the variation is much more important for the share concerning those aged 80 and more in the population (a ratio of 12 to 1 between the maximum and the minimum value) than for the share concerning those aged 60 and more (a ratio of 4.7 to 1). As said before, the main differences between member states concern mortality (and not fertility), more particularly with respect to differences in survival rates at older ages. The proportion aged 80 and over is a much more sensitive indicator to this than the proportion aged 60 and over.

Figure 2.4 presents the life expectancy at ages 60 and 80, respectively. The member states are regrouped by sub-group and ranked in the same way as in figure 2.3. As could be expected, the highest number of years of life expectancy at age 80 is observed for sub-group HIGH (a median value of 8.1 years). Also the highest life expectancy at age 60 is observed for sub-group HIGH (median value of 21.8 years). As was the case for the proportion aged 80 and over and 60 and over also here the most important relative differences are observed for the highest age.

The most remarkable observation that can be made from figure 2.4 is the low variation within the sub-group for the life expectancy at age 80. The range between the lowest and the highest

¹⁷ When the categorisation was made (Schoenmaeckers, 2004b) Belarus was not included in the analysis. As stated in, for example, the annual publication of the Council of Europe "Recent Demographic Developments in Europe" Belarus is a 'non-member state'. It was however decided to include it here (it is part of the sub-group 'LOW'). Its inclusion would likely have led to a somewhat different composition of sub-groups (Slovenia may have become part of sub-group 'MIDDLE'). Since such changes appear irrelevant in the light of the purpose of creating sub-groups (see text), we decided not to repeat the exercise but to simply use the categorisation as it was obtained in Schoenmaeckers (2004b).

number is hardly one year (7.74 vs. 8.68 years). The countries of the sub-group HIGH also show a low variation in the years of life expectancy at age 60.

The categorisation into sub-groups is made on the basis of statistical criteria only. However, it cannot be denied that the sub-groups greatly coincide with specific socio-economic characteristics (Schoenmaeckers, 2004b, pp. 16-19). It is moreover clear that there is a great overlap with political entities. Sub-group HIGH greatly encompasses the former 15 EU-Member States, plus Switzerland and Norway. Of the former EU-15 only Ireland, Luxembourg and Portugal are missing. All three are included in sub-group MIDDLE. For Ireland and Portugal the reasons probably lie in the fact that both countries have merely reached the early stages of the second demographic transition. In both countries the fertility decline started relatively late and life expectancy is relatively low compared to the other countries in sub-group HIGH¹⁸. The specific position of Luxembourg is possibly due to the high percentage of the population of foreign citizenship, of more than 30 percent since beginning of the ninety-nineties¹⁹. Sub-group MIDDLE comprises 7 of the 10 new EU Member States. Finally, sub-group LOW is the group with a majority of countries (10 out of 16) that is neither a member of the EU or a candidate for membership.

Figure 2.5 represents the prospected values from 2000 to 2050 of the proportion people aged 60 and more and aged 80 and more by sub-group. In all countries the proportions will clearly be on the rise. As in figures 2.3 and 2.4 one can observe the close pattern between the countries in sub-group HIGH (as well as between those in sub-group MIDDLE). The greatest heterogeneity is observed for sub-group LOW.

By 2050 for half of the countries in each sub-group at least one-third of their population will be aged 60 and more. There are however small differences between sub-groups. The highest share is recorded for sub-group LOW: a full 35 percent. In the two other sub-groups the proportion is 33 percent, but only sub-group HIGH shows signs of attenuation in the increase. As stated above, the proportion aged 60 and more in the population is related to earlier changes in fertility. The decline in fertility follows different patterns in each sub-group²⁰. For example, the attenuation effect observed in sub-group HIGH is the result of relatively small changes since the ninety-eighties (at least in absolute terms). The proportions of people aged 60 and more and the pattern of change in these proportions not only reflects the magnitude of the decline — which could be referred to as the 'intensity' — but also its duration.

Things are different with respect to the proportions of people aged 80 and more. In this case one observes a steady increase for all countries, also in sub-group HIGH. The proportion of the 'oldest old' is sensitive to the changes in mortality at older ages. The *Population Prospects* foresee a steady and continued increase of the chances for survival after age 60, and this for all countries. Note however, that also by 2050 there will still be relatively large differences

18 In 1995 life expectancy at birth was in Ireland 72.8 years for men and 78.3 years for women; in Portugal the figures were 71.6 and 78.7 years, respectively. This is, in the case of men, 3.4 to 4.06 years less than the highest value recorded (in Sweden, 76.2 years) and in the case of women, 3.1 to 3.5 years less than the highest value recorded for women (in France, 81.8 years); in both cases they are about 1/2 to 2 years lower than the median value for the 15 EU member states (Council of Europe, 2003)

19 In the other 15 EU member states the percentage of the population of foreign citizenship is around 5 to 9 percent; the only country in the European area with a higher percentage is Switzerland with close to 20 percent.

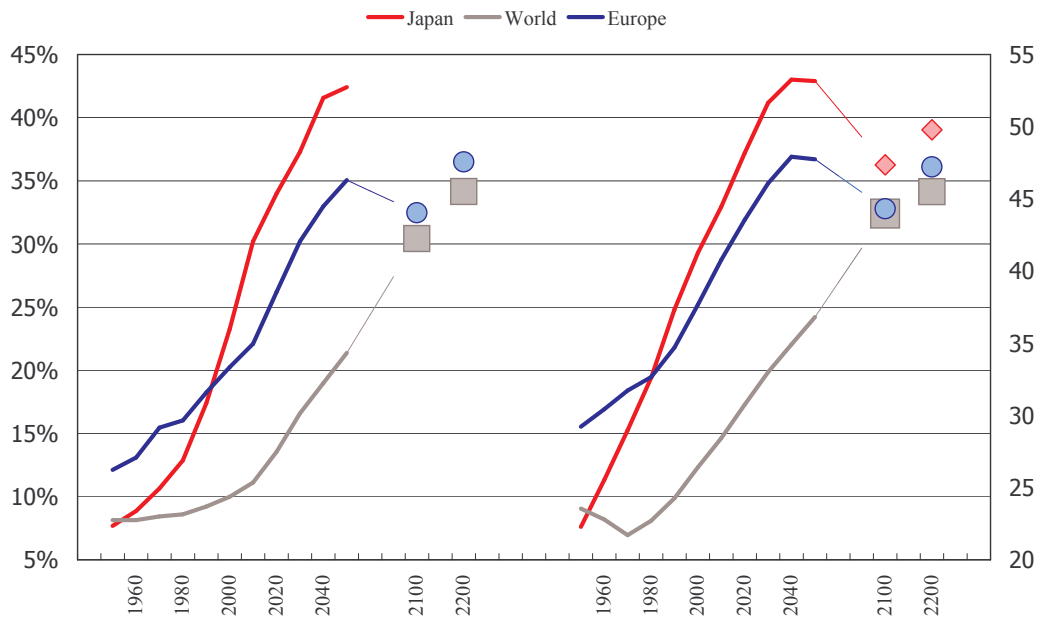
20 A more detailed account of the changes is given in annex on the basis of figure A1. The different patterns of change in fertility (and mortality) have also been commented in Schoenmaeckers (2004b); see more particularly figures 4.3 and 4.4).

between countries. By 2050, on 'average' the share in the population of people aged 80 and more of sub-group HIGH will be 10.8 percent (median value); for sub-group MIDDLE the share will be 8.4 percent; and for sub-group LOW 7.0 percent.

In the long run, mortality becomes the determining factor indeed in the process of 'population ageing'.

Figure 2.1 — Percentage of population aged 60 and over (left scale) and of the median age (right scale) in the World, Europe, and Japan. Estimates of the biannual prospects for years 1950-2050 and long-range projections for 2100 and 2200

Notes: □ 'Europe' defined according to the UN classification (total of 47 countries); □ Long-range projections do not provide an estimate for the proportion 60 and over in Japan

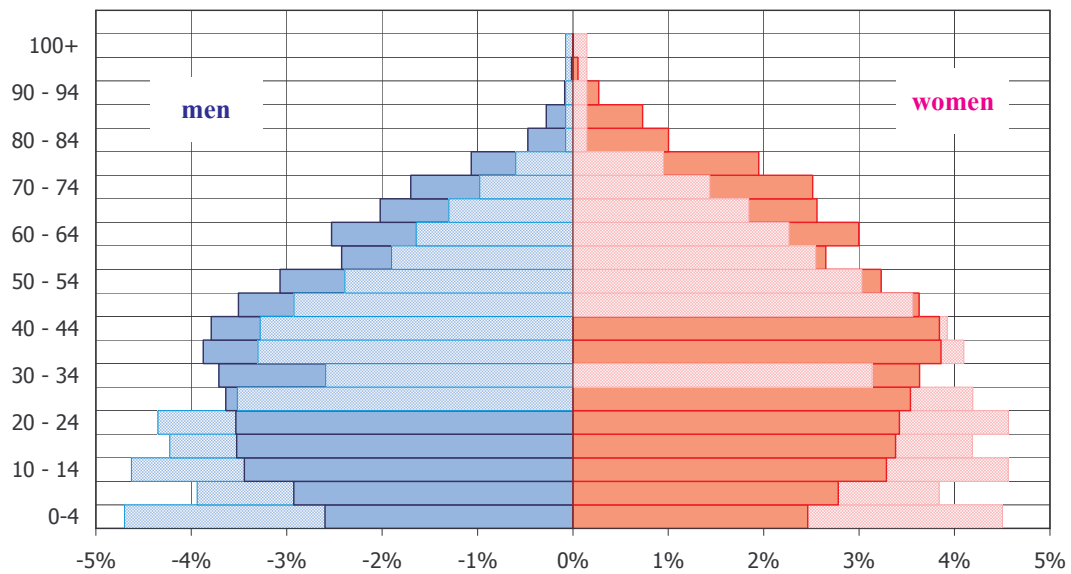


Source: UN (2003a, 2003c, 2004)

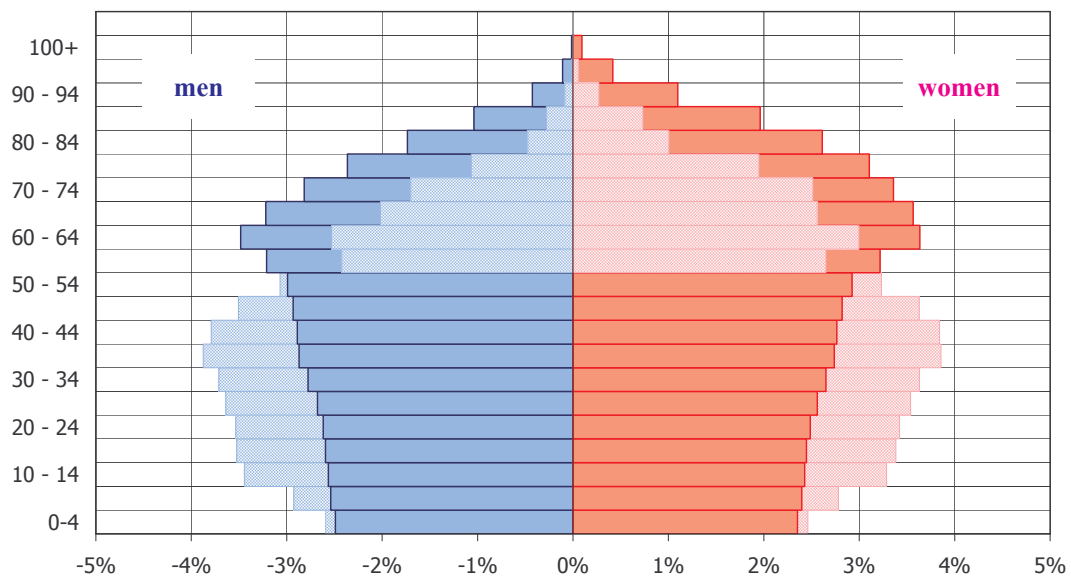
Figure 2.2 — Changes in the age pyramids of the European population, from 1950 to 2000 (panel A) and from 2000 to 2050 (panel B)

Note: 'Europe' defined according to the UN classification (total of 47 countries)

A. Situation 1950 (light shades areas) vs. situation 2000 (dark shaded areas)

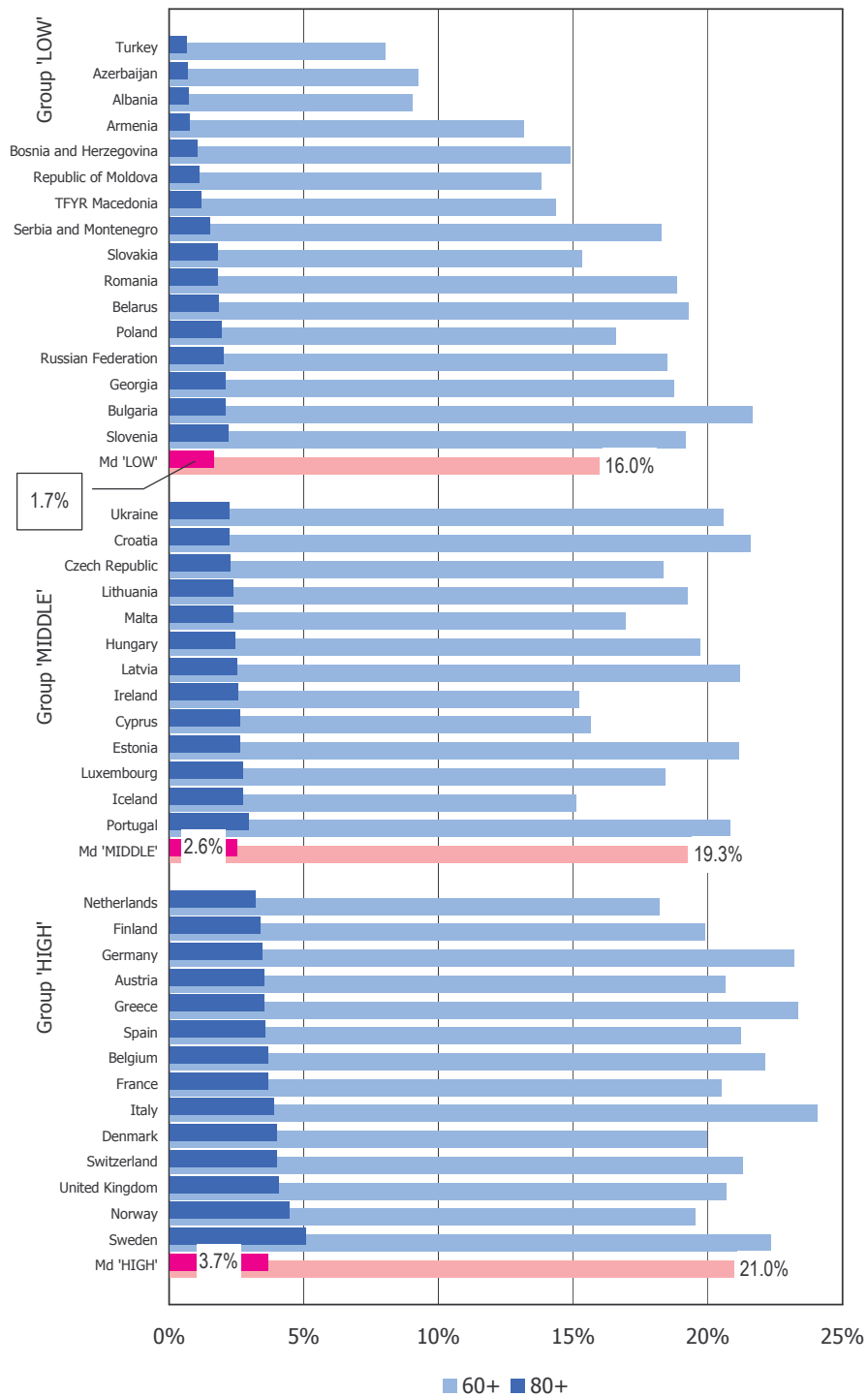


B. Situation 2000 (light shades areas) vs. situation 2050 (dark shaded areas)



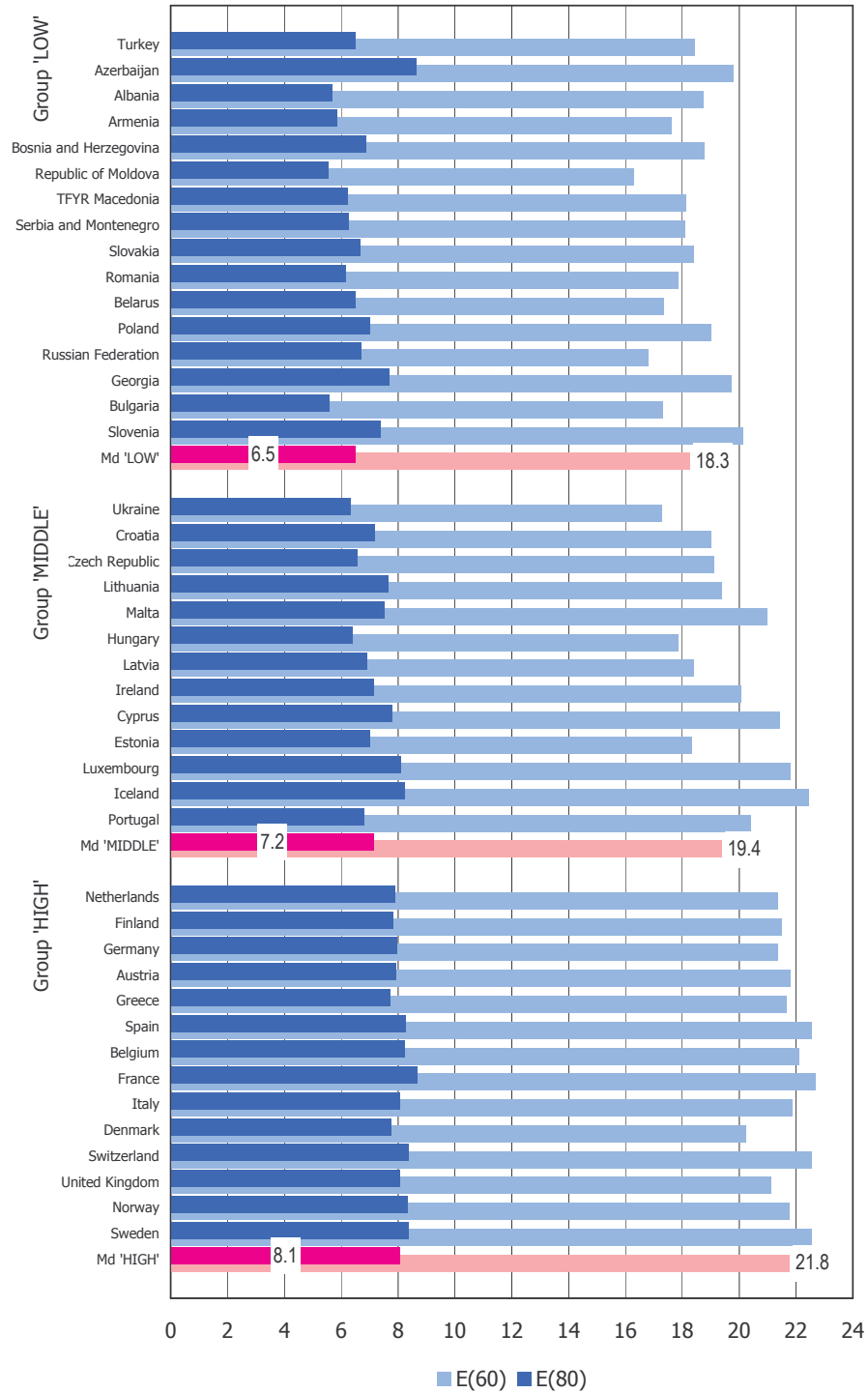
Source: UN (2003a)

Figure 2.3 — Percentage of persons aged 60 and over and of persons aged 80 and over in the member states of the Council of Europe, by sub-group, 2000



Source: UN (2003a)

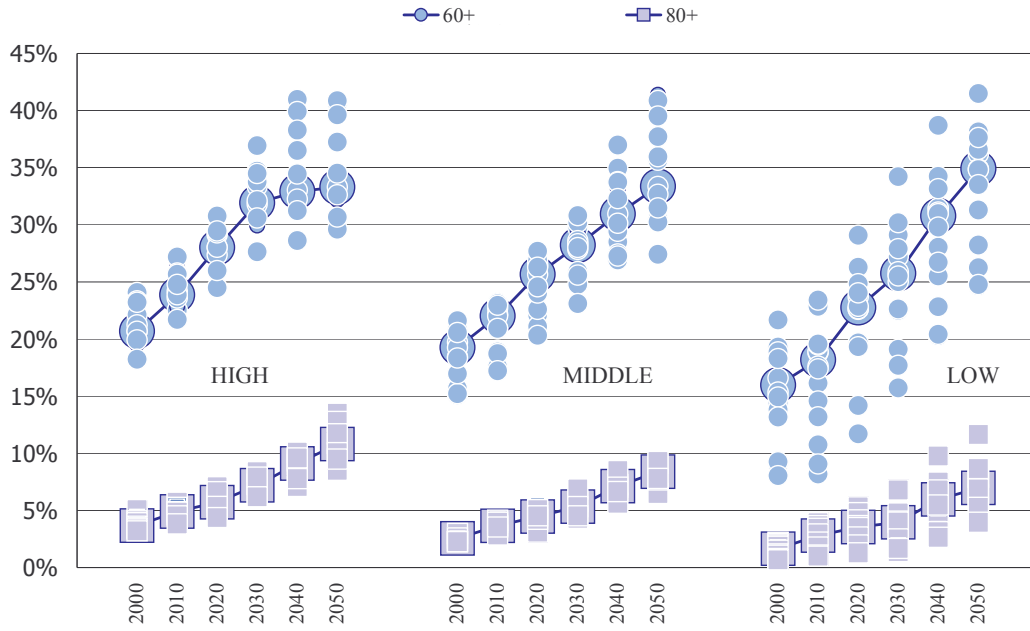
Figure 2.4 — Life expectancy at age 60 and at age 80 in the member states of the Council of Europe, by sub-group, 2000



Source: UN (2003a)

Figure 2.5 — Prospected percentages of people aged 60 and over and aged 80 and over, by sub-group, period 2000-2050

Note: □ Dots represent individual country values; □ Oversized dots and curves indicate median value for each sub-group



Source: UN (2003a)

Table 2.1 — Median age and percentage of people aged 60, and annual rate of change, in the World, Europe, and Japan, for selected years

A. Median age											
Region/ country	1950	2000	2050	2100	2200	2300	annual rate of change				
							1950-2000	2000-2050	2050-2100	2100-2200	2200-2300
World	23.6	26.4	36.8	44.0	45.5	48.0	23.0%	66.4%	35.5%	3.4%	5.4%
Europe	29.2	37.7	47.7	44.3	47.2	50.3	50.8%	47.4%	-14.9%	6.3%	6.3%
Japan	22.3	41.3	53.2	47.4	49.8	53.0	123.3%	50.7%	-23.1%	5.0%	6.2%

B. Percentage of population aged 60 and over											
Region/ country	1950	2000	2050	2100	2200	2300	percentage point difference				
							1950-2000	2000-2050	2050-2100	2100-2200	2200-2300
World	8.2%	10.0%	21.4%	30.4%	30.4%	30.4%	1.8	11.4	9.0	0.0	0.0
Europe	12.1%	20.2%	35.1%	32.5%	36.5%	40.4%	8.1	14.8	-2.6	4.0	3.9
Japan	7.7%	23.3%	42.4%	n/a	n/a	n/a	15.6	19.2	---	---	---

Source: UN (2003a, 2003c)

Table 2.2 — Crude death and crude birth rates in Northern and Western European countries, around 1750 and 1800, and in years 1950 and 2000

A. Crude death rate							
± 1750	± 1800	1950	2000	annual rate of change (%)			
				1750-1800	1800-1950	1950-2000	
27.0 ¹	21.2 ²	11.3 ⁵	10 ⁵	-48.4%	-41.9%	-16.6%	

B. Crude birth rate							
± 1750	± 1800	1950	2000	annual rate of change (%)			
				1750-1800	1800-1950	1950-2000	
38.7 ³	32.7 ⁴	17.2 ⁵	11 ⁵	-33.7%	-42.8%	-82.3%	

1/ Median value for England and Wales, France, Finland, Norway, and Sweden;

2/ Median value: as 1, plus Belgium, Denmark, Germany, and the Netherlands;

3/ Median value for England and Wales, France, Finland, Norway, and Sweden;

4/ Median value: as 3, plus Austria, Belgium, Denmark, Germany, and the Netherlands

Source: Chesnais (1986) for 1-4 and UN (2003a) for 5

3. The economic and financial impact of population ageing

The key issue in the discussion on 'population ageing' is the fear that the shift in the number of 'economically active' — roughly the adult population providing the goods and services in a society — with respect to the 'economically non-active' — the young (who are at school) and the old (who are retired) — will undermine the sustainability of the existing social systems — the payment of family allocations, pensions, and health care services.

Demographic textbooks suggest capturing this shift by one single indicator, the so-called dependency ratio. Its formula is as follows:

$$\text{Dependency ratio} = [N(0-19) + N(65+)] / [N(20-64)]$$

The nominator represents the number of persons at non-working age and the denominator those at working ages. The suggested age limits may be subject to criticism. Depending on the actual situation in the country it may be more appropriate to define, for example, the 'young' as those aged 0-14 years. The age limits indicated above are those that are commonly used for international comparative purposes.

At any rate, the dependency ratio is a strict 'demographic' indicator. It does capture the changes in the age structure of a population. It is a poor measure to capturing the changes in the ratio of the economically non-active with respect to the economically active persons in a population. We return to this in paragraph 3.2 with the use of employment rates. But let us start by having a look at the changes in the age structure by broad age groups and the evolution of the dependency ratio.

3.1. Evolution of the dependency ratio

Figure 3.1 presents for each of the three sub-groups the changes in the age structure by broad age groups (0-19, 20-64, and 65 and more) and the corresponding dependency ratio, in 1950 and between 2000 and 2050.

In all sub-groups one observes a 'narrowing' of the age segment that is associated with the working ages. In for example sub-group HIGH, in 1950 persons aged 20-64 represented 58 percent of the total population; by 2000 their relative share had slightly increased to 61 percent, but by 2050 they will hardly represent one half of the total population (52%). The actual values differ, but the patterns of change are similar in the other sub-groups.

Concurrently with the diminishing share of the working age population one observes the increase in the dependency ratio, reaching by 2050 values that are close to one in all sub-groups (and of more than one if one restricts the upper age limit to 60). The precise values are given in table 3.1 for a selected number of years.

The values illustrate the far-reaching consequences that 'population ageing' may have on the economic and financial structures of society. Between 2000 and 2050 in the countries of sub-groups HIGH and MIDDLE per 100 persons at non-working age the number at working age will reduce by no less than one third; in the case of sub-group HIGH the number decreases from 156 to 106 (and to only 83 if one restricts the upper working age to 60).

The situation appears less serious for the countries in sub-group LOW. However, a closer look at table 3.1 reveals that here the greatest changes will occur after 2025. For the time being, the

countries in sub-group LOW have slightly higher proportions of their population at working age, which is the result of higher fertility until recently (reflected in figure 3.1 by the higher proportions aged 0-19 in the beginning of the century).

Based on these results, 'population ageing' can be feared to pose a serious economic and financial threat and the future looks quite worrisome indeed. But, as said, the dependency ratio (and the other indicators that can be derived from it) only reflects demographic changes. What is the outlook if also more economic parameters such as employment rates (and the changes therein) are taken into account? This will be dealt with in the next paragraph.

3.2. A more realistic outlook by using employment rates

Figure 3.2 presents the percentage of persons who are economically active (or the labour participation rate, comprising employed and non-employed) by 5-year age group for men and women. The data are based on the *Community Programme of Population and Housing Censuses in 2001* (Eurostat, 2004a). As said in the introductory notes, the data set does not cover all member states of the Council of Europe. However, the countries that are included can be regarded as 'representative' samples for each sub-group²¹.

On average, the rates are higher for men than for women. The large variation is also quite clear between countries — and the fact that there is more heterogeneity among women than among men.

Age patterns vary among countries. For example, Sweden has relatively high labour force participation (for both men and women) at higher ages (age 50 and beyond), but shows low rates at young ages. Poland on the other hand has relatively low participation rates. This is at least the case for men, much less so for women.

Swedish men show much lower labour force participation at young age than Polish men. In age group 15-19, in Sweden only 17.5 percent of men identify themselves²² as 'economically active'. In Poland, 37.0 percent of men state being active. For women one can observe the reverse pattern: labour force participation of young women is less in Poland than in Sweden (although the difference is much smaller: 13% vs. 20%). However, more important in the light of the following lines, more particularly the assumptions regarding increased employment rates, is the observation that in Sweden male-female differences are relatively small. This is not only true for just age interval 15-19 but also for more 'adult' ages.

Other countries such as France and Switzerland (not identified) show relative high participation rates for men, but only at 'middle' ages; on the other hand — this is especially the case for Switzerland — participation rates for women are much lower than average.

The results also show that in general women enter the labour market at a later age than men. For men, the highest labour force participation (median value of 92%) is recorded for ages 30 to 40; for women not before ages 40-44 (81%).

Figure 3.3 allows a closer look at basically the same data. The figure does not display individual country values but only median values, but patterns are displayed for each sub-

21 See footnote 4 in paragraph 1.2. The complete list of countries is given in the explanatory note with figure 3.2.

22 The Eurostat data base stems from census data.

group. Moreover, the information is not limited to labour force participation, but also comprises employment²³. Finally, figure 3.3 gives a summary measure for the rates for ages 50 to 65.

There are important differences between sub-groups. The differences are greatest for women and in general they concern differences in employment rates. The gap between labour force rates and employment is especially obvious for sub-group LOW and in all sub-groups, the gap is greater for women than for men.

Although actual levels differ seriously, all sub-groups show relative low rates for labour force participation and employment for ages 50 to 65. Although in most countries the standard age retirement age is 60-65 years (OECD, 1998), on average²⁴, close to one third (sub-group HIGH) to more than half (sub-group LOW) of the men do not have a job in the 10-15 years before reaching age 65. For women, the number without a job is much higher: half (HIGH) to three-quarters (LOW) of women aged 50-64 are without employment. It would however be wrong to interpret these figures as particularly high rates of unemployment. This is denied by the close correspondence between the curves of labour force participation and employment. The explanation is rather that many people have stopped being 'economically active' long before they reach retirement age.

The reasons for leaving the job market may be manifold. In some countries the dominant reason may be the hardship of working conditions; in others it may be health conditions. The reasons must differ between countries.

According to the OECD (1998: 14, 43), the current trend and desire to early retirement must be in part a reflection of a rising demand for leisure as societies become more prosperous but also be interpreted as a response to existing early-retirement benefit schemes. In many Western countries old-age pension schemes, in conjunction with disability benefits, actually discourage work at older ages. Most of the early-retirement and disability schemes have been developed in the ninety-seventies and ninety-eighties as a response to high and persistent unemployment among younger workers.

The effect of increased employment rates

In the following lines the effect of increased employment rates will be measured. The basic idea is to assess to what extent increased employment rates would be able to 'offset' the negative effects of the decreased numbers of people at working-age (as shown in figure 3.1, by the evolution in the dependency ratio).

The simulations as such did not constitute a serious problem, but the difficulty was how to decide on the underlying assumptions, more particularly on the level of the increases of employment? One easy solution was to assume full employment but such approach would have been criticised (for good reasons) as being 'totally unrealistic'. It was decided to choose the

23 For reasons that will be detailed further below (and already in figure 3.3), the concept of 'employment rate' used here does not correspond to the 'conventional' definition, i.e. the proportion of employed among those who are 'economically active'. 'Employment rate' is here calculated as the number of persons effectively employed over the total number of persons, irrespective of labour force participation, i.e. irrespective of whether the person is categorised as 'economically active' or not.

24 The percentage values that are given in figure 3.3 correspond to the median for values for all countries as observed in age intervals 50-54, 55-59, and 60-64.

countries with the highest employment rates as references. It turned out that these were observed for Denmark, Finland and Sweden. Besides the fact that activity and employment rates needed to be higher-than-average overall, the guiding principles for the selection were also (a) relatively high rates beyond age 50; and (b) relatively high rates for women.

As a result, eventually the 'Scandinavian' model was chosen as a reference²⁵.

There are in total four scenarios, the assumptions of each are given in table 3.2. One particularity of the assumptions is that their effects are cumulative.

The objective of the simulation exercises is to assess to what extent increased employment rates may be able to 'offset' the effects of decreasing proportions of the population at working-age. Figure 3.4 gives by way of illustration the changes in the age structure for the countries of sub-group HIGH. The figure presents the proportions in the population by 5-year age interval (limited to the working-ages, 20-64, left panel) in 2000, 2025 and 2050; and the corresponding total percentage for age 20-64 (right panel).

The changes in the age structure can be observed from the percentages by 5-year age interval. Clearly, the percentages for the younger age intervals (ages 20 up to 45) were much higher in 2000 than they will be in 2025 and 2050. At the same time one observes that the highest percentages for the oldest age intervals (ages 50 and more) are observed in 2025. The lower percentages in 2050 are related to the attenuation in the increase of older persons already observed earlier (cf. figure 3.1). Finally, one observes that the percentages by 5-year age interval increasingly show a 'smoother' age pattern. It has already been stated earlier (see comments regarding the changes in the age pyramids, figure 2.2) that in the long run the age structure of the European population will increasingly be in line with the survival curve of the life table.

In 2000, the proportion of people at working-age accounted for 60.1 percent of the total population. The implication of these changes is a steady decrease of the overall proportion of the population at working-age: from 60.9 percent to 57.9 percent between 2000 and 2025 and to just 51.7 percent by 2050. One and the other correspond to an overall decrease by over 15 percent (see table 3.3) between 2000 and 2050 of the working-age population.

As already known from the evolution of the dependency ratio (figure 3.1) the changes are somewhat different for the countries in the other sub-groups. This can also be observed from the results summarised in table 3.3. In all countries the greatest decrease in the working-age population can be expected to occur between 2025 and 2050. This is however especially the case for the countries in sub-groups MIDDLE and LOW. In fact, between 2000 and 2025 both will even experience a (slight) increase in the proportion at working-age (of 0.5% and 4.8%, respectively)²⁶.

But what are eventually the results from assuming increased employment rates, more particularly of the scenarios described above (cf. table 3.2)? The results for each sub-group are shown in figure 3.5.

Figure 3.5 is constructed on the same basis as figure 3.4. The left panel shows the percentages

²⁵ It is likely that also Norway may have fitted these criteria, but unfortunately Norway is not included in the Eurostat data set (cf. the speech of Arni Hole (2004), Director General of the Norwegian Ministry of Children and Family Affairs, given at the European Population Forum, 12-14 January 2004 in Geneva).

The actual steps of the selection are explained in more detail in Annex.

²⁶ One and the other are perfectly in line with the changes in figure 3.1.

by 5-year age interval for 2000, 2025, and 2050. The right panel however does not show the corresponding percentage of the population at working-age but the proportions employed for the same age range as implied by the changes in the age structure and the increases in employment as assumed in the scenarios ²⁷.

Let us start with the results for sub-group HIGH. In 2000, the 'average' employment rate ²⁸ of the population in the countries of sub-group HIGH was 43 percent. Assuming constant employment rates (i.e. equal to those observed in 2000), the percentage of people employed will *on the basis of the demographic changes alone* decrease to 39 percent and to 35 percent by 2025 and 2050, resp. However, assuming increased employment rates, for 2050 the percentage would, according to scenario C, be increased to 41 percent — a value much closer to the 'initial' 43 percent. Depending on one's outlook, one may state that the increase of employment would limit the 'loss' in employment to 2 percentage points or would provide a 'compensatory' effect of 75 percent ²⁹.

The results are different for sub-groups MIDDLE and LOW. They can in fact be considered much more 'optimistic' to the effect that increased employment would generate *higher* rates in 2025 and 2050 than the one observed for 2000. For sub-group MIDDLE, the changes in the age structure would lower the percentage of people in employment from 40 percent in 2000 to 33 percent in 2050. Applying the rates of scenario C would however bring employment to 41 percent. The effect is much greater for sub-group LOW. On average, for these countries the effect of scenario C would be to 'boost' employment in 2050 to a full 43 percent — no less than 9 percentage points more than the value observed in 2000 (34%).

In a way, these results are related to the relatively low employment in 2000 for sub-groups MIDDLE and LOW compared to the value for sub-group HIGH: 40 percent and 34 percent, respectively, as compared to 43 percent). But the main effect stems from applying the 'Scandinavian' model, more particularly the implication of higher labour force participation of women. The effect of scenario A alone is an increase of employment by 4.2 percentage points for sub-group MIDDLE and by 9.6 percentage points for sub-group LOW. The mere application of scenario A is sufficient for obtaining employment rates in 2025 and 2050 that are 'significantly' higher than the one observed in 2000 for sub-group LOW.

The effects are far from homogeneous among countries of each sub-group. In Austria, for example, even in the case of the most optimistic scenario (C), employment rate in 2050 would be four percentage points less than in 2000 (40% vs. 44%). On the other hand, for Greece it would mean four percentage points more (38% vs. 34%). The extent to which increased employment may compensate for the older population structure largely depends on the magnitude of the demographic change and on the initial patterns of employment (compared to the 'Scandinavian' model, Greece experienced low female labour participation in 2000) ³⁰.

27 Equal to the sum of multiplying employment rate by the percentage by 5-year age interval.

28 The term 'average' refers to the fact that the result is based on the combined data for countries in sub-group HIGH, with, however, the restriction (contrary to figure 3.4) that not all countries are included, but only those for which information is available on the number of 'economically active' and 'employed' (see list in note figure 3.2). The same remark applies to the results for sub-groups MIDDLE and LOW.

Let us also remind that 'employment rate' does not correspond to the 'conventional' definition but refers to the number of employed with respect to, the total population.

29 Calculated as $100 * [(0.41-0.35) / (0.43-0.35)]$.

30 Individual country effects of increased employment are shown for a selected number of countries in figure A4 in Annex.

One and the other imply that the strategies for offsetting the negative effects of an older population on economic output will need to be tailor-made. One not only will need to take into account the specific demographic situation of the country, but also the local conditions regarding labour force participation, in particular the situation of women in this respect.

The wealth of a country does not only depends on the share of its population at working-age. Another determining factor is labour productivity — its technical level for producing good, or in a more general way the added value to the goods and services it produces. This is the subject of the following paragraph.

3.3. The (in)compatibility of future GDP-levels with increasingly older population structures

Basic textbooks on economy will tell us that the Gross Domestic Product (GDP) per capita is a function of the proportion in the population at working-age, the number of those at working age being effectively employed, and the labour productivity or the average wealth generated by one person at work. One and the other is captured in the formula below:

$$\begin{aligned} \text{GDP / inhabitant} &= [\text{GDP / (proportion population employed)} \\ &\quad \times [(\text{population employed}) / (\text{population at working age})] \\ &\quad \times [(\text{population at working age}) / (\text{total population})] \\ &= [\text{labour productivity}] \times [\text{proportion population employed}] \\ &\quad \times [\text{proportion population at working age}] \end{aligned}$$

As suggested by the title — *The (in)compatibility of future GDP-levels with increasingly older population structures* — the objective of the present paragraph is to assess to what extent the increase in GDP-levels can keep pace with 'population ageing'. Or, using more down-to-earth terms, to what extent would societies be able to 'pay' for the extra financial 'burden' occasioned by older populations?

Future GDP-levels can be estimated with the use of the formula above. Some of its parameters are known. The demographic parameters (population at working-age) can be derived from the UN *Population Prospects* (UN, 2003a). Estimates of employment are available on the basis of the simulation results realised in the preceding paragraph. Several estimates for future productivity can be obtained by assuming different levels of growth derived from past trends (a standard practice of national planning offices). One practical problem however with the latter was that 'starting' levels are readily not available. The *Human Development Reports* of UNDP (e.g., UNDP, 2000) provide information on levels of GDP and on GDP per capita, but not on labour productivity. The first step of the exercise therefore consisted to estimate 'productivity' levels for 2000. This was achieved using the basic formula above.

The estimation procedure and the actual calculations are given in table A2 in Annex. The obtained estimates are given in table 3.4 for each sub-group. It is important to note that the estimates are given in 2000 USD PPP equivalents³¹, making estimates comparable between

31 Made possible by the fact that the 2000 edition of the Human Development Report (UNDP, 2000) provides estimates of the GDP per capita in 2000 USD PPP equivalents.

sub-groups and allowing fixed-cost estimates in the future.

Table 3.4 points at the important differences between sub-groups. The 'average' productivity rate for sub-group MIDDLE is below 60 percent of the average for sub-group HIGH (57%); and with 47 percent the average of sub-group LOW is not even half of it. These differences have partly determined the assumptions regarding future growth rates of productivity³². Eventually, growth rates for productivity encompass a range with a minimum of 1.5 percent and a maximum growth rate of 3 percent per annum (see table A3 for the intermediate values)³³.

The results of the simulation exercises are presented in figure 3.6. Some preliminary remarks are needed before their interpretation.

Figure 3.6 does not include all the results (these can be found in table A3 in Annex). Next to the assumption that employment and productivity will remain unchanged (identified on the x-axis as 'Constant'), figure 3.6 only shows the estimated resulting from three combinations of scenarios regarding employment and growth of productivity ('AA', 'BB', 'CC', the letters referring to the scenario used for each parameter). Moreover, figure 3.6 does not show the estimates as such for GDP per capita but their relative increases in 2025 and 2050 with respect to the situation in 2000. One relative value refers to the increase with respect to the initial value in 2000; another one is with respect to the value obtained for sub-group HIGH (in case of panel 'sub-group HIGH, the latter value is equal to 100%). Finally, figure 3.6 shows the relative increase of the people aged 65 and more in the population with respect to, the situation in 2000.

The underlying justification for showing relative values is that the estimates of GDP per capita are meaningless unless their relative increase can be judged against the increase of the higher number of older persons. The inclusion of the relative value with respect to the GDP per capita obtained for sub-group HIGH permits to have a measure of absolute wealth; for the countries in sub-group MIDDLE and LOW, even (very) important increases of GDP does not automatically imply reaching a similar level as the one estimated for sub-group HIGH.

Eventually, which conclusions can be drawn from figure 3.6?

At constant employment and at constant productivity in 2050 GDP per capita will be less than in 2000 for all sub-groups (for sub-group HIGH GDP per capita will already in 2025 be lower than in 2000). However, even at the most moderate levels of growth³⁴ for both employment and productivity all countries would experience relative increases of GDP per capita that are greater than the relative increase in the population aged 65.

The only exception when the most moderate levels of growth are assumed would be the countries of sub-group HIGH in 2025, staying two percentage points short for 'breaking even' (+37% vs. +39%). However, in all other cases increases in GDP per capita would largely exceed the ones in the number of older people in the population. By 2050, on the basis of

32 One and the other will become clearer in discussing the results of figure 3.6. let it already be said that the underlying reasoning is that in the case of sub-groups MIDDLE and LOW the only objective can not be assessing to what extent growth in productivity (and hence GDP per capita) would make it possible to keep pace with increasingly older population structures, but also to 'catch up' with the more affluent countries of sub-group HIGH.

33 Note that the economic perspectives of the Belgian Planning Office are based on an annual growth of 1.75% (personal communication Michel Englert, Federal Bureau du Plan).

34 Scenario 'AA', implying the basic 'Scandinavian' model for employment and a modest growth of productivity of just 1.5% per annum.

scenario 'CC'³⁵ the increase in GDP per capita may be twice as important as the increase in the numbers aged 65 and more (+156% vs. +73%).

The same scenario would imply similar results for the countries of sub-groups MIDDLE and LOW. By 2050, scenario 'CC' would imply increases of GDP per capita of 174 percent in sub-group MIDDLE and of no less than 241 percent in sub-group LOW. However, although more important, these increases would compensate any better for the demographic changes (+102% for sub-group MIDDLE and +120% for sub-group LOW). More worrisome however is the observation that, in spite of their important increases, in both sub-groups GDP per capita will remain far below the estimate for sub-group HIGH. In sub-group MIDDLE GDP per capita will represent not more than 57 percent; and in sub-group LOW not more than 51 percent.

This is not to say that it is impossible for countries of sub-groups MIDDLE and LOW to attain levels of GDP per capita equivalent at those obtained by countries in sub-group HIGH. This will however need some 'extra' effort. According to the results in table A3 in Annex the level will always remain below the one that is estimated with scenario 'CC'. It should however be possible to arrive at the level of sub-group HIGH in 2050³⁶ that is attained with scenario 'BB' (54,245). But for countries of sub-group MIDDLE this will need a steady growth rate of a full 3 percent per annum — a much higher increase than the 1.75 percent assumed for sub-group HIGH. Sub-group LOW will need an even greater extra effort. To come to a GDP per capita that is equivalent to the one obtained in sub-group HIGH, countries of sub-group LOW not only need productivity to grow annually by a full 3 percent but in addition need to arrive at the highest level for employment (scenario C) — a pattern that some may even consider hard to reach for countries of sub-group HIGH³⁷.

A 'reliability' test

A haunting idea with simulation exercises is that their outcomes are no't at all realistic. The assumptions might look credible on paper but there is no way that they will be realised in the future. And since, by definition, the future is unknown tests are rather difficult.

One way however is to see to what extent the outcomes are in line with past trends. The results of such exercise are given in figure 3.8.

The starting point of the exercise are the values of GDP per capita for the years 1975, 1980, 1985, 1990, and 1998 (the latter not shown in figure 3.8) observed for the countries of sub-group HIGH (UNDP, 2000). Depending on the number of data points used³⁸ in the calculation HGDP per capita would increase at an annual rate of 1.30 percent or 1.64 percent. Applying such growth rates to the median value of the values of GDP per capita observed in 2000 (UNDP, 2002) gives trend lines corresponding to the red curves in figure 3.8. (the one corresponding to an annual growth of 1.30% is indicated in bold, being the most 'conservative' estimate).

35 Corresponding to the highest levels of employment (cf. table 3.2) and an annual growth rate of 2% for labour productivity.

36 Note that the level of GDP per capita that is obtained for sub-group HIGH on the basis of scenario 'BB' (37,285) is never attained by sub-groups MIDDLE and LOW, for not any scenario.

37 Scenario C assumes increased employment by 2.5% for men and by 5% for women at all age intervals: see table 3.2.

38 From 1975 through 2000, or from 1975 through 2050, the values themselves being obtained with the SPSS-function 'TREND'.

The red curves indicate for 2025 estimates of GDP per capita that are very close to the estimate based on scenario BB. As can be expected the gap between both curves widens towards 2050 but both estimates remain consistent with those of the simulation exercises. One may assume that the increases in GDP per capita as implied by the scenarios are in line with the increase that is observed on past values.

The differences between the estimated and observed values in the years 1975 to 1990 must be attributed to the fact that the latter are given in 1995 USD, whereas the former are derived from the 2000 value that is expressed in PPP 2000 USD.

The 'test' has been realised only for the countries of sub-group HIGH. It must be clear from the results in figure 3.7 that for the other countries any 'test' based on past trends would be unreasonable (and should be hoped not to give consistent results).

It should also be noted that the conclusions drawn from the simulations above are rather similar to those of other more 'specialised' studies. For example, both the report prepared by the Economic Policy Committee of the European Commission (EPC, 2001) or the 2004 Report of the Belgian Study Commission on Ageing (Studiecommissie voor de vergrijzing, 2004)³⁹ underline the importance of higher productivity — and therefore increased GDP — and of higher labour force participation of women.

Finally, one should also keep in mind that the increase of employment rates as implied in the different scenarios (cf. table 3.2) "[...] would address many social problems as well as helping to meet workforce needs" (Coleman, 2004: 36; see also Punch and Pearce, 2000). We will return to this in the paragraph on *Final comments and considerations*.

3.4. The unpopularity of some suggested changes: some results of the 'DIALOG' project

The simulation results shown above indicate that increasing employment after age 50 (scenario B: cf. table 3.2) would in most countries (at least partially) compensate for the unfavourable changes in the age structure. This measure would imply forsaking existing early retirement schemes and that, on average, people would need work longer.

However, according to some results of the DIALOG-project (DIALOG, *on-going activity*), an 'attitude' survey, this could constitute a highly unpopular measure.

The module on 'older people' includes two relevant questions in this respect: on the *expected* age of retirement and on the *preferred* age of retirement. The answers to both questions are given in figures 3.9 and 3.10 for each of the participating countries⁴⁰.

According to the results, on 'average' 59 percent (median value) of the persons interviewed in the 'Western' countries do expect to retire before age 65. The two exceptions are West and East

³⁹ The Economic Policy Committee acts under the guidance of the Directorate General for Economic and Financial Affairs of the European Commission. The report brings together the work undertaken by a group on ageing populations attached to the EPC. Chairperson of the Group on Ageing Populations is Henri Bogaert (Commissioner of the federal Planning Office in Belgium) and chairperson of the EPC is Jean-Philippe Cotis (Chief Economist at the OECD)

The [Belgian] Study Commission on Ageing acts under the auspices of the Hoge Raad van Financiën (Conseil Supérieur des Finances/ High Council of Finance). The High Council of Finance is an advisory body to the Minister of Finances that has been established in 1936; its members include renowned specialists in matters of finance and economics.

⁴⁰ The limited number is the result of the fact that modules and questions vary between the partner countries.

Germany⁴¹, showing values of 32 percent and 41 percent. On average, only 34 percent of the interviewees expect to retire at the legal age of 65 years and only a minority (less than 10%) at an older age. In the 'Eastern' countries the percentage expecting to, retire before age 65 is no less than three-quarter.

It is very likely that the differences can be partly explained by the differences in job opportunity. The data of the *Community Programme* show for the 'Western' countries⁴² between ages 25 and 50 an unemployment level of 6.5 percent (median value between age intervals), but of 9.9 percent for the 'Eastern' countries (Eurostat, 2004a)⁴³. Poor job opportunities might be an even more forceful consideration for leaving the work force than are attractive early retirement schemes (which are mainly found in the Western European countries).

When asked about the *preferred* age of retirement the great majority (more than 85%) of persons interviewed answered before 65. The small variation between countries (or between both 'groups' of countries) is remarkable: the observed percentages vary between 84.1 percent (the Netherlands) and 95.9 percent (Slovenia). Very few people (hardly 10%) wish to retire at age 65: and the number prepared to work until after age 65 is negligible, the highest percentage is 5% and is observed for the Netherlands).

It has already been suggested above that the desire to early retirement could be related to more prosperity (OECD, 1998). This is possibly a valid explanation for the more affluent Western countries. However, other causes — and these would apply to all countries — could be job insecurity and in a more general way, job satisfaction. It is perhaps not so much the risk of losing one's job — this is generally not the case for civil servants — but the fact that career opportunities have become less clear than in the past. The length of service has become less and less the sole or major criterion for promotion. Promotion is more and more granted on the basis of individual skills and on job devotion. These characteristics are closely related to the aptitude (and willingness) for 'continued learning'. The latter may indeed be a key factor in the pursuit to maintain competitiveness, but may appear to workers as a rather menacing perspective⁴⁴.

41 The original reason to distinguish 'West' from 'East' Germany is made on technical grounds. The data stem from two separate samples of equal size. Presenting results for 'Germany' would have needed the use of weights, which we preferred to avoid in this case. However, as the results in figure 3.9 indicate, 'West' and 'East' Germany are sociologically still two different entities.

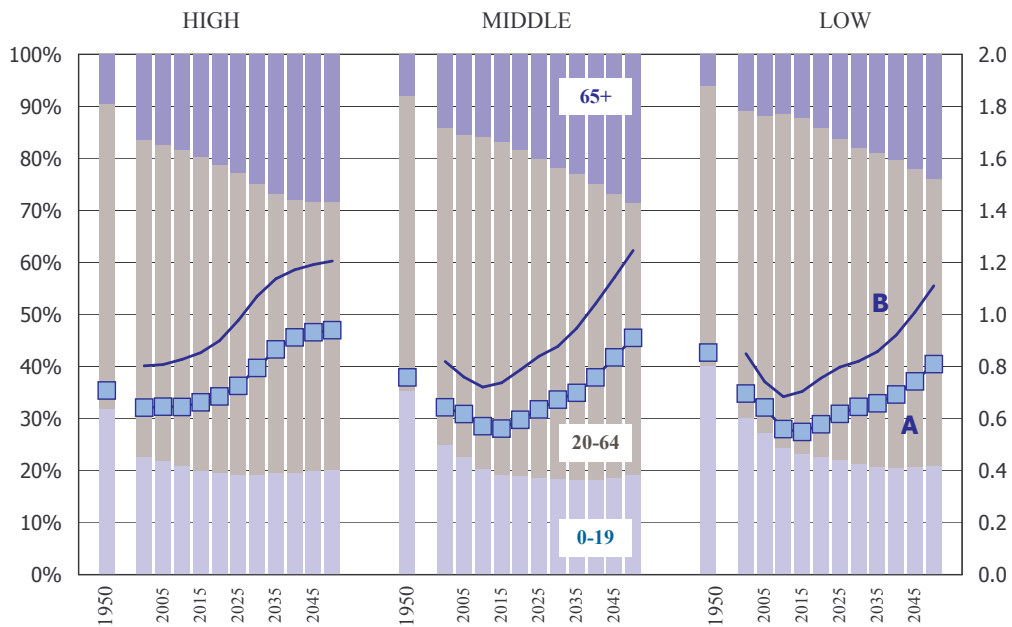
42 No distinction made in this case between 'West' and 'East' Germany.

43 With minimum and maximum values of 2.2% and 11.7% for the 'West' and of 2.5% and 23.4% for the 'East'.

44 Other researchers have reached similar conclusions. For example, also Bernard Fusulier, sociologist, researcher FNRS (Fonds National de la Recherche Scientifique) at the Université Catholique de Louvain (UCL), and Thibault Moulart, researcher at the UCL, suggest that the desire for early retirement could be related to increased job insecurity (cf. the position paper in the Belgian weekly *Le Vif* / *L'Express* of 17 December 2004).

Figure 3.1 — Evolution of the proportions of people in the population aged 0-19 years, aged 20-64 years, and aged 65 years and over (left scale) and of the dependency ratio (right scale), for sub-groups LOW, MIDDLE and HIGH, in 1950 and years 2000-2050

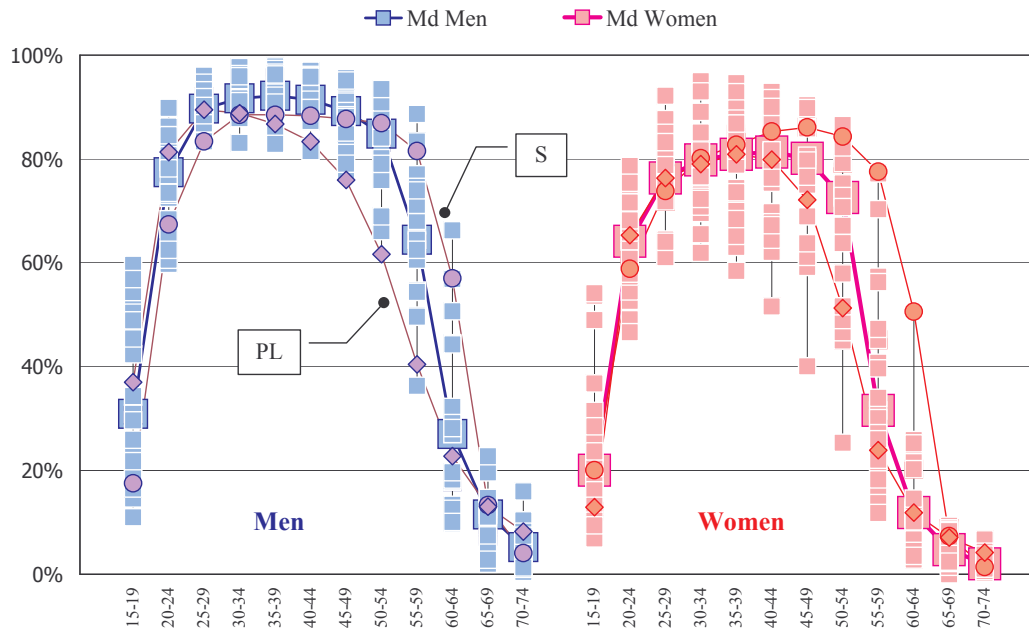
Note: Next to the 'common' definition using for working ages age limits 20-64 (A) the figure also shows the dependency ratio corresponding to age limits 20-59 (B)



Source: UN (2003a)

Figure 3.2 — Percentages economically active, by 5-year age interval and by sex, individual country estimates (dots) and median value between countries (solid graph line), circa 2000

Note: The results in figure 3.2 (and the figures below) stem from the data set *Community Programme of Population and Housing Censuses in 2001* (Eurostat, 2004a). The data set does not include information for all member states of the Council of Europe (cf. footnote 4). For sub-group HIGH, the countries included are: Austria, Denmark, France, Finland, Germany, Netherlands, Sweden (S), Switzerland, and the UK; for sub-group MIDDLE: Estonia, Czech Republic, Cyprus, Portugal, Ireland, Hungary, Luxembourg, Latvia, and Lithuania; for sub-group LOW: Bulgaria, Poland (PL), Romania, Slovenia, and Slovak Republic



Source: Eurostat (2004)

Figure 3.3 — Percentages economically active (median values between countries) and percentages employed (*idem*), by 5-year age interval and average for age group 50-64, for men and for women, by sub-group, circa 2000

Note: Results are based on the data of the following countries: see list figure 3.2.

Legend:

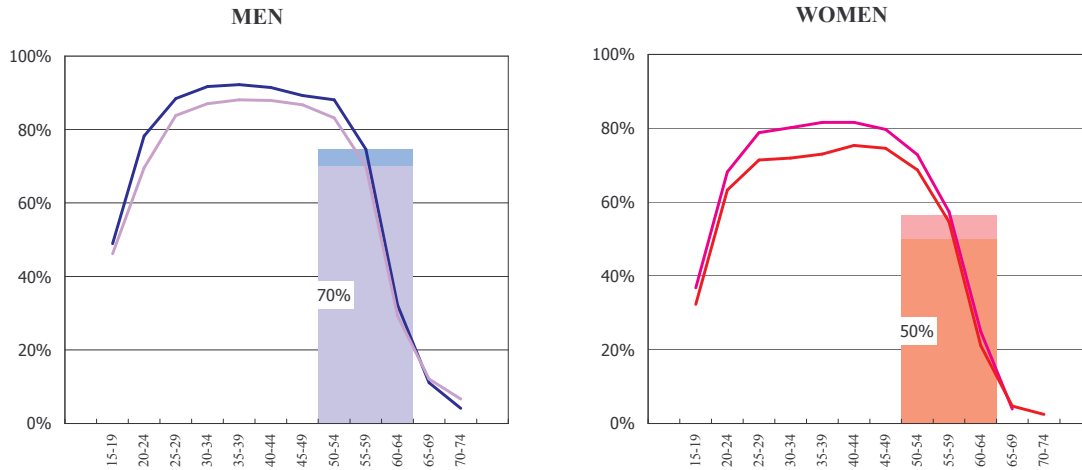
For men:

- Economically active ages 50-64
- Employed 50-64
- Employed 5-yr age interval
- Economically active 5-yr age interval

For women:

- Economically active ages 50-64
- Employed 50-64
- Employed 5-yr age interval
- Economically active 5-yr age interval

Sub-group HIGH



Sub-group MIDDLE

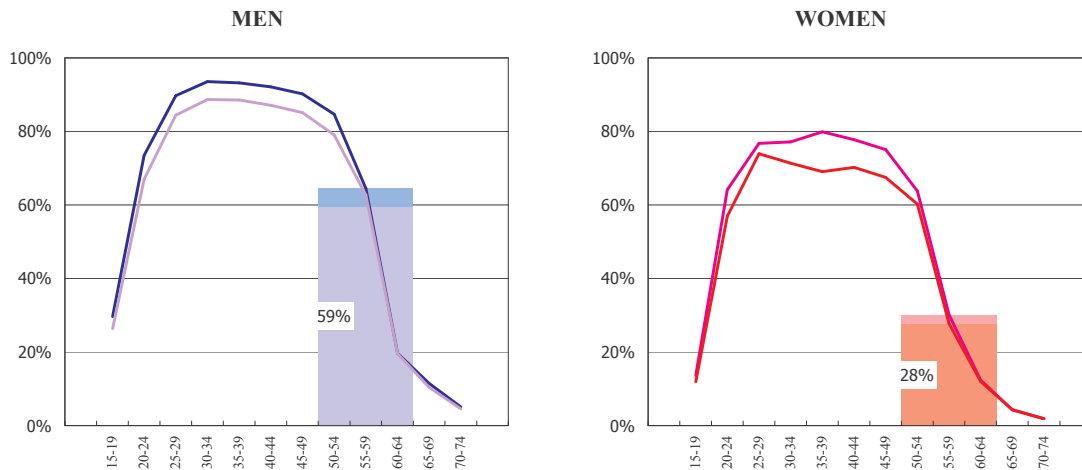
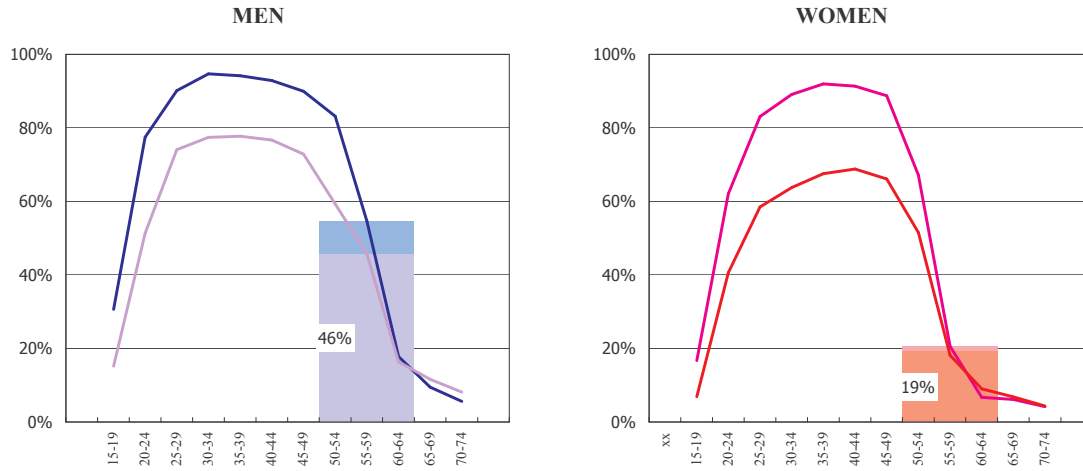


Figure 3.3 — *Cont'd*

Sub-group LOW



Source: Eurostat (2004)

Figure 3.4 — Changes in the age structure between 2000 and 2050. Percentage of the population per 5-year age group (left scale) and percentage of population at working age (ages 20-64, right scale) in 2000, 2025, and 2050, countries of sub-group HIGH

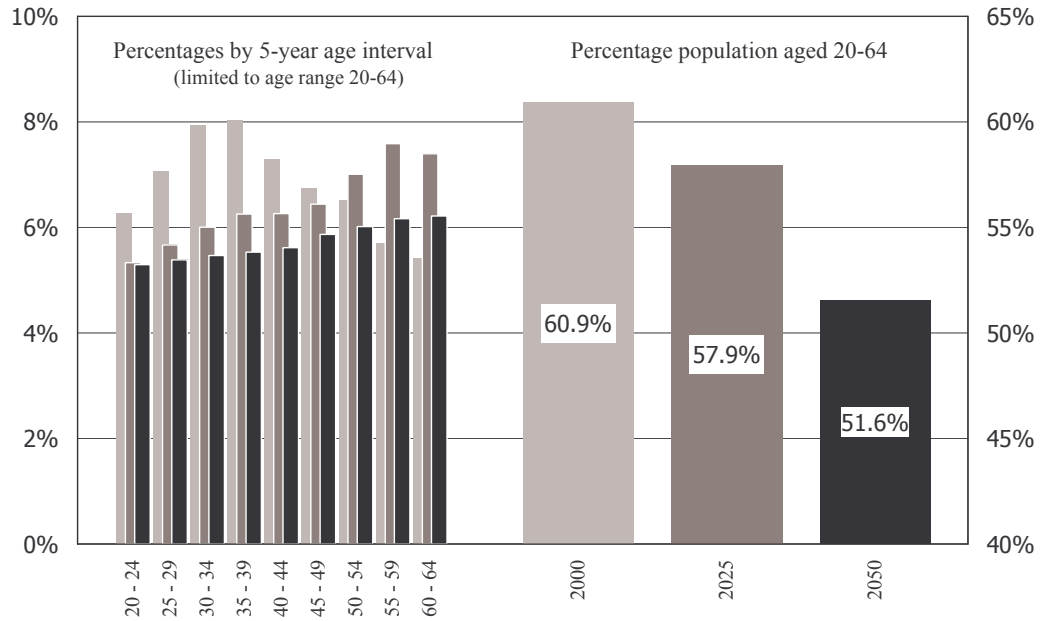
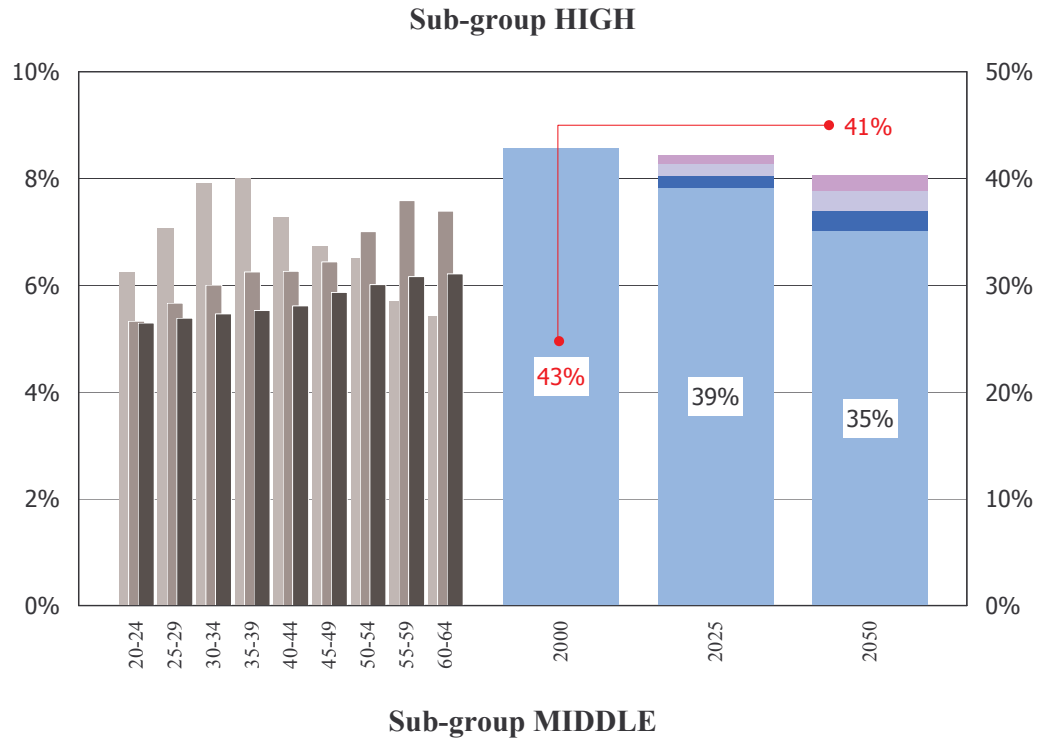


Figure 3.5 — Changes in the age structure by 5-year age interval between 2000 and 2050 (left scale) and percentages employed age group 20-64 (right scale), as observed in 2000 and as estimated in 2025 and 2050 according to scenario (see assumptions table3.2), by sub-group

Legend:

■ 2000 ■ 2025 ■ 2050 ■ constant ■ Scenario A ■ Scenario B ■ Scenario C



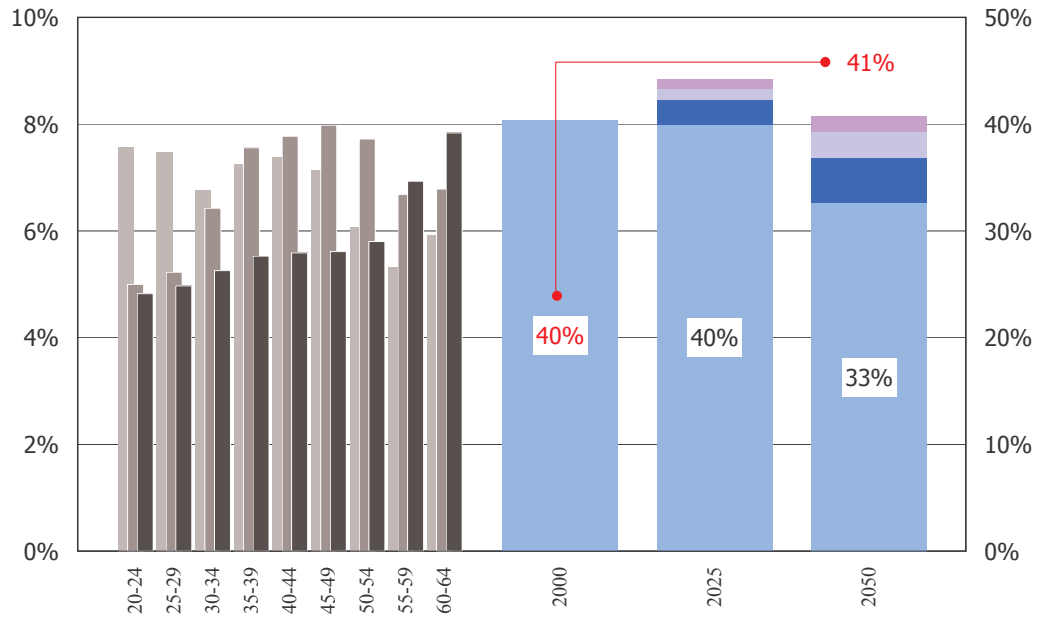


Figure 3.5 — *Cont'd*

Sub-group LOW

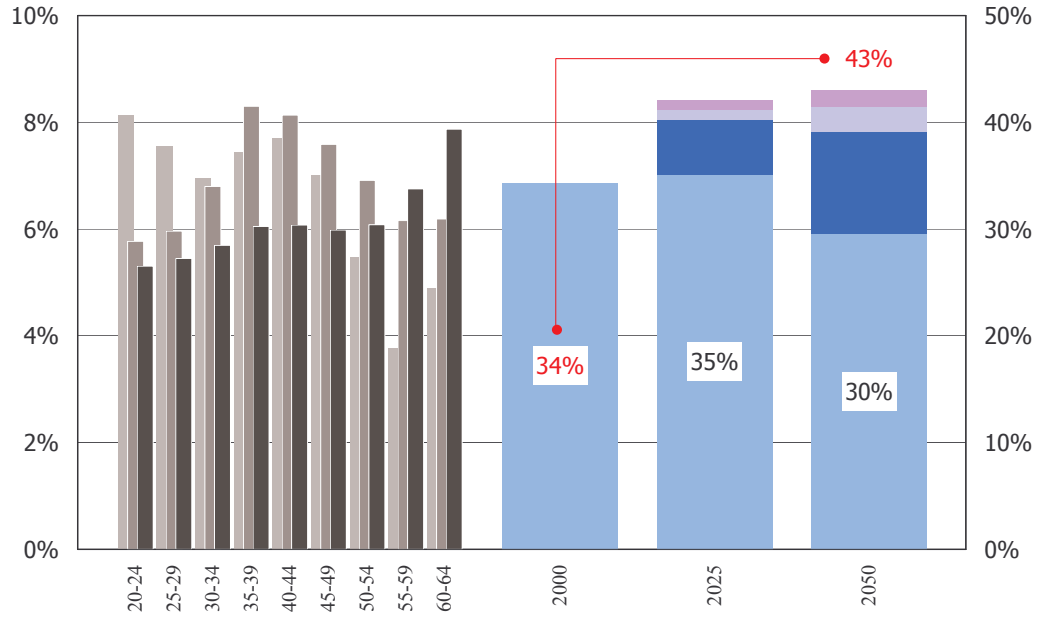
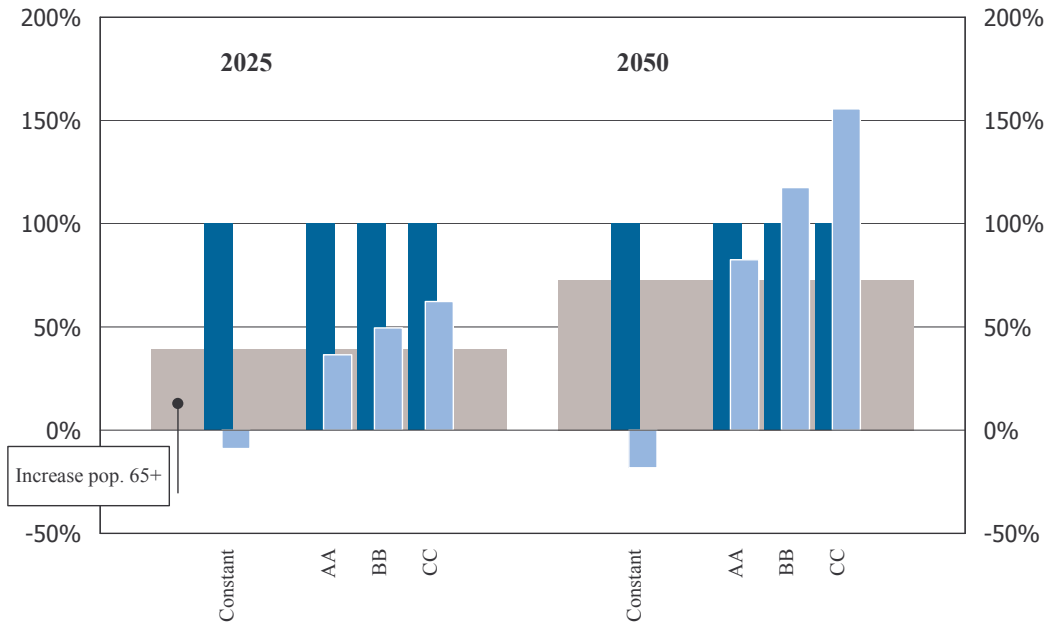


Figure 3.6 — Relative increases of GDP per capita in 2025 and 2050 with respect to 'observed' 2000-estimates, according to scenarios concerning increases in employment and productivity, by sub-group

Legend:

- Increase pop. aged 65+
- Increase by scenario
- Relative to estimate HIGH

Sub-group HIGH



Sub-group MIDDLE

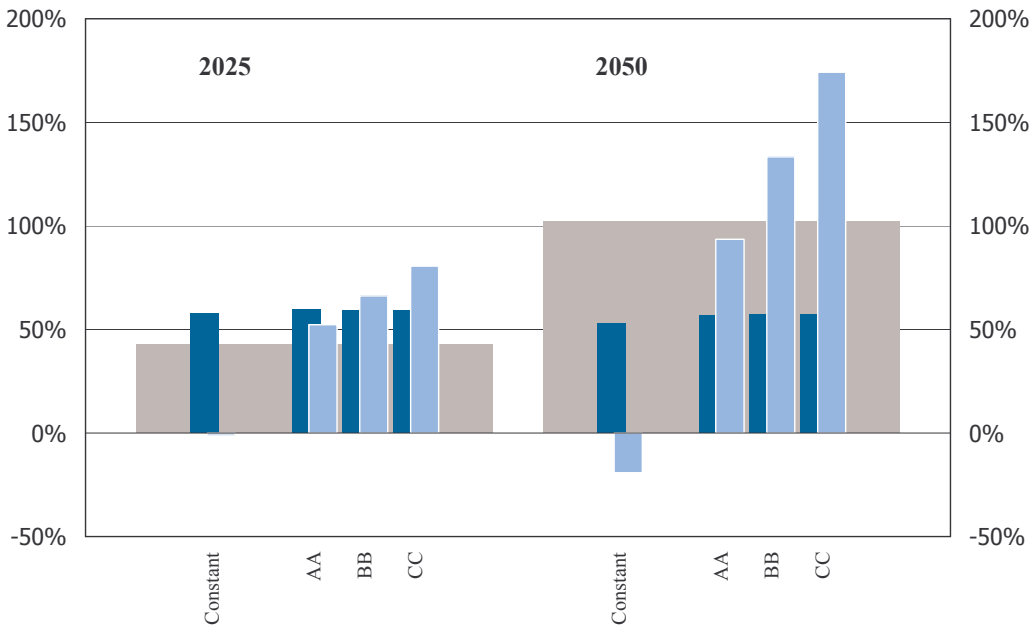
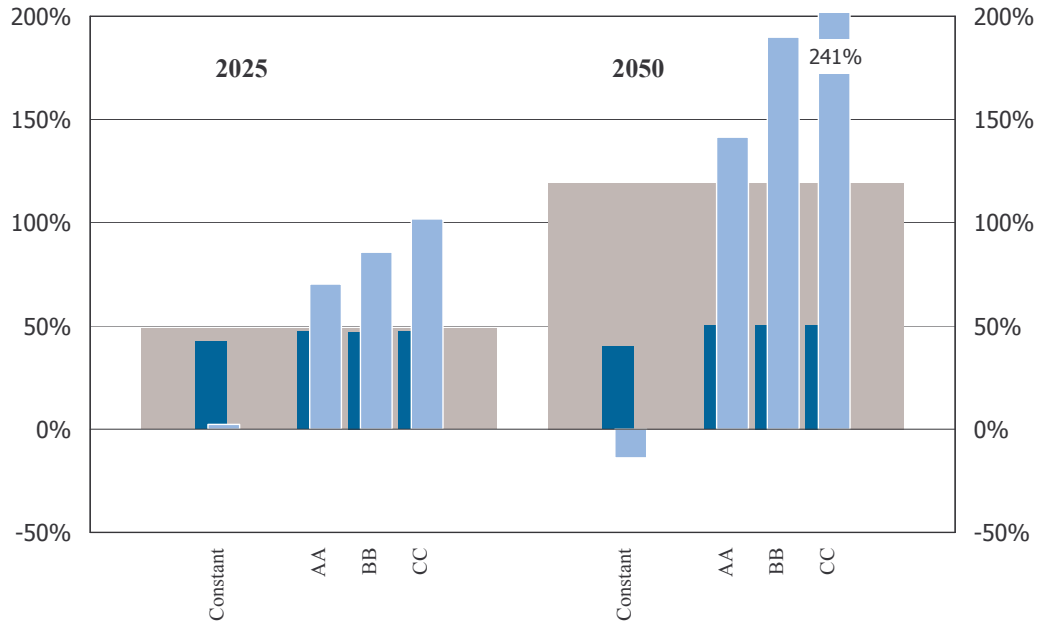


Figure 3.6 — *Cont'd*

Sub-group LOW



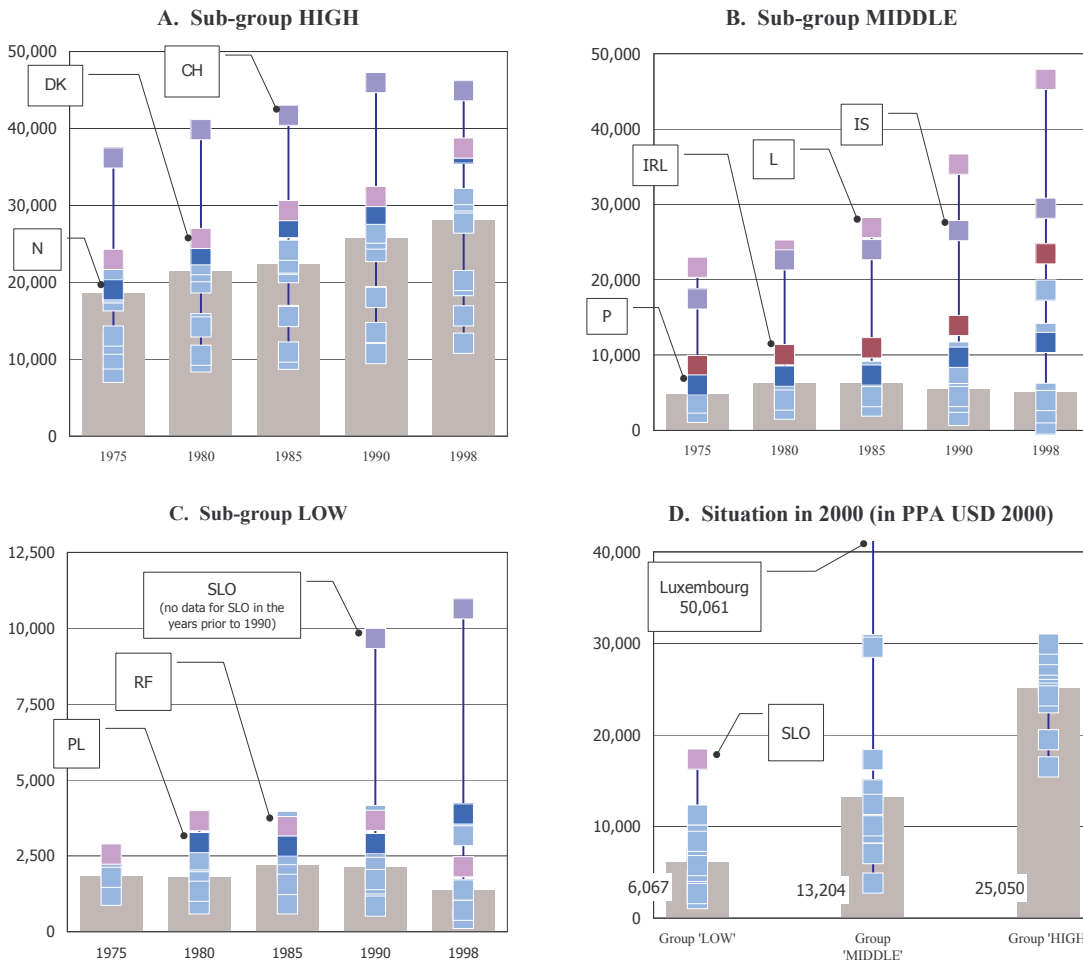
Source: UN (2003)

Figure 3.7 — Trend of GDP per capita during the years 1975 through 1998, by sub-group

Notes: □ In panels A, B, and C, GDP is expressed in 1995 USD equivalents; in panel D are used PPP-values in 2000 USD; □ List of abbreviations: Norway (N), Denmark (DK), Switzerland (CH), Portugal (P), Ireland (IRL), Luxembourg (L), Iceland (IS), Poland (PL), Russian Federation (RF), Slovenia (SLO)

Legend:

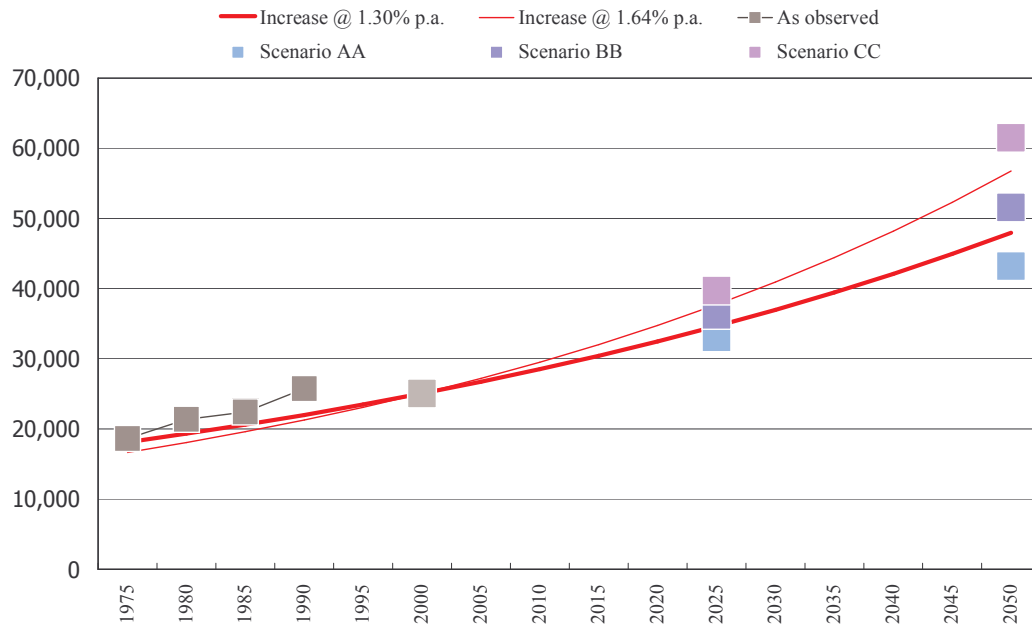
■ median ■ country



Source: UNDP (2000) for data panels A-C; UNDP (2002) for data panel D

Figure 3.8 — Observed (1975-2000) and estimated (2000 and beyond) values of GDP per capita for sub-group HIGH

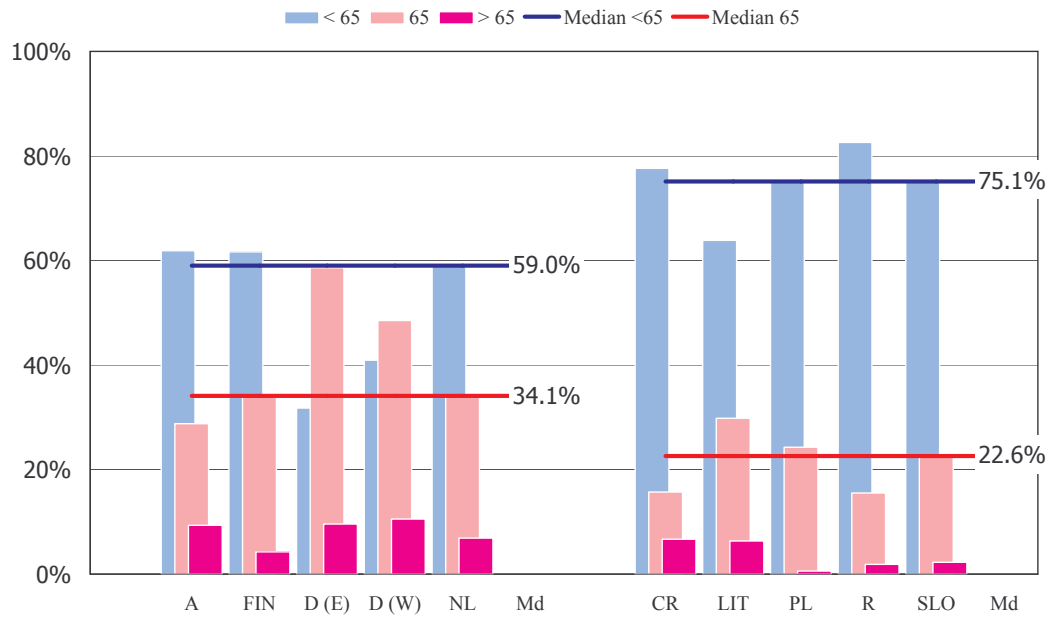
Notes: □ GDP--values as observed for years 1975-1990 are expressed in 1995 USD equivalents; □ GDP-value observed in 2000 is expressed in PPP 2000 USD equivalents; □ Increase of 1.3% per annum is derived from the observed increase during the years 1975-1990; □ For Scenarios and assumptions, see tables 3.2 and A3;



Source (observed values only): UNDP (2000)

Figure 3.9 — Expected age of retirement (%), selected number of countries, *circa 2003*

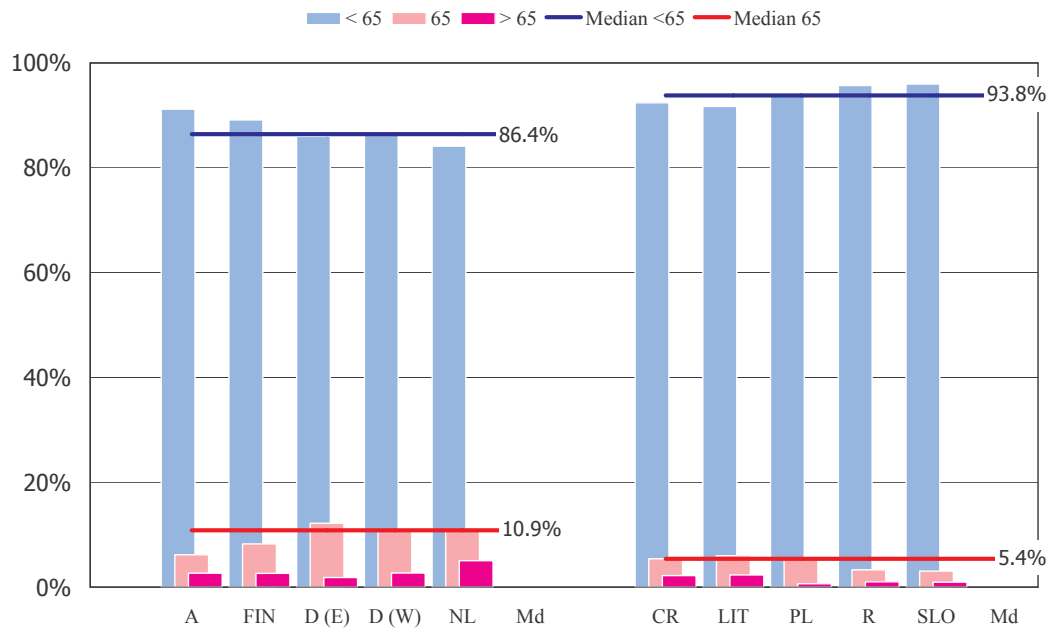
Note: List of abbreviations: Austria (A), Finland (FIN), Germany (D), Netherlands (NL), Czech Republic (CR), Lithuania (LIT), Poland (PL), Romania (R), Slovenia (SLO)



Source: DIALOG (2004)

Figure 3.10 — Preferred age of retirement (%), selected number of countries, circa 2003

Note: List of abbreviations: Austria (A), Finland (FIN), Germany (D), Netherlands (NL), Czech Republic (CR), Lithuania (LIT), Poland (PL), Romania (R), Slovenia (SLO)



Source: DIALOG (2004)

Table 3.1 — Dependency ratio and corresponding number of persons at working age per 100 persons at non working age, by sub-group, for selected years

Sub-group	working age	dependency ratio			nb. of persons at working age per 100 at non-working age					
					value			relative change (%)		
		2000	2025	2050	2000	2025	2050	2000-2050	2000-2025	2025-2050
HIGH	20-64	0.642	0.726	0.940	156	138	106	-31.7%	-11.6%	-22.7%
	20-59	0.803	0.978	1.205	125	102	83	-33.4%	-18.0%	-18.8%
MIDDLE	20-64	0.643	0.635	0.910	156	157	110	-29.4%	1.2%	-30.2%
	20-59	0.820	0.839	1.246	122	119	80	-34.2%	-2.3%	-32.7%
LOW	20-64	0.696	0.618	0.810	144	162	124	-14.0%	12.6%	-23.7%
	20-59	0.850	0.798	1.110	118	125	90	-23.5%	6.5%	-28.1%

Table 3.2 — Scenarios regarding increased employment rates and underlying assumptions

Scenario	Underlying assumptions
'Constant'	Employment rates are kept constant and identical to those observed around 2000
Scenario 'A'	Employment rates (for both men and women) are equal to those of the 'Scandinavian' model (i.e., averages of those observed for Denmark, Finland, and Sweden around 2000)
Scenario 'B'	Rates of scenario 'A', but decrease beyond age 50 follows a fixed but sex-specific pattern, equal to the decrease observed age interval 45-49 to 50-54
Scenario 'C'	Rates of scenario 'B' but increased for all age intervals by 2.5% for men and by 5% for women

Table 3.3 — Percentage of people in total population at working-age in 2000, 2025, and 2050 and relative change, by sub-group

Note: Results are based on all countries in each sub-group, irrespective of data availability or not with respect to employment

Sub-group	Percentage of people in the population at working-age (ages 20-64)					
	value			relative change (%)		
	2000	2025	2050	2000-2050	2000-2025	2025-2050
HIGH	60.90%	57.94%	51.56%	-15.3%	-4.9%	-11.0%
MIDDLE	60.87%	61.15%	52.35%	-14.0%	0.5%	-14.4%
LOW	58.96%	61.81%	55.26%	-6.3%	4.8%	-10.6%

Table 3.4 — 2000-estimates for labour productivity by sub-group

Note: Estimate of sub-group corresponds to the median value between country estimates. The latter are shown in table A2.

Absolute and relative value	Sub-group		
	HIGH	MIDDLE	LOW
Value (in 2000 USD PPA)	58,115.9	32,946.6	27,564.2
Relative (%) to value sub-group HIGH	---	56.7%	47.4%

4. Two specific societal challenges: living arrangements and health expenditures

It would be a mistake to only focus on the economical and financial implications of 'population ageing'. Older populations will have an immense impact on *all* aspects of society. Most of them may so far not even be recognised.

The fact that 'population ageing' affects all aspects of society is the direct result that 'age' (and its derivative: the 'life course') is a major determinant for individual behaviour — let it be social behaviour, partnership behaviour or economic behaviour (Riley, 1986)⁴⁵.

The following paragraphs — dealing with 'living arrangements of older people and 'health' — are nothing more than an introduction to the vast area of societal issues. However, as we will see, also in these cases, the implied financial implications — more precisely the fear for higher costs — are an important part of the discussion.

45 Matilda White Riley can be considered one of the pioneers on the subject of 'age'. The cited reference is her presidential address to the American Sociological Association and can be consulted by way of introduction to her work.

4.1. Living arrangements among older people at the turn of the 20th century

'Living arrangements' covers a wide variety of specific topics such as marital status, household composition, the presence or not of children in the household, single mother households, households composed of partners of different or same sex, the presence or not of other family members in addition to the nuclear family, sharing the home with a non-relative, ... In this case the data are limited to the distribution of the population by marital status, the percentage of persons living alone, and the percentage of persons living in institutions for retired persons.

The data are drawn from the *Community Programme of Population and Housing Censuses in 2001* (Eurostat, 2004a). As such, they refer to the situation at the beginning of the 21st century. The data are classified by sex and describe the situation of persons aged 65 and more.

Contrary to the preceding paragraphs, the data are this time not presented by sub-group (HIGH, MIDDLE, LOW) but by major European region. This corresponds to the UN classification (used in the *UN Population Prospects*), and identifies four regions: 'East', 'North', 'South', and 'West'⁴⁶. The choice is based on the consideration that 'living arrangements' are to a great extent culturally determined (see Schoenmaeckers 2004b, more particularly figures 5.4 and 5.5) and that the UN classification is more appropriate in this respect.

The results are presented in figures 4.1 to 4.3. The results are not based on all countries for each region. Their number is function of the data availability in the *Community Programme of Eurostat*⁴⁷.

Figure 4.1 presents the distribution of people aged 65 and more by marital status. As can be expected, one observes a decrease in the numbers of married people and an increase in the numbers of widowers by 5-year age interval. By and large, the pattern is the same in all four groups of countries. All regions also show the same sex differences. All show lesser percentages of married women than men. A closer look at the data reveals that the differences in the percentages married between men and women are smallest for the 'Northern' European countries. In an earlier CAHP study these male-female differences were explained as follows (Schoenmaeckers, 2004b: 58): "The explanation is probably [...] a mixture of differences in life expectancy and differences between men and women⁴⁸, but also in different societal norms with respect to re-marriage — or rather the social pressure on women not to re-marry after the death of their husband".

A somewhat intriguing pattern is the increase in the percentages single at the highest age intervals. It is generally believed that persons living alone run a higher risk of dying. The explanation would be that married couples would have a healthier life style. The reverse side of the coin would be that social isolation pushes mortality upwards. The latter would be especially true for men; according to Bobak (1999) this would explain the increased differences in life

46 In the UN Population Prospects, countries are classified as follows: Region 'Eastern Europe': Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, and Ukraine; Region 'Northern Europe': Channel Islands, Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and the UK; Region 'Southern Europe': Albania, Bosnia and Herzegovina, Croatia, Greece, Italy, Malta, Portugal, Serbia and Montenegro, Slovenia, Spain; Region 'Western Europe': Austria, Belgium, France, Germany, Luxembourg, Netherlands, and Switzerland.

47 The countries included are given in the Note accompanying each figure.

48 As already said before (see, for example, footnote 18), in general, women outlive men by a number of years. In 2000, the smallest difference in life expectancy between men and women was recorded for the 'Northern' countries (5.6 years) and the greatest difference for the 'Eastern' countries (10.6 years). The 'Southern' and 'Western' countries showed intermediate differences (6.4 and 6.5 years, resp.)

expectancy between men and women in the Eastern European countries since the ninety-sixties. The results in figure 4.1 do not seem to support these 'theories'. It is possible that the pattern points at a 'selection effect'. Single people — men and women alike — live longer than married couples, but this is only true at very old age. The *Community Programme* of Eurostat is one of the first data sets allowing a breakdown by age interval after age 85 (cf. footnote 14).

Figure 4.2 presents the percentage of people living alone. As is the case for marital status, there are clear differences between sex. In general, the proportions are higher for women than for men. On 'average', between ages 70 and 85, the differences are 22 percent⁴⁹. Differences are however somewhat lower in the 'Southern' countries (17%) and higher in the 'Western' countries (31%). In all regions, the smallest differences between men and women are observed for the oldest age groups.

The general age pattern takes the form of an inverse 'V': an increase followed by a (rather sudden) decrease. Although they both follow the same pattern, the highest proportions are not observed at the same age interval for men and women. For women, the highest proportions are observed at ages 80-84; for men, at ages 90-94 ('Northern' and 'Southern') or at ages 95-99 ('Eastern'). The only exception is observed for the 'Western' countries. Here the proportions of men who live alone steadily increases, to finally attain a median value at age 100 and more of 35 percent — 10 to 22 percentage points more than the value of the other regions (although in all regions some countries show similar proportions⁵⁰).

An explanation for the several patterns — as well as between men and women and countries as between regions — must be multi-faceted.

The higher proportions of women living alone must be linked to the observation already made above that women re-marry less than men in case of divorce or widowhood.

It would be wrong to interpret the relatively high proportions of older people living alone as signs of loneliness and isolation. This might be true in some cases. But in the 'Northern' and 'Western' European countries the high proportions also certainly stem from the fact that many older people — men and women alike — would prefer to live alone, also after having started a new relationship (de Jong-Gierveld et al., 2001; de Jong-Gierveld, *forthcoming*). One and the other would be related to increased financial independence, especially in the case of women (Grundy, 1989; Palloni, 2001).

Economic considerations could also be an explanation for the proportion in the 'Eastern' countries. But these would however be of a different kind. According to Botev (1999), they would be related to the erosion of traditional structures of extended families as the result of the ongoing economic transformations⁵¹.

On the other hand, the relatively low values that are observed for Greece and Portugal (region 'Southern') could be related to the 'survival' of multi-generation households. There is only indirect proof for this assumption. It is consistent with the relative high percentages of 'older' household members in the Southern European countries that are given in table 4.1.

49 Median value between differences observed in age intervals 70-74, 75-79, and 80-84 in all four regions.

50 The highest proportion of men living alone (46 at ages 90-94) is observed in the Slovak Republic in region 'Eastern'.

51 For more details concerning explanations on the proportions living alone, see Schoenmaeckers (2004b: 53-55).

A last remark concerning figure 4.2. The decline in the proportions observed at the oldest age intervals probably finds its explanation in increased frailty, i.e., problems related to disability and health, so that long-term residential care has become unavoidable, eventually forcing people to opt for a retirement home. Remarkable however is the observation that women seem to make this decision sooner than men (see above). Could it be that women find a home for retired or older persons a more acceptable alternative than men for living alone? or could it be that men become dependent at a later age? (which again could point at a selection effect). It is possible that both mechanisms intervene. Whatever the precise explanation, it appears that the changes only occur at a very late age — after 80 years of age for women and after 90 years of age for men⁵².

The last figure related to living arrangements, figure 4.3, gives the percentages of men and women who reside in an institution for retired or older persons. In general, percentages increase with age; only the 'Eastern' European countries show a decrease for the oldest age interval, but here the numbers are low in general.

By and large, the proportions are higher for women than for men. The highest proportions (for both men and women) are observed in the Western European region, followed by those of the Northern European region. Both regions show however large variations between countries.

For several Western European countries the number of women aged 100 and more that reside in retirement homes largely exceeds 40 percent. This is the case for Luxembourg (60%), Switzerland (58%), the Netherlands (56%) and France (47%).

As we have argued elsewhere (Schoenmaeckers, 2004b: 53), the numbers of elderly residing in retirement homes is not just a matter of demand but also of supply. However, the number of people in retirement homes does not only depend on supply, but is also a reflection of the social texture of society (Schoenmaeckers, 2004b: 54-55). The latter is illustrated by the regional differences that can be observed for Belgium (for which no data are included in figure 4.3). Supply is largely determined by cultural and historical differences; and demand will in turn be function of the social climate.

It is not clear whether in Europe there could be an increase in the number of retirement homes (and of the number of residents). Jacobzone and colleagues (2000) argue that there exists the general aim of welfare policies to de-institutionalise long-term care. Their conclusions are based on observations for six countries, of which three are European (France, Netherlands, Sweden). In other words, there is no firm ground for predicting the proportions of older people in retirement homes in the future. It is nevertheless perfectly possible to make an estimate of the *numbers* of people in retirement homes by assuming constant *levels*. Or in other words, making an estimate of the future numbers on the basis of demographic change alone. The results of such exercise are given in table 4.2.

In spite of their relative low proportions of people aged 65 and more in retirement homes (less than 1% in 2000) between 2000 and 2050 the Eastern European countries may face an increase in the number of residents in retirement homes by more than 50 percent (53%). The other

52 The differences between men and women could be indicative of the fact that women decide sooner than men to live in a retirement home. This is consistent with the findings of colleague Edith Lodewijckx of the CBGS. According to her analysis on the living situation of older people in the Flemish Region, the probability to move to a retirement home is greater for women than for men, regardless whether they are living alone or with a partner (preliminary results, final results will become available on the CBGS Web site in the beginning of 2005: www.cbgs.be).

European regions may face even higher increases, of more than 60 percent. In all regions, the greatest share of the increase would occur in the next 25 years; for the Western region this would be no less than two-thirds.

Unless governments are prepared to look for, and do find other alternatives, they must get prepared to make huge investments for the construction and maintenance of retirement homes, and adequate training of personnel.

4.2. The age profile for public health expenditures and their implied cost

A summary of some earlier findings

Internationally comparable data on health status are scarce. In a previous CAHP study (Schoenmaeckers, 2004b) micro-data samples were used that have been compiled by the UNECE as part of its programme on ageing⁵³. The data were limited to four countries only: Bulgaria, Finland, Hungary and the UK. What follows is a brief summary of the findings.

International comparison remains a tricky exercise because of differences in definitions on health and disability. The results show that there would be more people with a disability living in two or more generation households than in others. The explanation may be that "for a disabled person, the presence of a person in the household that can take care of him or her, is probably an important consideration to stay a member of the household (as opposed to taking up residence in a non-private household)" (Schoenmaeckers, 2004b: 73).

The findings also point at possible effects of policy measures. In Finland, for example, there is a clear increase with age of the proportions of persons with a disability in a private household. This is probably the consequence of existing social policies, which favour long-term residential care, being encouraged with financial incentives.

An interesting finding was made on the basis of the UK data. The UK was the only country with data available from the 1991 census and the 2001 census. Both data sets show a gradual increase of the proportion of people with 'limiting long-term illness'. Depending on the year of observation, in age group 65-69 the proportion is around 30%-35% and by age 85 and more the proportion is at around 60%-75%. The patterns are about similar for men and women. However a remarkable observation was that there were higher proportions of older people with 'long-term illness' (the denomination used with the UK data) in 2001 than 10 years earlier. The difference is difficult to explain. The British colleagues themselves rule out that the explanation would be differences in the definition (Chappell, Office for National Statistics, personal communication). One hypothesis is that, because of improved treatment, disabled people simply live longer than before.

53 The project is carried out by the Population Activities Unit (PAU) of UNECE, and has financial assistance from the US National Institute on Aging (NIA) and the United Nations Population Fund (UNFPA). The data stem from the 1900-round of censuses. A similar project is being undertaken on the basis of the 2000-round of national population and housing censuses. For more details on the UNECE Ageing programme (and on the data set), see Botev (2000), or visit the project's www site: www.unece.org/ead/pau/age.

Age profile for public health expenditures on health care

Figure 4.4, presents the age profile for public expenditure on health care. The level that is given by age group corresponds to the average expenditure per head expressed in its percentage value of the GDP per capita. The results are based on data for in total 11 West European countries (see list in accompanying note). The data refer to the situation circa 2000⁵⁴.

In fact, figure 4.4 is a re-make of graph 4.1 of a report of the Working Group on Ageing of the Economic Policy Committee of the European Commission on 'Budgetary challenges posed by ageing populations: the impact on public spending on pensions, health and long-term care for the elderly and possible indicators of the long-term sustainability of public finances' (EPC, 2000)⁵⁵.

According to figure 4.4, there is a high correlation between health expenditures and age. "Older persons tend to consume more health care than other groups — this is especially the case for the highest age groups. [...] Average expenditures per head on health care for different age groups (expressed as a share of GDP per capita) are quite similar across Member States for prime-age individuals — the largest differences between Member States are at the tail-end of the age-distribution. Nevertheless, in all Member States, after childhood, the age-related expenditure profiles reveal increasing per capita expenditure levels with age" (EPC, 2000: 34-35).

Individual country patterns indicate the existence of national age-related policies. The UK shows especially high expenditure levels for both the very young and the very old, but has relatively low levels in between. Denmark shows relatively low expenditure levels for the oldest in the population but relatively high expenditure levels for the youngest ones (with levels quite close to the median for all other age groups); the data for France rather follow an opposite pattern. The differences that are observed for the older age groups may be the result of differences in the institutionalisation of older persons. Some studies indeed indicate that long-term residential care can have a limiting effect on public expenditures (see, for example, Jacobzone et al., 2000).

In order to estimate the effect of 'population ageing' 'averages expenditures per head' have been weighted by the number of persons in each age group and the exercise has been repeated for the years 2000, 2025 and 2050. The numbers of persons are based on the combined population for all countries in sub-group HIGH. As GDP per capita is taken the value of 25,050 (in 2000 USD PPP equivalents), which corresponds to the median value for sub-group HIGH (see panel D of figure 3.7). The results are shown in figure 4.5.

Assuming a constant age profile for public health expenditures demographic changes alone could be responsible for an increase of total cost by 17 percent between 2000 and 2025, and by an additional 5 percent between 2025 and 2050 — a total increase by 22 percent.

The exercise has been repeated for the countries of sub-groups MIDDLE and LOW. The results are presented in figure 4.6. Figure 4.6 shows two pairs of results, one is based on an

54 The French data refer to the situation in 1997; the Belgian, Danish, Spanish and UK data to the one in 1998; Italy to the one in 1999; and Austria, Finland, Germany, the Netherlands, and Sweden to the situation in 2000.

55 Members of the EPC working group include representatives from several national planning offices and ministries of economic affairs, as well as of representatives of the European Commission and of the OECD. We are especially thankful to Howard Oxley and Stepahne Jacobzone from OECD for having made available the individual country data that constitute the basis of figure 4.4.

'unadjusted' GDP per capita — corresponding to the median value as observed for 2000 —, the second one based on an 'adjusted' value for GDP per capita, i.e., corresponding to the one observed for sub-group HIGH. The reasoning for using two different values for GDP per capita — one unadjusted, one adjusted — is that one cannot expect similar quality of health care unless also its cost is similar. Since the age profile for public health care is based on the average expenditure per head *expressed as share of GDP per capita* it is necessary to obtain comparable results to use an identical basis in the calculations — in this case the GDP per capita as observed for sub-group HIGH⁵⁶. The results are given in figure 4.6.

The increases that are observed for sub-groups MIDDLE and LOW on the basis of the unadjusted values are similar to the ones for sub-group HIGH. The differences reflect the differences in demographic changes. On the other hand, those based on the adjusted values show enormous increases in the cost — increases of two to four times greater than those based on the unadjusted values. As explained just above (cf. footnote 56), they may be overestimated. But they also hint at the extra burden implied to assure the same quality of health care as the one provided in the wealthier Western countries.

At any rate, such patterns of increase do not happen in reality. In repeating the exercise that is the basis for figure 4.5 for the years 1990 and 2000 one arrives for sub-group HIGH at an estimate of a 8 percent increased cost; likewise, for sub-groups MIDDLE and LOW the estimates are zero percent (0.5% to be precise) and 6 percent. The increases shown in figure 4.7 are however quite different.

Figure 4.7 shows public health expenditures expressed as their share of GDP for the years 1990 and 2000, by sub-group. The data stem from the 2003 edition of the *Human Development Report* (UNDP, 2003). According to these data, between 1990 and 2000, on 'average' — as is usual the case, the median value is used as reference — countries have rather experienced a *decrease* of the share of GDP to public health expenditures (-2.5%). There are, as may be expected, increases for sub-groups MIDDLE and LOW. But in the case of sub-group MIDDLE the increase is much greater than the expected estimate (+14.6%) and in the case of sub-group LOW it is much smaller (+1.6%).

One and the other seem to indicate that there must be other factors besides age structure — and more particularly the changes therein — that determine the cost of health care. We will come back to this in the last paragraph, dealing with some comments and considerations.

It is also possible that the age profile for public expenditures on health care as presented in figure 4.4 is an unreliable source for making any forecasts of health costs linked to population prospects. This might come as a surprise — however, on second thought appears quite understandable — but, as Mr. Robert Kieffer (2004)⁵⁷ has shown, the age profile for public expenditures very much resembles the average expenditure on health care during the last 48 months of life, and this independent of the age at death. In other words, the cost increase by age as suggested in the age profile for health expenditures does not reflect so much that older people would need more (and more costly) health care, but rather reflects the distribution of

56 The applied solution is not entirely 'fool proof'. A cost for health care can be lower because of, for example, lower wages for medical personnel. However, since the GDP per capita only represent a fraction of the one observed for the reference group (40% in the case of sub-group MIDDLE and 24% in the case of sub-group LOW), the use of unadjusted values seemed totally unjustified.

57 We are grateful to colleague Louis Lohlé-Tart, Director of ADRASS (*Association pour le Développement de la Recherche Appliquée en Sciences Sociales*) for having drawn our attention to the study of Mr. Kieffer.

deaths in the population. In fact, the age profile for public health expenditures is closely related to the mortality schedule (or the risk of dying at age x) in a population.

What's more, Mr. Kieffer shows in his interesting paper that during the last years of life, persons aged 70 and more incur less health expenditures than younger people. We tend to agree with his conclusion, namely that (citing Kieffer) "the impact of 'population ageing' on health cost is secondary compared to, for example, the increases that are induced by better health care and technological medical innovation" (own translation ⁵⁸).

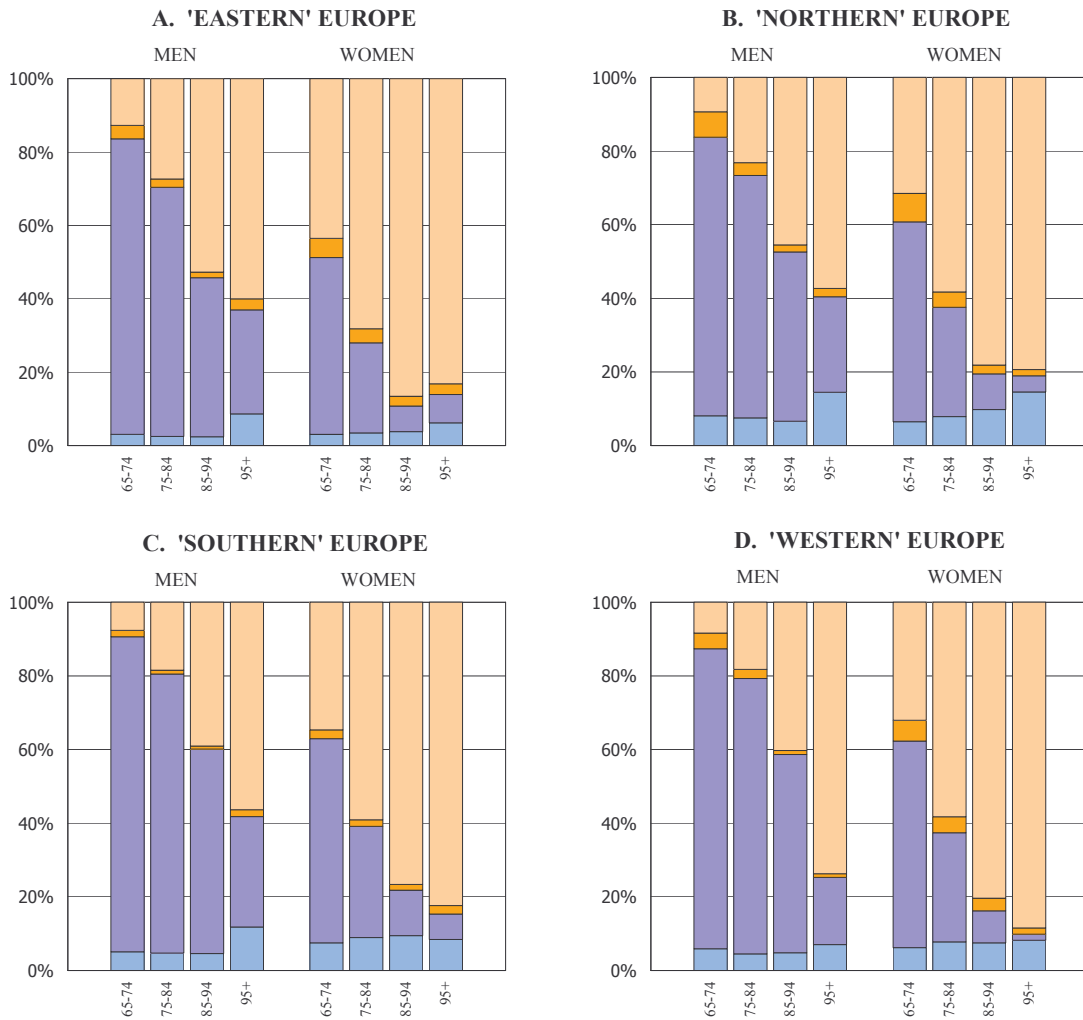
⁵⁸ The original text is as follows: "Je suis d'avis que l'impact du vieillissement sur les dépenses de santé est plutôt secondaire par rapport à d'autres phénomènes qui influent sur les dépenses, à savoir la croissance de l'offre de soins et le développement technologique en médecine".

Figure 4.1 — Living arrangements of people 65 and over. Marital status (in %), by 5-year age group and by 'European region', circa 2000

Note: 'Group of countries' corresponds to the UN classification with the categories of 'Eastern', 'Northern', 'Southern' and 'Western' Europe. The Eurostat data set does not include information for all countries. Figure 5.1 is based on data of: □ Panel A: Bulgaria, Czech Republic, Hungary, Romania, and Slovak Republic; □ Panel B: Denmark, Estonia, Finland, Ireland, Lithuania, Norway and the UK; □ Panel C: Greece, Italy, Portugal and Slovenia; □ Panel D: Austria, France, Germany, Netherlands and Switzerland.

Legend:

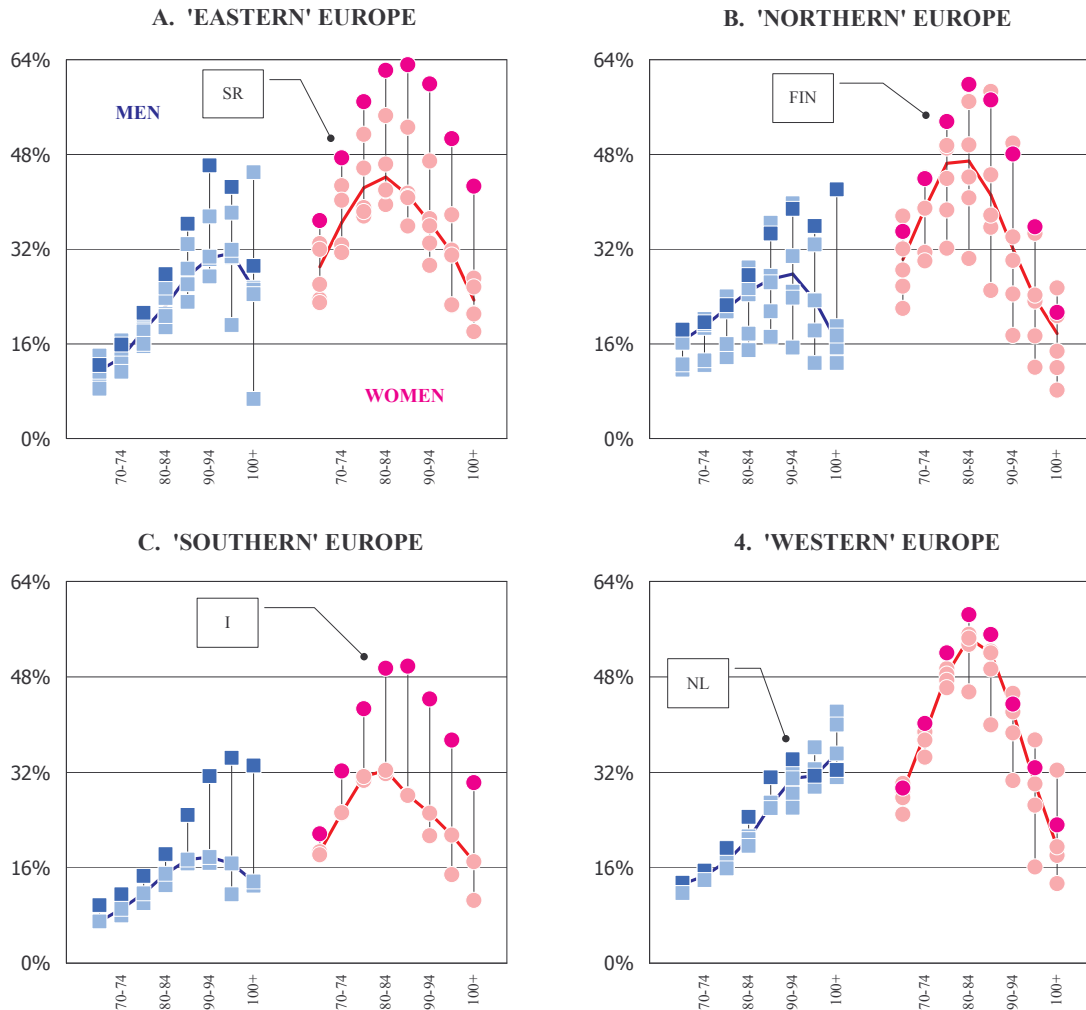
■ single ■ married ■ divorced ■ widowed



Source: Eurostat (2004: 'Topic' table 2)

Figure 4.2 — Percentage of people living alone, by sex and by 5-year age group, by 'European region', circa 2000

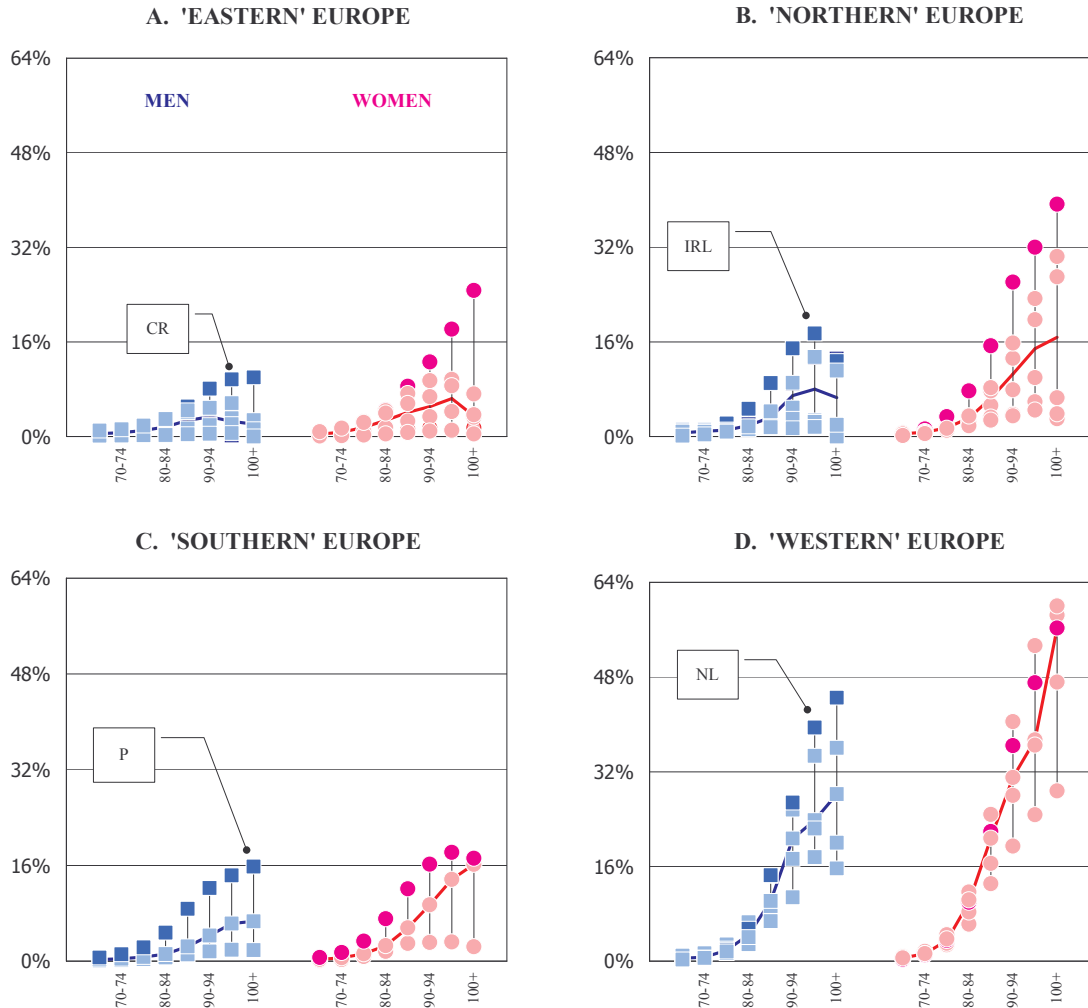
Notes: □ Dots correspond to individual country estimates and curves to median value in each data set;
 □ 'Group of countries' corresponds to the UN classification with the categories of 'Eastern', 'Northern', 'Southern' and 'Western' Europe. The Eurostat data set does not include information for all countries. Figure 5.2 is based on data of: Panel A: Bulgaria, Czech Republic, Hungary, Poland, Romania, and Slovak Republic (SR); Panel B: Estonia, Finland (FIN), Ireland, Latvia, Lithuania, and the UK; Panel C: Greece, Italy (I), and Portugal; Panel D: Austria, France, Netherlands (NL), Luxembourg, and Switzerland.



Source: Eurostat (2004)

Figure 4.3 — Percentage of persons in institutions for retired or older persons, by sex and by 5-year age group, by 'European region', circa 2000

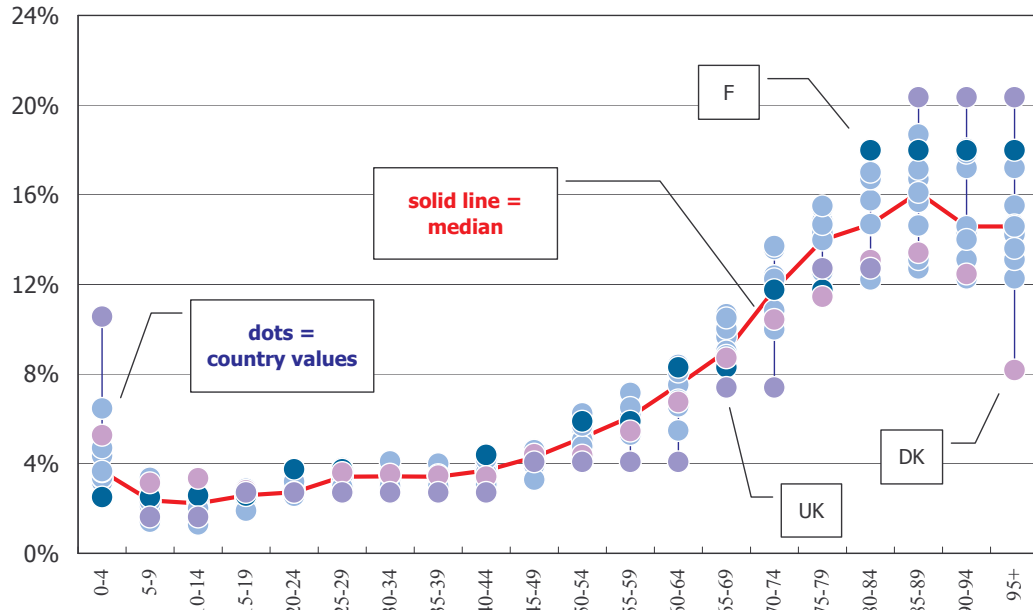
Notes: □ Dots correspond to individual country estimates and curves to median value in each data set;
 □ 'Group of countries' corresponds to the UN classification with the categories of 'Eastern', 'Northern', 'Southern' and 'Western' Europe. The Eurostat data set does not include information for all countries. Figure 5.3 is based on data of: Panel A: Bulgaria, Czech Republic (CR), Hungary, Poland, Romania, and Slovak Republic; Panel B: Estonia, Finland, Ireland (IRL), Latvia, Lithuania, and the UK; Panel C: Greece, Italy, and Portugal (P); Panel D: group 'West' for Austria, France, Netherlands (NL), Luxembourg, and Switzerland.



Source: Eurostat(2004)

Figure 4.4 — Age profile for public expenditure on health care: average expenditure per head expressed as share (%) of GDP per capita, selected group of countries, circa 2000

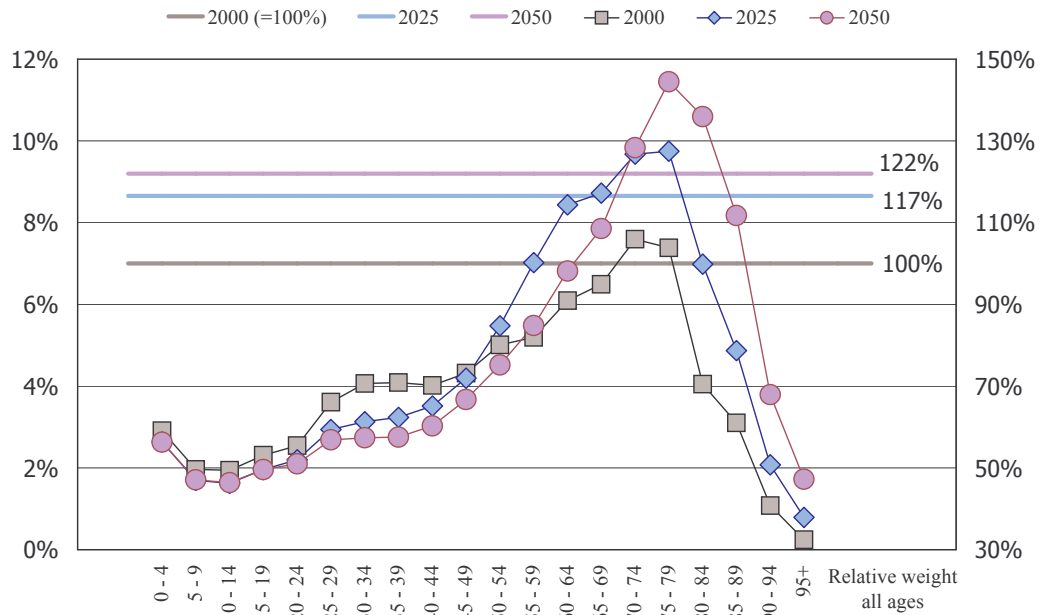
Note: Selected countries are: Austria, Belgium, Denmark (DK), Finland, France (F), Germany, Italy, Netherlands, Spain, Sweden, United Kingdom (UK).



Source: EPC (2001)

Figure 4.5 — Age profile for public expenditure on health weighted by number of persons per age interval. Percentage of total expenditure per age 5-year age interval (left scale), and relative weight of total compared to 2000-estimate (right scale), countries sub-group HIGH, years 2000, 2025, and 2050

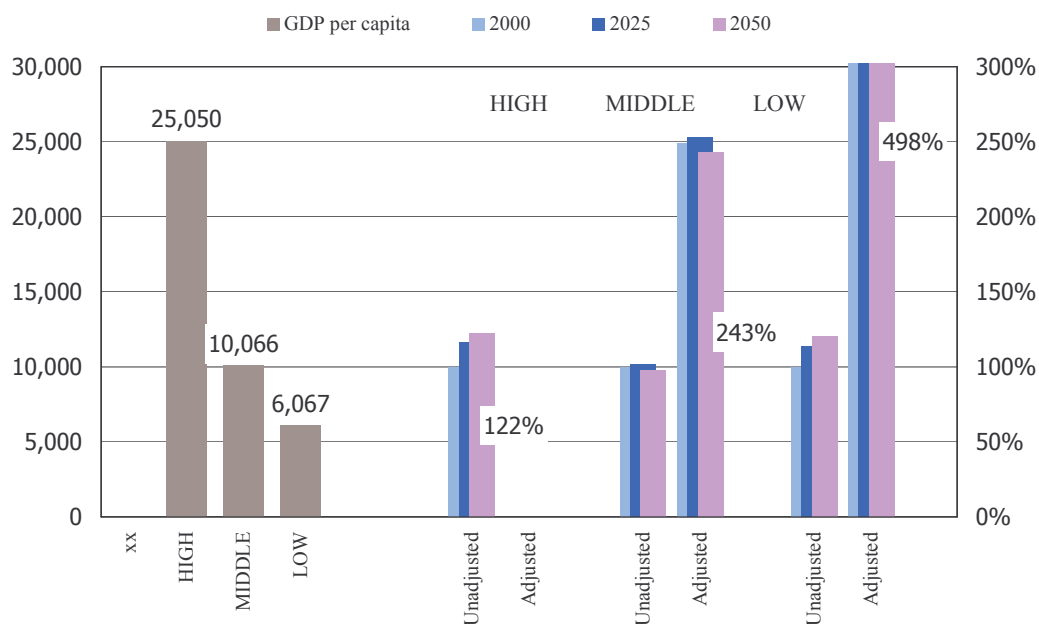
Notes: □ Age profile for public expenditure on health is based on the median value between selected group of countries (see figure 5.4); □ As GDP per capita is used the median for sub-group HIGH (see figure 4.6 and also panel D in figure 3.7); □ For the list of countries included in sub-group HIGH, see, for example, figure 2.3)



Source: EPC (2001), UN (2003a), UNDP (2002)

Figure 4.6 — GDP per capita in 2000 (expressed in PPP 2000 USD equivalents) (left scale) and relative increase in public health expenditure, for unadjusted and adjusted values (right scale), by sub-group, years 2000, 2025, and 2050

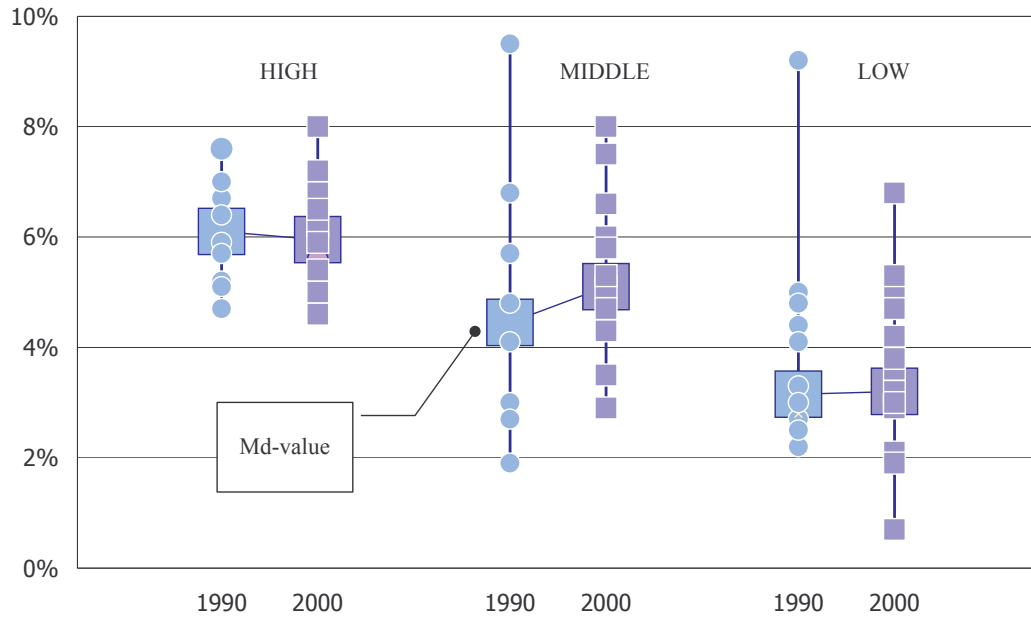
Notes: □ Used GDP per capita corresponds to median value between countries in sub-group; □ Base for 'unadjusted' values is GDP per capita as observed; □ Base for 'unadjusted' values is GDP per capita for sub-group HIGH



Source: EPC (2001), UN (2003a), UNDP (2002)

Figure 4.7 — Public expenditures on health care expressed as share of GDP, by sub-group, years 1990 and 2000

Note: 'Dots' correspond to individual country estimates



Source: UNDP (2003)

Table 4.1 - Percentage of private households with an older member (at least one), by region, circa 2000

Region	Co-residents aged					
	65 or more			75 or more		
	median	minimum	maximum	median	minimum	maximum
'Eastern Europe'	28.69%	26.00%	32.14%	12.41%	11.61%	13.78%
'Northern Europe'	27.73%	24.96%	28.35%	11.61%	8.84%	13.96%
'Southern Europe'	33.76%	32.31%	35.21%	14.71%	14.51%	14.91%
'Western Europe'	24.77%	20.79%	28.51%	11.47%	9.29%	14.21%
All regions	28.28%	20.79%	35.21%	12.09%	8.84%	14.91%

Source: Eurostat (2004: 'Topic' table 22)

Table 4.2 — Estimated number of men and women aged 65 and more in retirement homes, by region, years 2000, 2025, 2050

Region	Observed percentage-values in 2000			Estimates on the basis of data for the following countries:					
	Men	Women	Both						
'Eastern Europe'	0.67%	1.09%	0.93%	Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovak Republic					
'Northern' Europe	1.04%	2.60%	1.96%	Estonia, Finland, Ireland, Latvia, Lithuania, UK					
'Southern Europe'	0.86%	1.92%	1.48%	Greece, Italy, Portugal					
'Western Europe'	2.50%	5.59%	4.34%	Austria, France, Netherlands, Luxembourg, Switzerland					
Region	Extrapolated numbers entire region								
	in 2000			in 2025			in 2050		
	Men	Women	Both	Men	Women	Both	Men	Women	Both
'Eastern Europe'	90,260	282,825	373,085	129,843	361,689	491,532	162,182	407,261	569,442
'Northern' Europe	63,002	224,301	287,303	90,239	300,446	390,685	110,566	355,661	466,227
'Southern Europe'	85,954	267,888	353,842	118,114	353,922	472,035	152,103	439,647	591,749
'Western Europe'	288,681	991,131	1,279,812	470,260	1,379,668	1,849,928	540,796	1,603,574	2,144,369
Region	Relative increases (%)								
	2000-2025			2025-2050			2000-2050		
	Men	Women	Both	Men	Women	Both	Men	Women	Both
'Eastern Europe'	44%	28%	32%	25%	13%	16%	80%	44%	53%
'Northern' Europe	43%	34%	36%	23%	18%	19%	75%	59%	62%
'Southern Europe'	37%	32%	33%	29%	24%	25%	77%	64%	67%
'Western Europe'	63%	39%	45%	15%	16%	16%	87%	62%	68%

Source: UN (2003), combined with results of figure 5.2

5. Some final comments and considerations

It is hoped that the present analysis convincingly demonstrates that strictly speaking 'population ageing' is not just a 'demographic' issue. According to the results of the simulations it should be possible to counterbalance most, if not all, of the 'negative' effects related to older age structures by taking appropriate measures in the socio-economic sphere.

As announced in the introductory paragraph, it was not the aim of this paper to make suggestions on how to implement these measures effectively. We do hope, however, that it is clear that the measures should have a long-range perspective. For the Western European countries, for example, this means that they should not just be remedies against the temporary effects induced by the fact that in the coming years the children of the 'baby-boom' will be joining the cohorts of pensioners.

It must indeed be clear that, as is shown by the intermediate (the regular *Population Prospects*) and long-range population prospects from the UN Population Division, 'population ageing' is here 'to stay'. The only demographic processes that are able to curb the trend in a sustainable way would be decreased life expectancy and increased fertility (at above replacement level). Concerning the first solution, one may fairly assume that it is an unacceptable alternative. Concerning the second solution, it should be clear to everyone that the prospect of a world population of more than 9 billion people is not a very promising outlook.

Finding the proper measures and how to implement them will not be an easy task. One crucial objective should be to make 'young' and 'old' live together harmoniously. More intergenerational solidarity probably is a key element in its implementation. This however assumes individual behaviour that is compatible with a life course perspective; and this will not happen unless every individual realises that his or her present situation not only depends on past experiences, but also determines to a great extent his or her well-being in the remaining years of life.

One obvious measure to cope with 'population ageing' appears to be working longer. However, in spite of the knowledge that with increased life expectancy one will also spend an increasingly share of one's entire life in retirement, the public seems rather hostile to the idea of longer working. On the one hand sight this may come over as a paradox. On the other hand, as suggested by the OECD (1998), this attitude would be compatible with the existing regulations that have made early retirement particularly attractive. Changing the existing early-retirement schemes — an unpopular idea not only among the public at large but also among worker's unions or syndicates — alone is certainly not a sufficient measure. As mentioned, more attention will need to go to the conditions at the work place itself and to 'job satisfaction'.

In the discussion on raising the age of retirement it would be a mistake to ignore the specific physical conditions of a profession. Likewise, those who are still in good health — and who express a willingness to do so — should be given the chance to work longer. More attention should probably also go to the number of years worked, rather than age for entering retirement. In other words, 'flexibility' appears to be the key element in the discussion. Furthermore, "a more flexible work-retirement transition is one example of 'active ageing' — the capacity of people, as they grow older, to lead productive lives in the society and economy" OECD (1998: 14).

An often-heard counter argument to the idea of working longer is that it needs the creation of new jobs. With unemployment rates close to 10 percent⁵⁹ for the working population aged 25-49 the idea may indeed seem unrealistic. But do these figures indicate that the idea is simply invalid in its own right, or do they rather indicate the difficulty of the task?

As said above, most of the existing early-retirement and disability schemes have been developed in the ninety-seventies and ninety-eighties as a response to high unemployment among younger workers. Based on the figures of some 25 years later one can conclude that the measure has not been very successful. Also at the beginning of the twenty-first century unemployment is (much) higher among 20 to 24 year olds than among the working population aged 25 and more. On 'average' unemployment rate is 8.4 percent in the 'Western' countries (as opposed to 6.5 for ages 25-49) and not less than 17.9 percent in the 'Eastern' countries (as opposed to 9.9)⁶⁰.

Besides, the pursuit of full employment is a commendable political objective in its own right. To cite once more the OECD (2000: 121): "[...] reforms in these directions make good social and economic sense quite apart from their role in addressing age-related challenges". As indicated in figure 3.3 also among the countries with the highest employment rates — those of sub-group HIGH — they never exceed, for whatever age interval, 90 percent of the population at working-age.

Seen from this perspective, current rates of unemployment should not — cannot — be taken as proper guidelines for forecasting labour participation. For example, in its 1994 Report the Belgian Study Commission on Ageing recognises that unemployment (in Belgium) must currently be estimated at 14,2 percent, but decides to use a 'structural' level of 7.5 percent for its estimates of the future cost of 'population ageing' (Studiecommissie voor de vergrijzing, 2004: 15)⁶¹. The Study Commission justifies its decision by referring to the 'structurally low level' that could be observed in the period 1953-2002.

A particular concern in relation to 'population ageing' would be the rising costs of expenditures on health care. As seen in paragraph 4.2 on the basis of demographic change alone one may indeed fear for substantial increases (by 25% by 2050). However, as argued there could be other factors besides age structure determining the expenditures on health care. There is even the possibility that the age profile for public expenditures on health care (figure 4.4) is misleading. It must be recognised that the subject is quite complex and not well understood. It is obvious that there is the need for more investigation.

In a recent study, Lutz and Scherbov (2003) suspect that increased life expectancy would go hand in hand with an increased number of 'healthy' years of life. If this is the

59 The estimates are derived from Eurostat's (2004) *Community Programme*. See also the discussion in paragraph 3.4, and footnote 43.

60 Cf. previous footnote.

61 The cited rate of 14.5% is high compared to the European averages in the previous footnotes. The Belgian Study Commission on Ageing is using national statistics whereas the *Community Programme* is based on census results. More recent figures from Eurostat (Eurostat, 2004b) indicate for the end of 2004 an unemployment rate for Belgium of 7.9%; a relative high rate however compared to the average of 8.9% observed for the countries of the Euro-zone.

case, 'population ageing' would not necessarily imply more people in need for more medical assistance — the contrary could be true. On the other hand, Doka and Lavin (2003: 135-136) argue that "[...] more persons with developmental disabilities are ageing [...]. In fact, with the exception of persons with Down syndrome who have shorter life spans, most persons with developmental disabilities will have life spans similar to their peers without disabilities". The causes would be better health care, greater medical understanding and treatment of developmental disabilities (as well as the beneficial results of de-institutionalisation⁶²). These conclusions seem to be in line with what was referred to in paragraph 4.2, namely the observation of increased proportions of people with 'limiting long-term illness' in the UK.

One and the other indicate the danger for 'circular reasoning'. 'Population ageing' *may* lead to increased health expenditures, but at the same one must remain conscious of the fact that better (and more expensive) health care is likely one of the main reasons for increased life expectancy.

It would at any rate in the debate be a serious oversight not to take into account the fact that health expenditures are determined by other factors besides the age structure. Expenditures are also determined by doctor's fees, the costs related to infrastructure of health facilities (the installation and maintenance of health equipment), the costs for the development of new equipment and treatment, for new and better drugs, ... Expenditures are also largely a function of the consumption of drugs. The latter itself depends on the 'prescription behaviour' of the medical community and of the claims made by patients (the belief that there is no valid treatment without the intake of drugs, and the desire to get well in the shortest time possible, in many cases because of job constraints). Eventually, health expenditures must largely depend on the retail price of drugs.

The arguments may seem obvious. However, in Belgium for example it took a publication by a 'leftist' medical practitioner⁶³ and much attention by the media before the matter was taken up seriously by the government. In his work on 'The cholesterol war' (free translation), Dr. Van Duppen (2004) argues that drug companies maintain artificially high prices for many drugs. He bases his arguments on the fact that prices vary between countries. Dr. Van Duppen is not alone in his fight against the excessive price policies of the pharmaceutical industry. Much of his reasoning is drawn from the findings from an American colleague, Marcia Angell, lecturer at the Harvard School on Social Medicine, published in 2004 under the title *The Truth about the drug companies*. According to Dr. Van Duppen expenditures related to drug consumption can be brought down with the use of alternative price mechanisms. His example is the situation in New Zealand where the price is the result of a public tender organised by the government. The system forces the drug companies to offer the lowest price for their products and a public health institute guarantees that only the best drugs will be selected.

This is not the place to discuss and judge the arguments of Dr. Van Duppen (or of Marcia Angell). However, one must give him the credit for having indicated an entire new window in the debate regarding expenditures and 'population ageing'.

62 Which consequently should not be pursued for just economic considerations (cf. Jacobzone and colleagues, 2000, cited in paragraph 4.1)

63 Dr. Van Duppen is member of a leftists doctor's association 'Medicine for the People'.

The simulation results indicate that the increase of older people is likely to be offset by increases in GDP per capita. The results appear realistic for the countries of sub-group HIGH (cf. figure 3.8). There is no way to verify to what extent the results are equally realistic for the countries of sub-groups MIDDLE and LOW. The reasons are precisely the very low levels of GDP per capita that are currently experienced in these countries (compared to those in sub-group HIGH) and their rather 'erratic' evolution in the past decades (cf. figure 3.7). There can however be no doubt that, in order to counterbalance the negative effects of 'population ageing' the countries in sub-groups MIDDLE and LOW will need to make (much) greater efforts. One and the other will not be achieved without much greater increases in labour force participation and in productivity than those needed in the countries of sub-group HIGH.

It is from this perspective that one can grasp what Andras Klinger meant in his earlier report prepared for the UNECE, entitled 'Labour Market Responses to Population Ageing and Other Socio-Demographic Change' (Klinger, 2002: 18): "For the transition economies of Central and eastern Europe, economic growth needs to be sustained at high rates over the medium to long term, but the issues here are the more fundamental ones of economic development and catch up. Without high rates of growth in the transition economies it is difficult to see how the impoverishment of pensioners and other dependent sections of the population can be reversed".

The socio-economic differences that exist between the more and less wealthy member states of the Council of Europe should get particular attention in the discussion on how to remedy the effects of 'population ageing'. It stresses the importance of international co-operation for 'maintaining prosperity in an ageing society'. The idea is not new. It can be found in an OECD study dating from 1998 (p.26, own italics): "Action at the international level can supplement national action. While specific reforms must be tailored to meet the circumstances of each country, there are many common directions and much that can be gained by international co-operation during the reform process. Areas of international co-operation include:

- collection of sharing new statistical data on *an internationally comparable basis* and exploitation of existing information;
- monitoring of reforms and *sharing of lessons in a multilateral setting*; and
- assisting emerging market economies to implement successful structural reforms and sound macroeconomic policies [...]"

Most likely that in these bullets are identified the *real* challenges posed by 'population ageing'.

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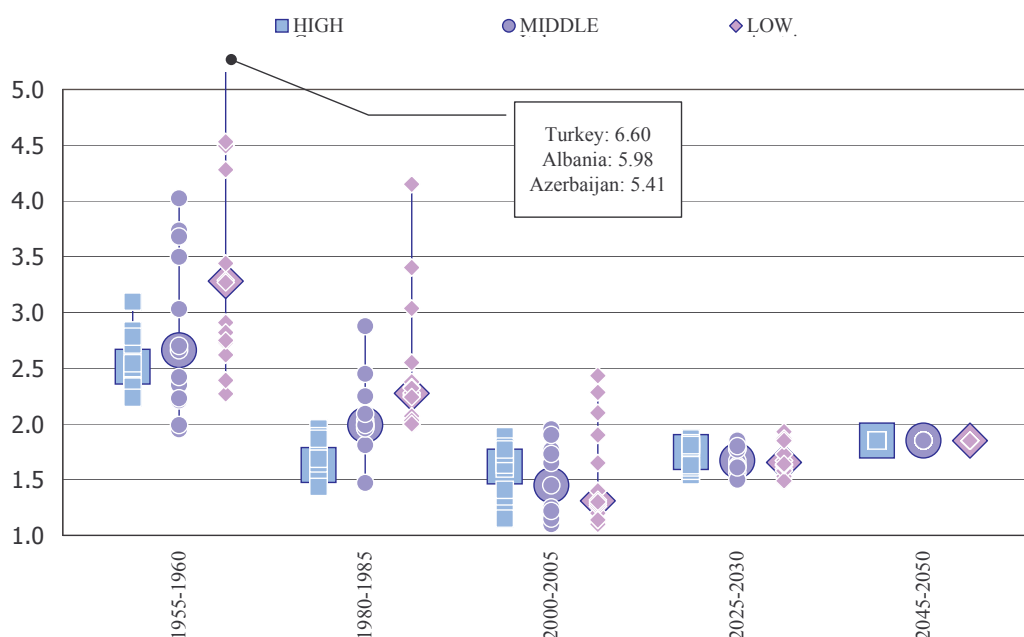
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ANNEXES

Annex to paragraph 2.3

Figure A1 — Total fertility (number of children per woman) among Member States of the Council of Europe, ordered by sub-group (HIGH, MIDDLE, LOW), for selected years in period 1955-2050

Note: □ Individual country values are represented by dots; □ Oversized dots indicate median value for each sub-group in corresponding year interval



Source: UN (2003a)

Around the middle of the 20th century the countries of sub-group HIGH showed with a median value of 2.51 children the lowest levels of fertility. The countries in the two other sub-groups showed much higher values. Median values were 2.66 (sub-group MIDDLE) and 3.28 (sub-group LOW). In both groups, several countries experienced levels of more than 3.5 children; the greatest 'outliers' however are observed in sub-group LOW with values of more than 4 children: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, TFYR Macedonia, and Turkey (the latter showing the highest value of 6.66 children). During the next decades in all countries fertility levels declined seriously. The most important declines (measured in absolute value) are recorded among the countries in sub-group LOW. By the turn of the century, the lowest values are no longer observed for the countries of sub-group HIGH, but for those of sub-group LOW. Median values for each sub-group are in 2000-2005: 1.62 (HIGH), 1.45 (MIDDLE), and 1.31 (LOW). Turkey, Albania and Azerbaijan are the only countries with fertility levels above replacement level around the turn of the century. Eventually, by 2050 all countries would have a fertility level of 1.85 children (in accordance with the assumption of the medium variant).

Annex to paragraph 3.2

Choice of base-line values for reference proportions employed and effect on reference values from scenarios with respect to increased ‘employment’

This part of the Annex deals with the choice of the 'base-line' values for the simulations of which the results are presented in the text in figure 3.5 and in figure A4 here below. The scenarios and assumptions are as follows (cf. table 3.2 in text):

Scenario	Underlying assumptions
'Constant'	Employment rates are kept constant and identical to those observed around 2000
Scenario 'A'	Employment rates (for both men and women) are equal to those of the 'Scandinavian' model (i.e., averages of those observed for Denmark, Finland, and Sweden around 2000)
Scenario 'B'	Rates of scenario 'A', but decrease beyond age 50 follows a fixed but sex-specific pattern, equal to the decrease observed age interval 45-49 to 50-54
Scenario 'C'	Rates of scenario 'B' but increased for all age intervals by 2.5% for men and by 5% for women

The 'base-line' values correspond to the average ‘employment’ rates observed around 2000 for Denmark, Finland, and Sweden — hence the designation of 'Scandinavian model' (cf. scenario 'A'). The steps with regard to this choice are indicated in table A1.

Table A1 presents the median values for each 5-year age interval regarding (a) the percentages 'economically active'; and (b) the percentages 'employed' (cf. remark concerning its definition in footnote 23). Next to the median values are given the percentage point differences by country. Negative values indicate that the country shows an 'activity' or 'employment' rate that is below 'average'.

The first panel includes the values for BOTH SEXES. The country with the best 'score' (all percentage point differences are positive and relatively high) is Denmark. Other good 'performers' are Switzerland (for 'employment' rates), and also, although to a lesser extent Finland and Sweden (both show relative high values at for the oldest age intervals).

The second panel includes 'activity' and 'employment' rates for MEN only. Here, the best 'performer' is undoubtedly Switzerland, followed by Germany and, taken 'employment' into account, the Netherlands. Denmark and Sweden show positive values for the oldest age intervals. (By contrast, Austria is a good 'performer' but shows negative values for the oldest age intervals.)

The third panel includes 'activity' and 'employment' rates for WOMEN. The highest (positive) values are observed for Denmark, Sweden, and also Finland; Sweden shows remarkable high values for the oldest age intervals.

Especially the high scores for WOMEN were decisive to choose the 'Scandinavian' model. Switzerland comes close, but has been eliminated because of the negative values for WOMEN at the middle ages (negative values concerning 'activity' for the youngest age intervals as observed for Finland and Sweden, must be interpreted as the result of prolonged schooling).

Table A1 — Countries sub-group HIGH. Median values and percentage point differences between median and individual country values for (A) Percentages economically active; and (B) Percentages employed, per 5-year age interval; both sexes combined, and for men and women

Note: Negative percentage point differences are indicated in grey, blue and pink, resp.

BOTH SEXES

Age	(A) Regarding percentages economically active										(B) Regarding percentages employed											
	Median	Country										Median	Country									
		A	CH	D	DK	F	FIN	NL	S	UK	A		CH	D	DK	F	FIN	NL	S	UK		
20-24	73.2%	0.06	0.06	-0.01	0.05	-0.12	-0.13	0.04	-0.10	0.00	66.5%	0.06	0.08	0.00	0.08	-0.19	-0.15	0.09	-0.08	0.00		
25-29	83.7%	0.05	0.04	-0.02	0.01	0.05	-0.02	0.00	-0.05	-0.01	77.5%	0.05	0.06	-0.02	0.03	-0.03	-0.06	0.04	-0.03	0.00		
30-34	86.3%	0.04	0.00	0.00	0.02	0.03	0.00	-0.05	-0.02	-0.05	80.1%	0.05	0.03	0.00	0.04	-0.02	-0.03	0.00	0.00	-0.03		
35-39	87.6%	0.02	-0.02	0.00	0.01	0.01	0.02	-0.08	-0.02	-0.06	81.4%	0.04	0.01	0.00	0.04	-0.02	-0.01	-0.04	0.00	-0.03		
40-44	88.5%	0.01	-0.01	0.00	0.00	0.00	0.02	-0.10	-0.02	-0.06	82.4%	0.03	0.02	0.00	0.03	-0.02	-0.01	-0.06	0.01	-0.03		
45-49	87.1%	-0.01	0.00	0.00	0.00	0.00	0.02	-0.11	0.00	-0.05	80.8%	0.01	0.03	0.00	0.04	-0.02	-0.01	-0.07	0.03	-0.02		
50-54	81.8%	-0.03	0.02	0.00	0.03	0.00	0.04	-0.13	0.04	-0.04	74.5%	-0.02	0.06	0.00	0.07	-0.01	0.01	-0.08	0.08	0.00		
55-59	67.2%	-0.22	0.09	0.00	0.10	-0.12	0.09	-0.14	0.12	-0.02	59.2%	-0.19	0.14	-0.01	0.12	-0.12	0.00	-0.07	0.17	0.03		
60-64	27.4%	-0.18	0.20	-0.04	0.07	-0.17	0.00	-0.08	0.26	0.10	22.9%	-0.14	0.23	-0.02	0.10	-0.14	0.00	-0.04	0.25	0.13		

MEN

Age	(A) Regarding percentages economically active										(B) Regarding percentages employed											
	Median	Country										Median	Country									
		A	CH	D	DK	F	FIN	NL	S	UK	A		CH	D	DK	F	FIN	NL	S	UK		
20-24	78.2%	0.04	0.01	-0.01	0.03	-0.13	-0.16	0.01	-0.11	0.00	69.6%	0.06	0.05	0.00	0.08	-0.18	-0.16	0.08	-0.08	0.00		
25-29	88.4%	0.04	0.04	-0.01	-0.01	0.05	-0.02	0.00	-0.05	0.02	83.8%	0.03	0.05	-0.03	0.00	-0.03	-0.06	0.03	-0.05	0.00		
30-34	91.7%	0.05	0.04	0.04	-0.01	0.05	0.00	-0.01	-0.03	-0.01	87.0%	0.05	0.06	0.02	0.00	0.00	-0.05	0.01	-0.03	-0.01		
35-39	92.2%	0.05	0.04	0.04	-0.02	0.04	0.00	-0.02	-0.04	-0.01	88.1%	0.05	0.06	0.02	-0.01	0.00	-0.05	0.00	-0.04	-0.02		
40-44	91.4%	0.06	0.04	0.04	-0.02	0.05	0.00	-0.02	-0.03	-0.02	87.9%	0.04	0.06	0.01	-0.01	0.00	-0.06	0.00	-0.04	-0.02		
45-49	89.2%	0.06	0.06	0.05	0.00	0.06	0.00	-0.01	-0.02	-0.01	86.7%	0.03	0.06	0.01	-0.01	0.00	-0.08	0.00	-0.03	-0.03		
50-54	88.1%	0.01	0.05	0.02	0.00	0.03	-0.03	-0.03	-0.01	-0.04	83.1%	-0.01	0.08	0.00	0.02	0.00	-0.08	0.00	0.00	-0.03		
55-59	74.6%	-0.10	0.14	0.02	0.09	-0.12	0.00	-0.03	0.07	-0.01	70.0%	-0.13	0.16	-0.03	0.09	-0.16	-0.12	0.00	0.07	0.00		
60-64	32.2%	-0.18	0.34	0.00	0.12	-0.22	-0.03	-0.04	0.25	0.18	29.3%	-0.17	0.34	0.00	0.13	-0.20	-0.04	-0.02	0.21	0.18		

WOMEN

Age	(A) Regarding percentages economically active										(B) Regarding percentages employed											
	Median	Country										Median	Country									
		A	CH	D	DK	F	FIN	NL	S	UK	A		CH	D	DK	F	FIN	NL	S	UK		
20-24	68.2%	0.08	0.10	0.00	0.07	-0.11	-0.10	0.07	-0.09	0.00	63.3%	0.06	0.10	0.00	0.09	-0.21	-0.14	0.10	-0.08	0.00		
25-29	78.8%	0.06	0.04	-0.04	0.02	0.04	-0.03	0.00	-0.05	-0.04	71.4%	0.07	0.07	-0.01	0.05	-0.04	-0.06	0.06	-0.02	0.00		
30-34	80.2%	0.03	-0.03	-0.04	0.05	0.02	0.01	-0.07	0.00	-0.08	71.9%	0.07	0.00	0.00	0.08	-0.03	0.00	-0.01	0.04	-0.03		
35-39	81.6%	0.00	-0.06	-0.03	0.05	0.00	0.05	-0.13	0.01	-0.08	73.0%	0.05	-0.01	0.00	0.10	-0.02	0.04	-0.07	0.05	-0.03		
40-44	81.6%	0.00	-0.03	0.00	0.06	0.00	0.08	-0.14	0.04	-0.05	75.4%	0.02	-0.01	0.00	0.08	-0.03	0.05	-0.10	0.06	-0.02		
45-49	79.7%	-0.02	-0.01	0.01	0.06	0.00	0.10	-0.16	0.06	-0.03	74.6%	-0.01	0.01	0.00	0.08	-0.03	0.06	-0.13	0.08	0.00		
50-54	72.8%	-0.04	0.01	0.00	0.09	0.00	0.14	-0.21	0.11	-0.02	68.7%	-0.06	0.02	-0.03	0.10	-0.04	0.08	-0.19	0.13	0.00		
55-59	57.3%	-0.31	0.06	0.00	0.13	-0.10	0.20	-0.23	0.20	-0.01	54.6%	-0.31	0.06	-0.06	0.10	-0.14	0.06	-0.21	0.20	0.00		
60-64	24.9%	-0.19	0.06	-0.10	0.00	-0.15	0.01	-0.15	0.26	0.00	21.1%	-0.15	0.08	-0.08	0.03	-0.12	0.00	-0.11	0.25	0.04		

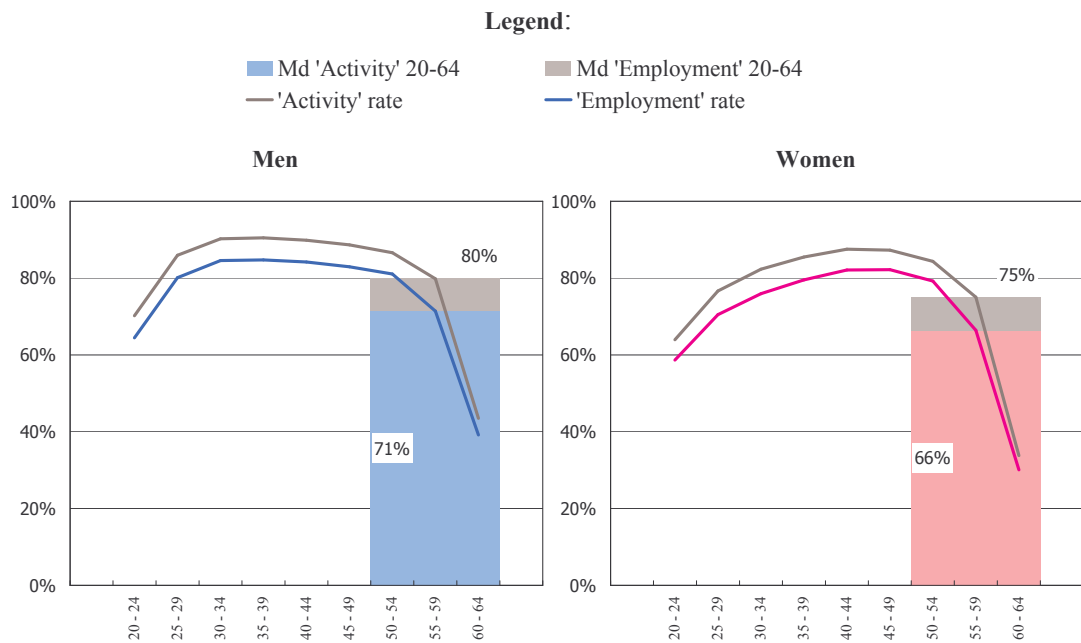
Source: Eurostat (2004)

Figure A2 below shows the base line values for 'activity' and 'employment' rates of the 'Scandinavian' model. The rates correspond to the average of the observed values for Denmark, Finland, and Sweden.

Figure A2 includes on the one hand the rates by 5-year age interval (two curves) and on the other hand the 'average' (i.e. the median) for ages 50-64 (bar diagram).

'Activity' and 'employment' rates follow near-parallel curves. The values for women are somewhat shifted to the right (i.e., toward higher ages). On average, rates are slightly lower for women than for men. The median value for 'activity' rates at ages 50-64 is 80% for men and 75% for women; the median values for 'employment' are 71% and 66%. In other words, 80% of the men at ages 50-64 state to be 'economically active', but only 71% is in 'active employment' (which implies an unemployment rate of 11.25%).

Figure A2 — Base-line values of 'activity' and 'employment' (equal to average values for Denmark, Finland and Sweden, situation around 2000) per 5-year age interval and average for age group 50-64, for men and for women



Source: Eurostat (2004)

Figure A3 presents the effects of assuming increased employment on the 'base-line' values. Only the effect of scenario 'C' is included. As such, figure A3 allows to assess the differences between 'activity' rates (2 & 6), 'employment' rates as observed (1 & 4), and finally 'employment' rates corresponding to scenario 'C' (3 & 5).

The differences between observed and scenario-based employment rates are greatest at the oldest age intervals and these are greater for women than for men — a pattern that is consistent with the expected cumulative effects of the scenarios. For women, the scenario-based 'employment' rates are higher than the (observed) 'activity' rates. This is consistent with the fact that the relatively low 'employment' rates that are observed for women are to a great extent the result of low 'activity' rates. The effect is greatest for the oldest age intervals. Scenario 'C' pushes the average 'employment' rate for women at ages 50-64 up to 78% whereas the (observed) 'activity' rate is 70%. In the case of men, 'employment' rate remains slightly below 'activity' (one may say that the effect of scenario 'C' would be to create unemployment close to zero).

Figure A3 — 'Base line' values for the proportions 'active' and 'employed' of the 'Scandinavian' model (averages of DK, FIN, and S), and proportions 'employed' resulting from scenario 'C'

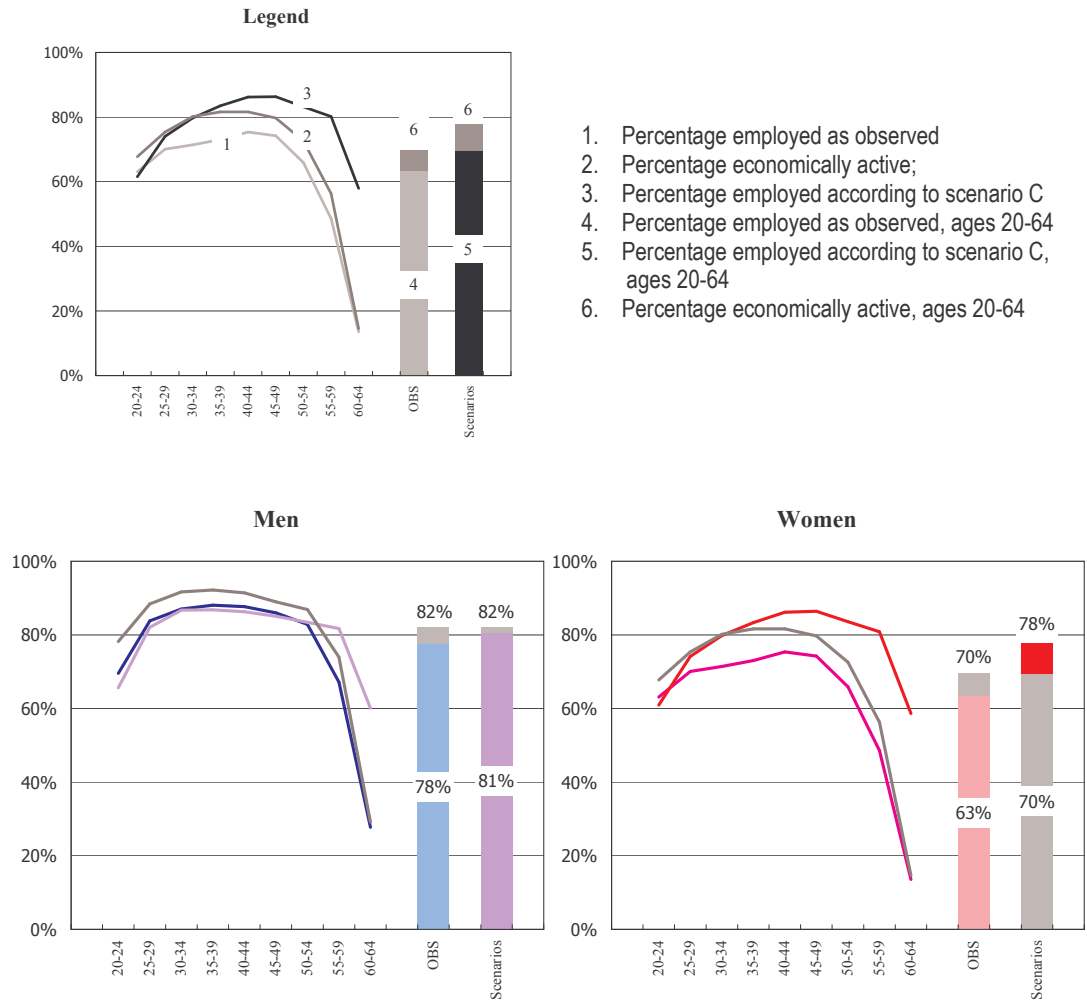


Figure A4 — Changes in the age structure by 5-year age interval between 2000 and 2050 (left scale) and percentages employed age group 20-64 (right scale), as observed in 2000 and as estimated in 2025 and 2050 according to scenario, for a selected group of countries

Legend:

■ 2000 ■ 2025 ■ 2050 ■ constant ■ Scenario A ■ Scenario B ■ Scenario C

Countries of sub-group HIGH

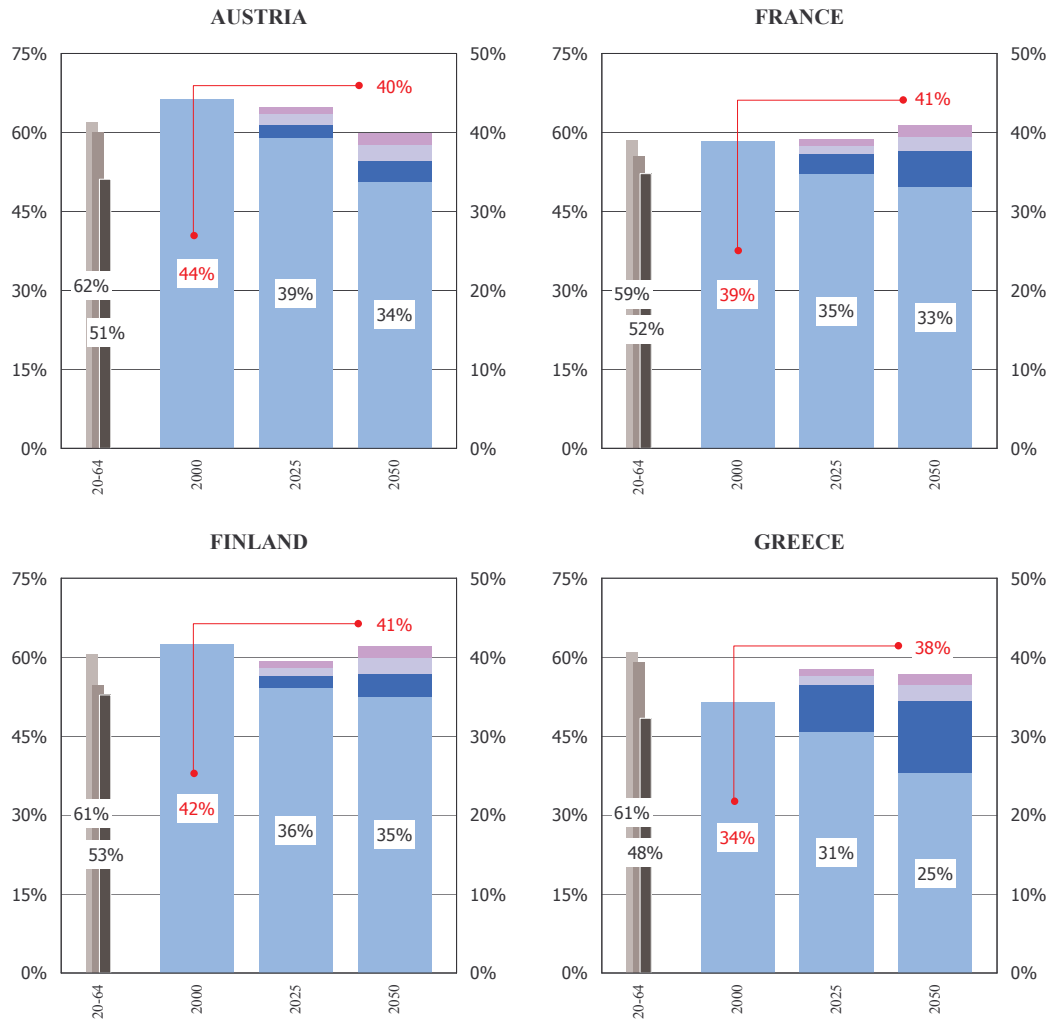
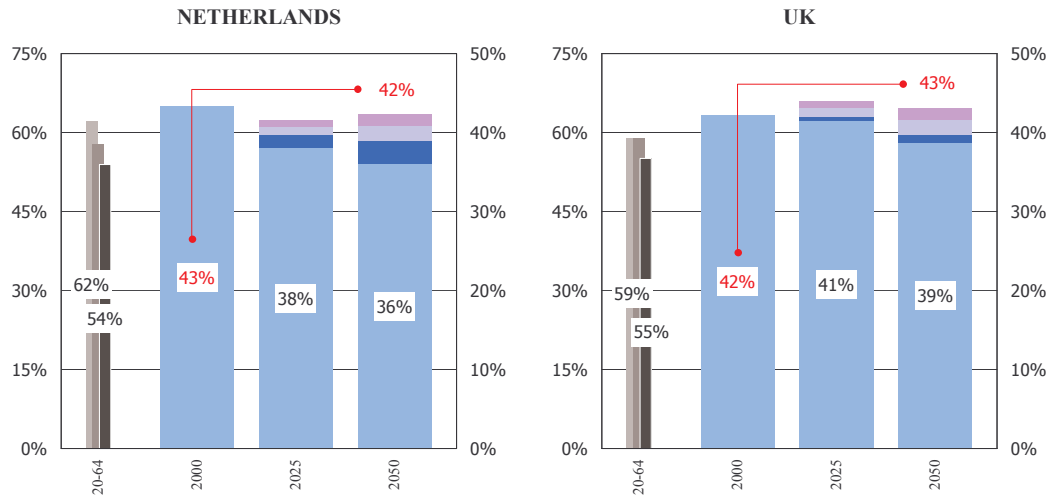


Figure A4 — *Cont'd*

Countries of sub-group HIGH — *cont'd*



Countries of sub-group MIDDLE

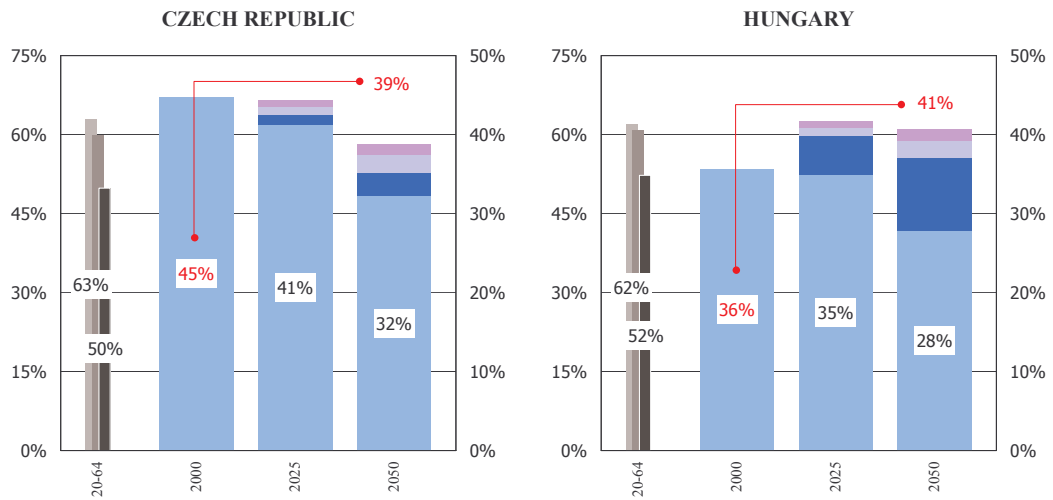
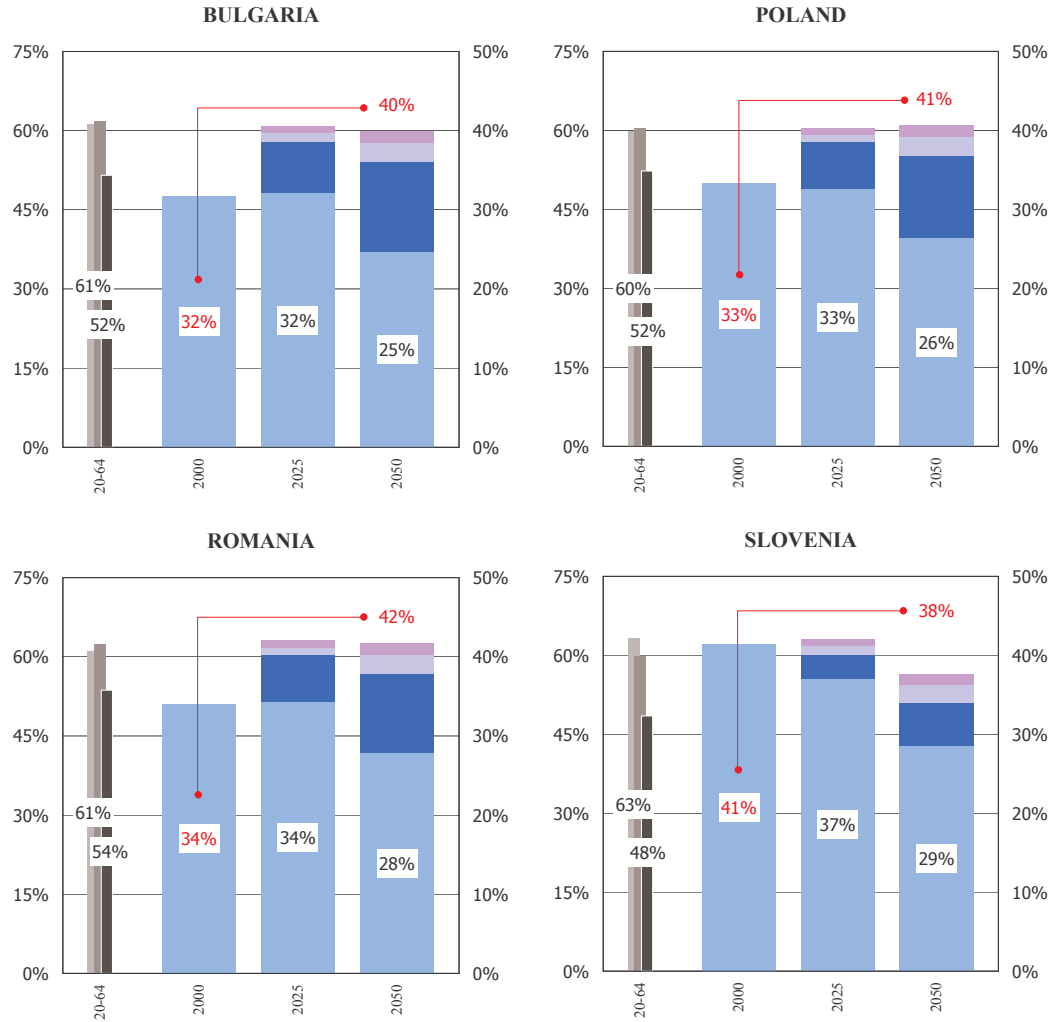


Figure A4 — *Cont'd*

Countries of sub-group LOW



Annex to paragraph 3.3

Regarding the forecast of GDP-levels per capita, assuming different growth levels for 'productivity' and increased 'employment' rates

This part is divided into two steps: the estimation of the level of labour productivity in 2000 (table A2); and the forecasting on GDP-levels per capita corresponding to several scenarios with respect to the growth of labour productivity and increased 'employment' rates (the latter being the object of paragraph 3.2).

Labour productivity can be estimated from the basic formula (presented at the start of paragraph 3.3):

$$\begin{aligned} \text{GDP / inhabitant} &= [\text{GDP / (proportion population employed)} \\ &\quad \times [(\text{population employed}) / (\text{population at working-age})] \\ &\quad \times [(\text{population at working-age}) / (\text{total population})] \\ &= [\text{labour productivity per capita}] \\ &\quad \times [\text{proportion population employed}] \\ &\quad \times [\text{proportion population at working-age}] \end{aligned}$$

So that:

$$[\text{labour productivity per capita}] = [\text{GDP / inhabitant}] / \{ [\text{employment rate}] \times [\text{proportion pop working-age}] \}$$

The results are given in table A2. Results are given by sub-group.

As indicated, 'employment rate' (or in a few cases GDP per capita) is not known for all countries. Table A2 includes estimates for labour productivity for all countries within each sub-group; where necessary the missing value was substituted by the median value. Eventually however, the simulation exercises themselves (see table A3) are based on the median value for labour productivity between the estimates for only those countries without 'missing values'.

Note that the difference in the median value based on all estimates and based on only estimates for countries without missing values is small for sub-groups HIGH and MIDDLE (in both cases a difference of less than 1%). The difference is much more important for sub-group LOW: 31.7%. Somehow, poor economic performance seems to go hand in hand with poor statistics.

The use in the simulation exercises the median for labour productivity based on estimates only for countries without missing values may imply overestimating the true value (by perhaps close to 30%). Concurrently, the results in table A3 for sub-group LOW are likely to correspond to 'optimistic' values for the GDP per capita. In other words, the extra effort needed to reach GDP -levels similar to those obtained in the countries of sub-group HIGH (see text) could be even higher than those suggested by the simulation results.

Table A2 — Individual country estimates for labour productivity on the basis of GDP per capita, ‘employment’ and the proportion of the population at working-age, by sub-group, 2000

Note: □ GDP/inhabitant is given in 2000 USD PPA equivalents, hence also labour productivity correspond to 2000 USD PPA equivalents; □ Grey shaded cells indicate that the parameter value was missing and that the country estimate for labour productivity was calculated using the median value. Eventually, further in the analysis not the country estimates but only the sub-group estimate for productivity is used. The latter correspond to the median value between countries without missing values in the parameters; □ the 2000-estimate of GDP per capita results from using the basic formula presented above (and is therefore different from the value given in panel D of figure 3.7, which correspond to the median value between the observed country values).

Sub-group HIGH

Country	labour productivity	GDP / inhabitant	employment rate	prop pop working age
Austria	60,855.7	26,765	0.7109	0.6186
Belgium	65,399.8	27,178	0.6970	0.5962
Denmark	52,844.8	25,103	0.7718	0.6155
Finland	60,055.6	24,996	0.6874	0.6055
France	62,292.3	24,223	0.6632	0.5864
Germany	58,115.9	25,103	0.6924	0.6239
Greece	47,136.2	16,501	0.5749	0.6089
Italy	54,379.5	23,626	0.6970	0.6233
Netherlands	59,223.9	25,657	0.6970	0.6216
Norway	72,848.7	29,918	0.6970	0.5892
Spain	44,921.9	19,472	0.6970	0.6219
Sweden	55,053.2	24,277	0.7525	0.5860
Switzerland	66,735.4	28,769	0.6970	0.6185
UK	55,787.0	23,509	0.7155	0.5890
Md Value between countries without missing values (in grey)	58,115.9	25,103	0.6970	0.6122
	58,669.9	(= Md All Countries)		

Source: UNDP (2002), Eurostat (2004), UN (2003a)

Table A2 — *Cont'd*

Sub-group MIDDLE

Country	labour productivity	GDP / inhabitant	employment rate	prop pop working age
Croatia	19,185.1	8,091	0.6978	0.6044
Cyprus	32,975.4	13,204	0.6980	0.5736
Czech Republic	30,998.6	13,991	0.7162	0.6302
Estonia	22,759.0	10,066	0.7461	0.5928
Hungary	34,894.7	12,416	0.5742	0.6196
Iceland	73,781.4	29,581	0.6978	0.5746
Ireland	76,716.9	29,866	0.6686	0.5822
Latvia	20,766.5	7,045	0.5711	0.5941
Lithuania	17,098.3	7,106	0.7113	0.5843
Luxembourg	122,873.6	50,061	0.6605	0.6168
Malta	41,210.2	17,273	0.6978	0.6007
Portugal	40,554.7	17,290	0.6978	0.6110
Ukraine	9,001.4	3,816	0.6978	0.6075
Md Value between countries without missing values (in grey)	32,946.6	13,204	0.6978	0.6007
	32,975.4	(= Md All Countries)		

Sub-group LOW

Country	labour productivity	GDP / inhabitant	employment rate	prop pop working age
Albania	11,285.6	3,506	0.5592	0.5555
Armenia	7,876.2	2,559	0.5592	0.5810
Azerbaijan	9,874.2	2,936	0.5592	0.5317
Belarus	22,659.3	7,544	0.5592	0.5954
Bosnia and Herzegovina	17,119.3	6,067	0.5592	0.6337
Bulgaria	18,014.4	5,710	0.5178	0.6122
Georgia	8,125.8	2,664	0.5592	0.5863
Moldova	6,469.0	2,109	0.5592	0.5830
Poland	27,564.2	9,051	0.5478	0.5994
Romania	18,825.0	6,423	0.5592	0.6101
Russian Federation	24,423.7	8,377	0.5592	0.6133
Serbia and Montenegro	18,343.0	6,067	0.5592	0.5914
Slovak Republic	28,614.7	11,243	0.6456	0.6086
Slovenia	41,882.7	17,367	0.6568	0.6314
The Former Yugoslav Republic of Macedonia	15,373.7	5,086	0.5592	0.5916
Turkey	23,664.3	6,974	0.5592	0.5270
Md Value between countries without missing values (in grey)	27,564.2	6,067	0.5592	0.5935
	18,825.0	(= Md All Countries)		

Table A3 — Estimates of GDP per capita according to the combined effect from different scenario for increased ‘employment’ (constant, A, B, C) and different scenarios for growth of labour productivity (constant, A, B, C, D, E), for years 2025 and 2050, by sub-group

Note: □ Estimates for GDP per capita are in 2000 USD PPA equivalents; □ for the underlying assumptions regarding ‘employment’, see table 3.2; □ the underlying assumptions regarding annual growth of productivity are 1.50%, 1.75%, 2.00%, 2.50%, and 3.00% for scenarios A, B, C, D, and E, resp.; □ the grey shaded cells in panels for sub-groups MIDDLE and LOW indicate the combinations of scenario with levels of GDP per capita that are equivalent to the one obtained for sub-group HIGH with combined scenario ‘BB’ in the same year (there are no equivalent levels of GDP per capita in year 2025).

Sub-group HIGH												
2000-Estimate	Tot. pop (x1,000)				Prop. working age				Productivity		Prop. employed (ages 20-64)	
GDP per capita	374,710				0.6090				58,116		0.7045	
24,935												
Estimates 2025						Estimates 2050						
Demogr. parameters 2025		Prop. employed (ages 20-64)				Demographic parameters 2050		Prop. employed (ages 20-64)				
Tot. pop. (x1,000)	380,518	Scenario				Tot. pop. (x1,000)	365,737	Scenario				
Prop. working-age	0.5794	Constant	A	B	C	Prop. working-age	0.5156	Constant	A	B	C	
Scenario / Productivity		0.6749	0.6950	0.7149	0.7289	Scenario / Productivity		0.6808	0.7176	0.7547	0.7826	
		-4.2%	-1.3%	1.5%	3.5%			-3.4%	1.9%	7.1%	11.1%	
Constant	58,116	22,726	23,403	24,073	24,544	Constant	58,115.9	20,397	21,500	22,613	23,448	
	0.0%	-8.9%	-6.1%	-3.5%	-1.6%		0.0%	-18.2%	-13.8%	-9.3%	-6.0%	
Scenario A	84,558	33,067	34,052	35,026	35,711	Scenario A	123,031	43,180	45,516	47,871	49,639	
	45.5%	32.6%	36.6%	40.5%	43.2%		111.7%	73.2%	82.5%	92.0%	99.1%	
Scenario B	90,012	35,199	36,248	37,285	38,014	Scenario B	139,413	48,929	51,577	54,245	56,249	
	54.9%	41.2%	45.4%	49.5%	52.5%		139.9%	96.2%	106.8%	117.5%	125.6%	
Scenario C	95,817	37,469	38,586	39,690	40,466	Scenario C	157,976	55,444	58,444	61,468	63,738	
	64.9%	50.3%	54.7%	59.2%	62.3%		171.8%	122.4%	134.4%	146.5%	155.6%	
Scenario D	108,575	42,458	43,723	44,974	45,854	Scenario D	202,845	71,191	75,043	78,927	81,841	
	86.8%	70.3%	75.4%	80.4%	83.9%		249.0%	185.5%	201.0%	216.5%	228.2%	
Scenario E	123,031	48,112	49,545	50,963	51,959	Scenario E	260,458	91,412	96,358	101,344	105,086	
	111.7%	93.0%	98.7%	104.4%	108.4%		348.2%	266.6%	286.4%	306.4%	321.4%	

Table A3 — *Cont'd*

Sub-group MIDDLE

2000-Estimate	Tot. pop (x1,000)		Prop. working age		Productivity	Prop. employed (ages 20-64)					
GDP per capita	97,380		0.6087		32,947	0.6628					
13,292											
Estimates 2025					Estimates 2050						
Demographic parameters 2025		Prop. employed (ages 20-64)				Demographic parameters 2050		Prop. employed (ages 20-64)			
Tot. pop. (x1,000) 86,160		Scenario				Tot. pop. (x1,000) 72,354		Scenario			
Prop. working-age 0.6115		Constant	A	B	C	Prop. working-age 0.5235		Constant	A	B	C
Scenario / Productivity		0.6532	0.6909	0.7081	0.7223	Scenario / Productivity		0.6231	0.7048	0.7497	0.7774
		-1.4%	4.2%	6.8%	9.0%			-6.0%	6.3%	13.1%	17.3%
Constant	32,947	13,162	13,920	14,267	14,554	Constant	32,947	10,748	12,157	12,931	13,409
	0.0%	-1.0%	4.7%	7.3%	9.5%		0.0%	-19.1%	-8.5%	-2.7%	0.9%
Scenario A	47,937	19,150	20,254	20,759	21,175	Scenario A	69,748	22,754	25,737	27,374	28,387
	45.5%	44.1%	52.4%	56.2%	59.3%		111.7%	71.2%	93.6%	105.9%	113.6%
Scenario B	51,029	20,386	21,560	22,098	22,541	Scenario B	79,035	25,783	29,164	31,019	32,167
	54.9%	53.4%	62.2%	66.2%	69.6%		139.9%	94.0%	119.4%	133.4%	142.0%
Scenario C	54,320	21,700	22,950	23,523	23,995	Scenario C	89,558	29,216	33,047	35,149	36,450
	64.9%	63.3%	72.7%	77.0%	80.5%		171.8%	119.8%	148.6%	164.4%	174.2%
Scenario D	61,552	24,590	26,006	26,655	27,190	Scenario D	114,995	37,514	42,433	45,133	46,803
	86.8%	85.0%	95.7%	100.5%	104.6%		249.0%	182.2%	219.2%	239.5%	252.1%
Scenario E	69,748	27,864	29,469	30,204	30,810	Scenario E	147,657	48,170	54,485	57,952	60,096
	111.7%	109.6%	121.7%	127.2%	131.8%		348.2%	262.4%	309.9%	336.0%	352.1%

Sub-group LOW

2000-Estimate	Tot. pop (x1,000)		Prop. working age		Productivity	Prop. employed (ages 20-64)					
GDP per capita	341,040		0.5896		27,564	0.5824					
9,465											
Estimates 2025					Estimates 2050						
Demographic parameters 2025		Prop. employed (ages 20-64)				Demographic parameters 2050		Prop. employed (ages 20-64)			
Tot. pop. (x 1,000) 336,236		Scenario				Tot. pop. (x 1,000) 308,683		Scenario			
Prop. working-age 0.6181		Constant	A	B	C	Prop. working-age 0.5526		Constant	A	B	C
Scenario / Productivity		0.5687	0.6504	0.6659	0.6802	Scenario / Productivity		0.5352	0.7085	0.7508	0.7787
		-2.3%	11.7%	14.3%	16.8%			-8.1%	21.6%	28.9%	33.7%
Constant	27,564	9,689	11,080	11,345	11,588	Constant	27,564	8,152	10,791	11,437	11,860
	0.0%	2.4%	17.1%	19.9%	22.4%		0.0%	-13.9%	14.0%	20.8%	25.3%
Scenario A	40,106	14,098	16,121	16,507	16,860	Scenario A	58,353	17,257	22,845	24,211	25,109
	45.5%	48.9%	70.3%	74.4%	78.1%		111.7%	82.3%	141.4%	155.8%	165.3%
Scenario B	42,692	15,007	17,161	17,572	17,947	Scenario B	66,123	19,555	25,887	27,435	28,452
	54.9%	58.5%	81.3%	85.7%	89.6%		139.9%	106.6%	173.5%	189.9%	200.6%
Scenario C	45,446	15,975	18,267	18,705	19,105	Scenario C	74,927	22,159	29,334	31,088	32,240
	64.9%	68.8%	93.0%	97.6%	101.8%		171.8%	134.1%	209.9%	228.4%	240.6%
Scenario D	51,497	18,102	20,700	21,196	21,648	Scenario D	96,209	28,452	37,665	39,918	41,397
	86.8%	91.2%	118.7%	123.9%	128.7%		249.0%	200.6%	297.9%	321.7%	337.4%
Scenario E	58,353	20,512	23,456	24,018	24,531	Scenario E	123,534	36,534	48,363	51,255	53,155
	111.7%	116.7%	147.8%	153.8%	159.2%		348.2%	286.0%	411.0%	441.5%	461.6%