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Education and Research in Times of Population Ageing

Paper to be presented at the Informal Meeting of Ministers of Education and Research, Uppsala, 1-3 March 2001

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If we try to look ahead into our common future, only one prediction can be made with some degree of certainty: the population of Europe will decline in size and grow increasingly older. It is projected that the decline in total population within the European Union will begin before 2010.[1] In 2050, we can expect 28 percent of the total European population, including Russia, to be aged 65 and over, as compared to 14 percent today.[2] In a global perspective, the share of the world population residing in Europe will decline considerably. According to current projections, the European population will decrease from 13 to 7 percent of the world population over the next fifty years. At the same time, the share of the world population residing in the Middle East, North Africa and Sub-Saharan Africa will increase from 15 to 24 percent.[3]

It is widely acknowledged that the implications of population ageing are deep and pervasive. We can expect reduced growth in Europe, as fewer workers must support more retirees. Fiscal strain will raise issues of inter-generational fairness. International relations will change in scope and character.[4]

At the Lisbon summit, a new goal was set for Europe: to become "the most competitive and dynamic knowledge-based economy in the world". In this paper, I argue that we need to discuss this goal of growth and competitiveness in the context of population ageing. Educational- and research policies, in particular, are deeply influenced by demographic change.

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[1] *The IPTS Futures Project Synthesis Report*, Institute for Prospective Technological Studies, Joint Research Centre, European Commission, Seville 2000.
[2] *Beyond Six Billion. Forecasting the World's Population*, National Research Council, National Academy of Sciences, Washington, 2000 , table 1-3, and p. 23 (projections from the United Nations; the figures for Europe refer to all European countries including Russia).
[3] *Beyond Six Billion*, p. 21, table 1-1.
[4] See for example G. Coomans, *Europe's Changing Demography. Constraints and Bottlenecks*, Futures Report Series no 8, Institute for Prospective Technological Studies, Joint Research Centre, European Commission, Seville, 2000; *Maintaining Prosperity in an Ageing Society*, OECD, Paris, 1998; and P. G. Peterson, *Grey Dawn: how the coming age wave will transform America - and the world*, New York, 1999.

My paper consists of four parts. First, I discuss current population forecasts for the European Union and the impact of population ageing on European economic growth. Second, I place European trends in a global context. Thirdly, I point to possible challenges, brought about by population ageing, in the field of education and research. Finally, suggest three long-term educational strategies of particular interest for ageing societies.

Europe in the 21st century: age structure change and economic growth

The process of age structure change in Europe from 1980 to 2040 is shown in Figure 1 (appendix). The most striking feature in this figure is the large post-war baby boom generation, that pass through the European age structure. In 1990, the European population was still fairly young. The largest cohorts were then 20 to 30 years old. By 2020, the large baby boom cohorts will be in their middle years. Twenty years later, they will have entered old age.

On the national level, there is substantial variation in the timing of the ageing process (Figure 2, appendix). The most dramatic development can be expected in continental Europe. Germany, Austria, Belgium, the Netherlands, Italy and Spain have at present favourable age structures, with the largest cohorts in working age. Within a few decades, however, the process of population ageing will have proceeded very far. Ireland stands out as an exceptional case. Ireland has still a young population and has experienced only a relatively modest decline in birth rates. In the year 2000, Ireland reported the highest crude birth rate in the European Union -14.6 live births per 1 000 inhabitants.[5]

As shown in Figure 3 (appendix), the enlargement of the European Union will have a minor impact on the basic scenario of population ageing. Almost all candidate countries have experienced a substantial drop in births in the 1990s, and it is predicted that birth rates will continue to be low. Among the more populous candidate countries, only Turkey presents a youthful population.

What are the macro-economic implications of these demographic changes? In the economic literature on age structure effects, it has been shown that age structure has a profound impact on several macro-economic phenomena, including economic growth.[6]

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[5] Eurostat, Population and Social Conditions, News Releases, 4/2000.

[6] For age effects on growth, see D. E. Bloom and J. G. Williamson, "Demographic Transitions and Economic Miracles in Emerging Asia", *The World Bank Economic Review*, 1998, vol. 12, no 3; D. E. Bloom, J. D. Sachs, "Geography, Demography and Economic Growth in Africa", *Brooking Papers on Economic Activity* 1998:2; and T. Lindh and B. Malmberg, "Age Structure Effects and Growth in the OECD, 1950-1990", *Journal of Population Economics*, vol 12, 1999. Other macro-economic variables, affected by age structure, include savings, investments, inflation, income distribution, capital flows, migration, budget deficits, balance of

According to Swedish economists Bo Malmberg and Thomas Lindh, who have studied variations in economic growth in the 1950-1990 period in the OECD area, the 50-64 age group has the strongest positive influence. The group above age 65, by contrast, contributes negatively. Due to the large post-war baby-boom generations, that mark the demographic structure of several OECD countries, growth prospects are at present bright. In the next decade, however, when the baby boomers go into retirement age, growth rates will fall. [7]

How soon will the process of population ageing affect the prosperity of our own economies? According to growth forecasts based on age structure modelling, produced at the Institute for Futures Studies in Stockholm, all countries in the European Union will enter a period of ageing and decreasing economic growth in the coming decades. The timing differs markedly, however. As shown in Figure 4 (appendix), Northern Europe, including the Nordic countries, the Netherlands and the UK, will experience good growth conditions up to about 2010. Thereafter will follow a marked slowdown. A similar pattern, with a turning point by 2010, is expected for France. Later turning-points, 2020 or thereafter, are predicted for most of continental Europe: Germany, Austria, Belgium, Greece, Italy, Portugal and Spain. In Ireland, with the most youthful age structure, the negative impact of ageing will set in only after 2040.[8]

The future of Europe in a global context

The slow-down of economic growth in Europe over the coming decades will take place in a global context marked by rapid demographic and economic change. This may aggravate the challenge posed by population ageing, but it can also open up new opportunities.

Current forecasts of global population trends show that a major demographic shift will occur in the next thirty years. Today, most people in the world reside in countries where children and young adults make up the major part of the population. Youthful age structures characterise North Africa, Central America, West Asia, South Asia and South East Asia.

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payments, etc. Literature on the subject include T. Lindh and B. Malmberg, "Age Structure and Inflation - a Wicksellian Interpretation of OECD Data", *Journal of Economic Behaviour and Organization,* vol 36, 1998; *Maintaining Prosperity in an Ageing Society*, OECD, Paris, 1998, chapter 7; B. Malmberg and L. Sommestad, "The Hidden Pulse of History. Age Transition and Economic Change in Sweden, 1820-2000", *Scandinavian Journal of History*, vol. 25, 2000; and L. Sommestad, "European Social Research in Times of Population Ageing", in *The Social Science Bridge*, Meeting 4-5 April 1997, Lisbon, Portuguese Ministry of Science and Technology, 1998.

[7] Lindh and Malmberg, "Age Structure Effects and Growth in the OECD".

[8] Forecasts produced by Thomas Lindh and Bo Malmberg for the demographic programme at the Institute for Futures Studies, Stockholm. Work in progress. The y-axis is the impact of demographic change, in percentage points. For more detailed information, see figure 4.

Already in 2015, however, populations in these regions will be more mature, and in 2030, large cohorts of middle-aged people will predominate.[9]

The growing literature on age effects on the macro-economy makes it reasonable to believe that current trends towards more mature populations will enhance growth and improve living standards. Youthful countries, with high child-dependency rates, are typically poor. Mature countries, by contrast, display high incomes.

Figure 5 (map, appendix) shows the present distribution of income in the world, followed by predictions for the future based on age structure modelling.[10] Growth predictions are particularly favourable for East and South Asia. Considerable income development is also expected for South East Asia, West Asia, North Africa and Latin America. Only sub-Saharan Africa is lagging behind. In the year 2050, we may live in a world where South Asia is the economic centre of the world, followed by East Asia. Europe has lost its former role as a predominant economic power.

Education and research in ageing societies

An important observation, drawn from comparative and historical research, is that there is no clear-cut relationship between demographic and economic change, on the one hand, and national developments in systems of education and research, on the other. As in other policy areas, responses to demographic and economic change vary both between countries and over time, due to differences in political institutions, patterns of interest group competition, etc. This variation implies that there is considerable scope for political action. [11]

Successful political action depends on multiple factors in the policymaking process, such as political dedication and strategic abilities. However, successful action also builds on a clear understanding of the problem that needs to be solved. In the present situation, with a severe process of ageing in front of us, it is thus of prime importance to explore, in depth, the problem of population ageing and its possible implications.

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[9] The following discussion is based on UN population forecasts, by age and sex, 1998 revision. For methodological issues in relation to population forecasts, see for example *Beyond Six Billion* or *The future population of the world : what can we assume today?* , ed. W. Lutz, London , 1996.

[10] The estimated model, based on data from 131 countries in the period 1950-1990, explains more than 50 percent of the variation in GDP per capita, between regions and over time. Income data from *Penn World Tables.* In B. Malmberg and L. Sommestad, *Tunga trender i den globala utvecklingen,* working paper, Institute for Futures Studies, 2000.

[11] L. Kim, *Val och urval till högre utbildning. En studie baserad på erfarenheterna av 1977 års tillträdesreform,* Uppsala 1998, p. 38-41; R. Premfors, *The Politics of Higher Education in a Comparative Perspective. France, Sweden, United Kingdom,* Stockholm 1980; L. Sommestad, "Human Reproduction and the Rise of Welfare States: The United States and Sweden in Comparative Perspective", *Scandinavian Economic History Review* 46, no 2, 1998, p. 99-100.

I would argue that four problems related to population ageing, observed in the literature, need particular attention.

First, a shortage of human and financial resources can combine to make the application of new knowledge slower and less complete. A slow-down in economic growth hampers the spread of technological innovations. Only when investments are made, can innovations materialise.[12] In addition, small cohorts of young people make the transfer of knowledge from educational institutions to working life slower. This effect may be hard to compensate for by more extensive educational programmes for people already in the work force. In a situation of labour shortage, working time is a scarce resource. [13]

Second, incentives to pursue higher education can be weak in an ageing society with small cohorts of young people. There is a tendency that people who belong to small cohorts demand less education than those who belong to larger ones, due to less severe competition in the labour market. Such a development might be particularly problematic as regards recruitment of young people to careers within science and technology.[14]

Thirdly, changes in labour market demand, triggered by an ageing population, can offset political ambitions to give priority to programmes in science and technology. A major concern today, for good reasons, is the shortage of technicians and scientists. Basic skills in IT are also in high demand. In a longer-term perspective, however, we can expect that demand for labour in Europe will increase above all within personal services, for example in health care.[15]

Finally, it may be increasingly difficult to defend – in an ageing society – ambitious strategies for education and research. Population ageing is closely connected with growing

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[12] A classic study of a technologically stagnating economy is Ingvar Svennilson's, *Growth and stagnation in the European economy*, New York, 1983, (Faks. of original printing: Geneva : United Nations Economic Commission for Europe, 1954).

[13] D. J.. Macunovich, D.J. (1998) "Relative Cohort Size and Inequality in the United States", *American Economic Review*, vol. 88, no 2, p. 259-264.

[14] K. Murphy, M. Plant and F. Welch, "Cohort Size and Earnings in the USA", i *Economics of Changing Age Distributions in Developed Countries*, 39-58, red. R. D. Lee, W. B. Arthur and G. Rogers, Oxford, 1988; R. Ohlsson, *Högre utbildning och demografisk förändring*, Lund, 1986; R. Shimer, "The Impact of Young Workers on the Aggregate Labor Market", Working Paper No 7306, National Bureau of Economic Research, Cambridge, Massachusetts, 1999.

[15] Tertiarization is a basic feature of mature industrial economies, as noted by Esping-Andersen (*Social Foundations of Postindustrial Economies*, Oxford, 1999, ch. 6: "The Structural Bases of Post-Industrial Employment"). The relationship between ageing and a rising demand for health care and other services are noted in many studies. In Sweden in the late 1990s, people aged 65 and over constituted 17 percent of the population and accounted for 54 percent of public spending on health care (*Från dagis till servicehus. Välfärdspolitik i livets olika skeden. Välfärdspolitiska rådets rapport 1999*, by Lars Söderström, Anders Björklund, Per Gunnar Edebalk and Agneta Kruse, Stockholm, 1999, ch. 2, table 2.1 and 2.4).

public expenditure. This may result in increasing competition for scarce public resources.[16] Furthermore, there is evidence that ageing public opinions tend to give priority to social spending that benefit the aged, rather than the young. Old age pensions and health care have a stronger public support than education.[17]

Long-term strategies – concluding suggestions

How can measures in the fields of education and research help to foster economic growth, in the context of ageing populations?

A broad range of political measures are possible. To conclude, I would like to point out three strategies of particular interest – a *quality strategy*, a *family strategy*, and a *global strategy*. Taken together they address not only the key issue of recruitment and high quality education and research, but also the very problem of population ageing.

The quality strategy. One way to compensate for a declining labour force is to launch more efficient educational programmes and to educate more highly qualified labour. This strategy can be particularly productive, if priority is given to the schooling of the young. Outstanding education for children and youth constitutes an indispensable basis for a competitive economy, and it reduces the need for basic programmes in adult education. Furthermore, an early introduction to science and technology contributes to developing not only a knowledge-based economy, but also a knowledge-based culture.

The family strategy. The negative economic effects of population ageing indicate that a more child-friendly Europe would, in the long-term perspective, be more productive. Making it possible for young men and women to combine education, family life and careers is therefore not only an important social issue. It may also contribute to the economic dynamics of the Union. In Europe today, welfare state systems are typically focused on the elderly population. A stronger emphasis on family policies, including housing, could make a difference for young couples.[18]

A major problem in relation to the family strategy is the persistent lack of gender equality in Europe. An increasing number of European women enter higher education, but in

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[16] Analyses of population ageing and the macro-economy in the OECD in recent decades show a strong, positive association between, on the one hand, the proportion of people aged 60 and above, and, on the other hand, government consumption, public sector employment, public debt, and taxes paid. Malmberg and Sommestad, ”The Hidden Pulse of History”, p. 143-144.

[17] Danish data reported by Gøsta Esping-Andersen in *Social Foundations of Postindustrial Economies,* p. 147-148.

[18] Esping-Andersen. *Social Foundations of Postindustrial Economies,* ch. 8: ”New Social Risks in Old Welfare Regimes”; L. Sommestad, ”Morgondagens utmaning: välfärdspolitik i ett åldrande samhälle”, Rapport från forskarseminariet Dagens socialförsäkring – ett system för gårdagens samhälle?, Stockholm, 2001.

many countries, social and political adjustments to modern women's broader role in society are still lacking. The result is that many women, who want to make use of attractive opportunities in education and research, postpone childbearing or give up children altogether.[19]

The global strategy. A third strategy for an ageing society is to recruit students from countries with a younger age structure. Large cohorts of youth, prepared to study and work abroad, reside today in Asia, Africa and Latin America. In the US, foreign students are since long an important – and economically rewarding – contribution to the student population. This is the case also in some European countries, for example the UK.[20]

The possible gains of an expanded cross-border exchange between Europe and other regions in the world are illustrated in figure 6 (appendix). The figure shows the future age structures of Europe and North Africa respectively, together with the combined age structure of the two regions. When the North African population is added to the European, the size of the young population increases substantially. In fact, Europe and North Africa taken together present a remarkably balanced population development.

To encourage cross-border mobility of students and researchers is already an important task for the European Union. Advancing the role of the European Union in a global strategy for cross-border mobility, could be a crucial contribution to the future growth and competitiveness of Europe.[21]

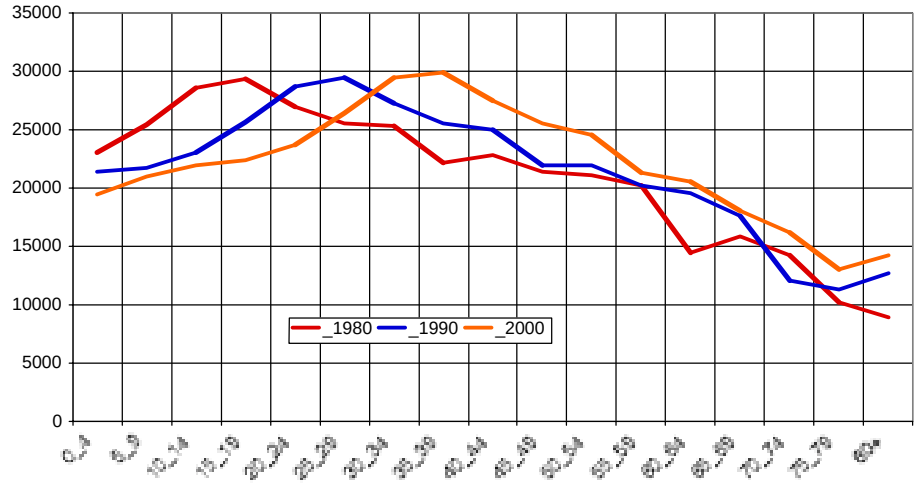
This paper was written in collaboration with docent Bo Malmberg, Department of Geography, Uppsala University, and professor Thomas Lindh, Institute for Futures Studies.

[19] *Beyond Six Billion,* p. 100-101.
[20] SOU 2000:92, *Advantage Sweden – en kraftsamling för ökad rekrytering av utländska studenter till Sverige*, Stockholm, 2000.
[21] *Education and Research. Programme of meetings and conferences during Sweden's EU Presidency, Spring 2001,* p. 29-32.

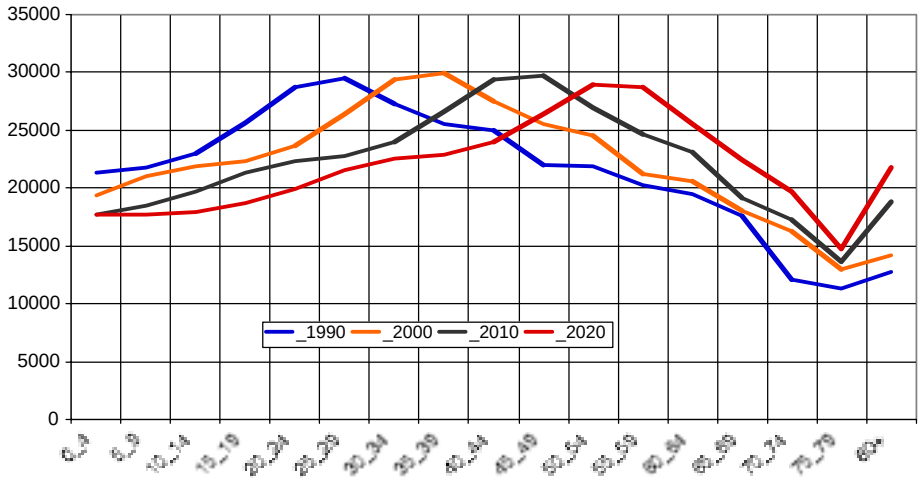
Figure 1. Age structure changes in the European Union, 1980-2040

5-year age groups, in thousands.

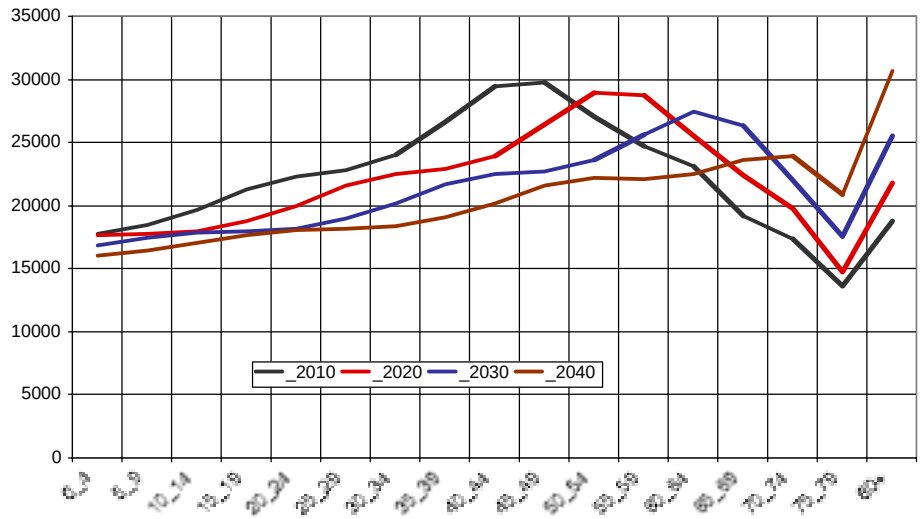
EU 15: 1980-2000



EU 15: 1990-2020



EU 15: 2010-2040

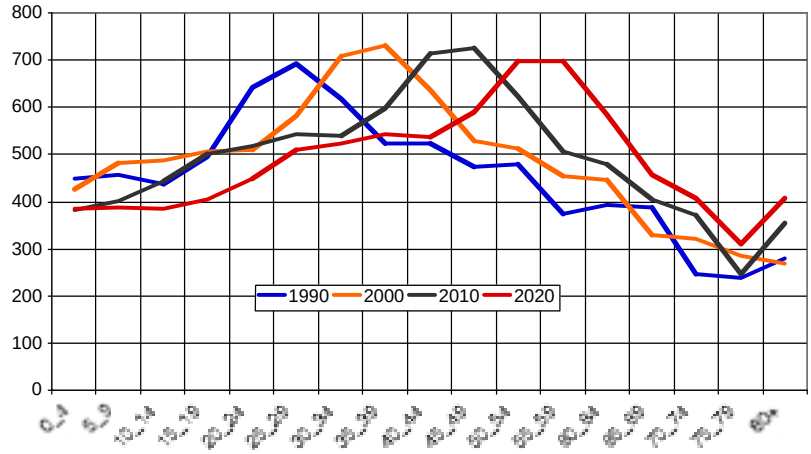


Source: Population by age and sex, United Nations, 1998 revision.

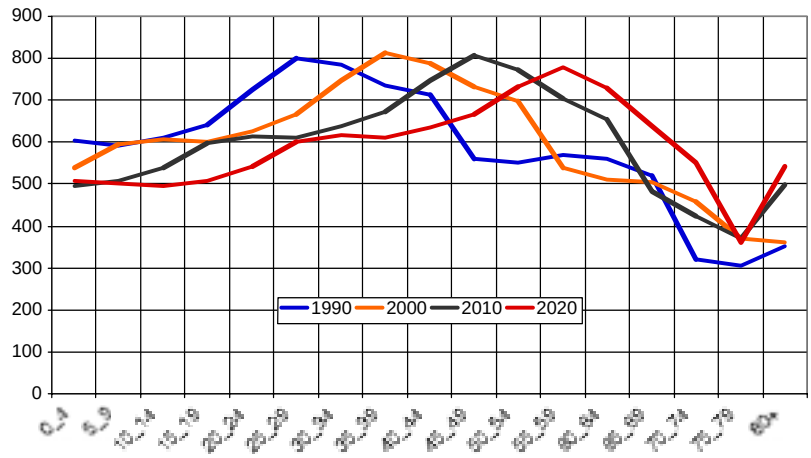
Figure 2. Age structure changes in European Union member states, 1990-2020

5-year age groups, in thousands.

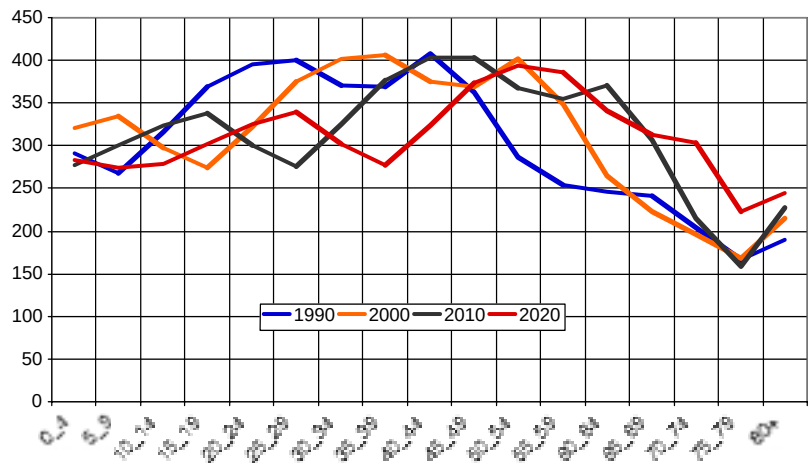
Austria



Belgium



Denmark

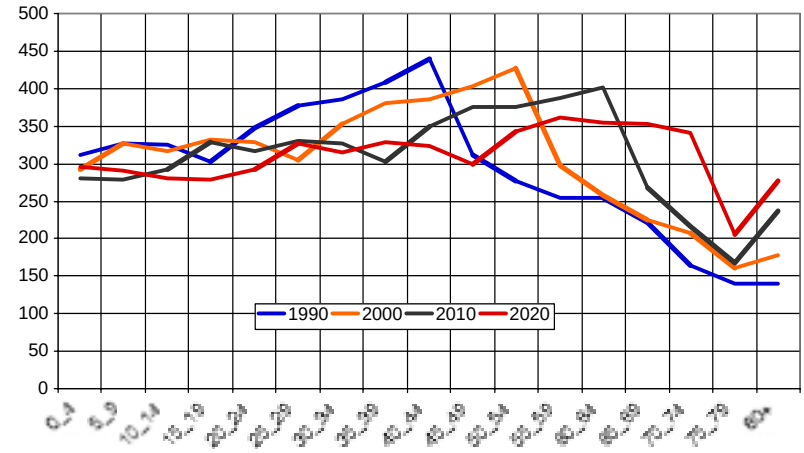


Source: Population by age and sex, United Nations, 1998 revision.

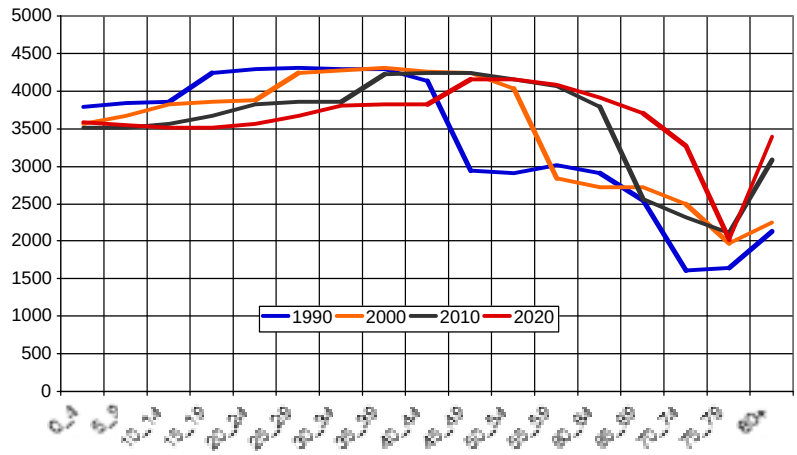
Figure 2. Age structure changes in European Union member states, 1990-2020

5-year age groups, in thousands.

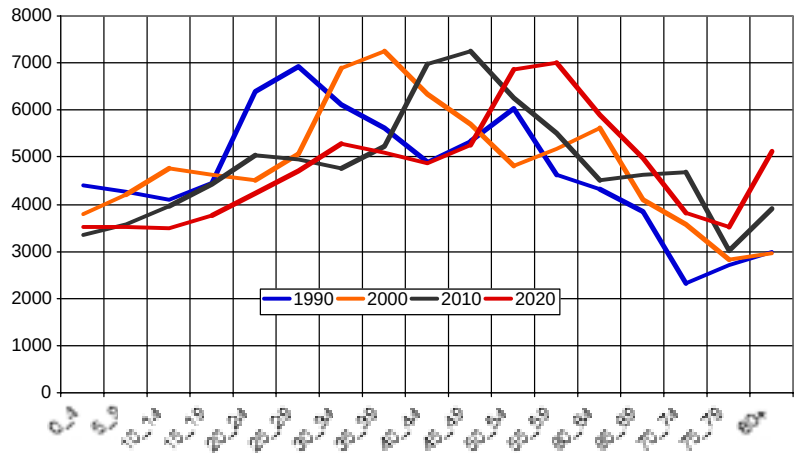
Finland



France



Germany

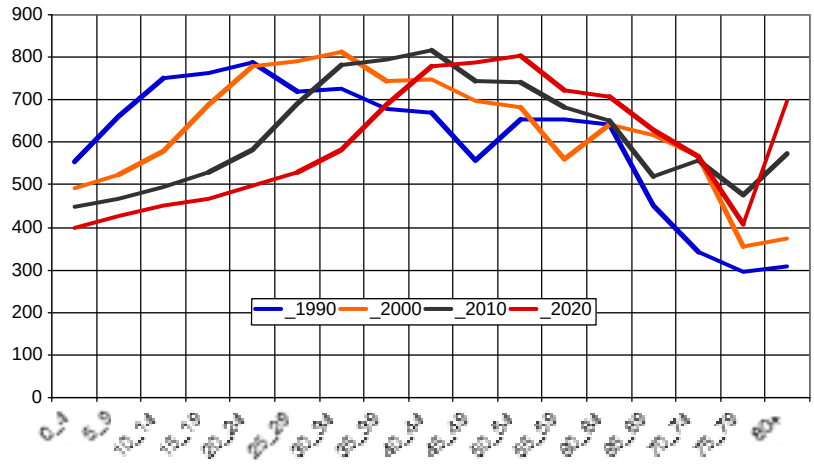


Source: Population by age and sex, United Nations, 1998 revision.

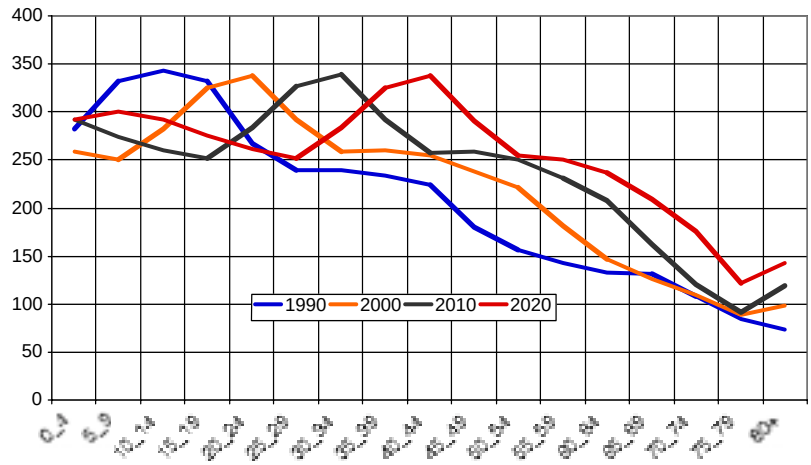
Figure 2. Age structure changes in European Union member states, 1990-2020

5-year age groups, in thousands.

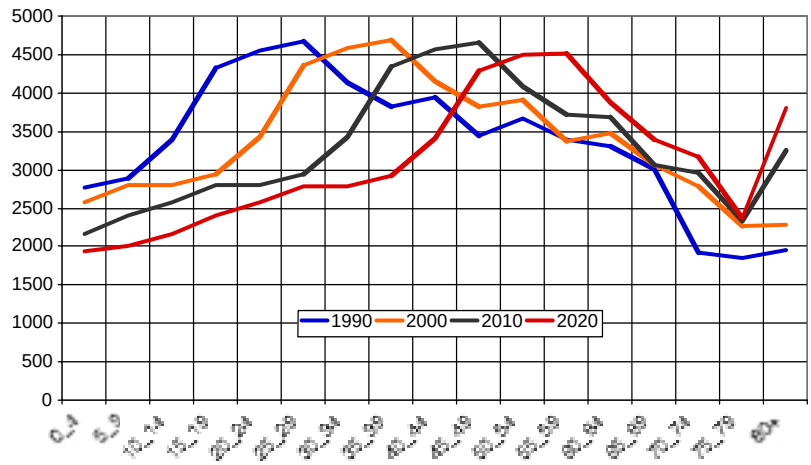
Greece



Ireland



Italy

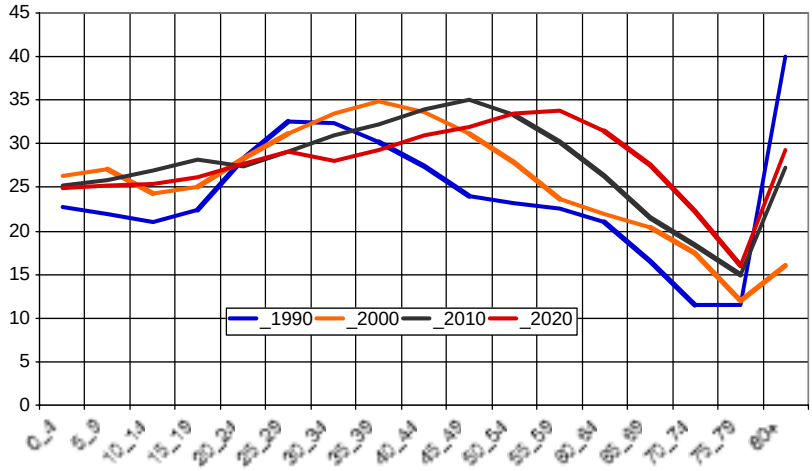


Source: Population by age and sex, United Nations, 1998 revision.

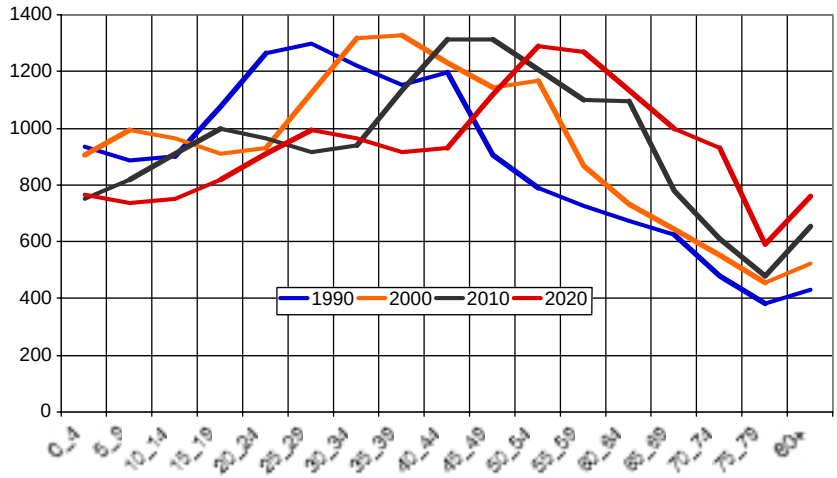
Figure 2. Age structure changes in European Union member states, 1990-2020

5-year age groups, in thousands.

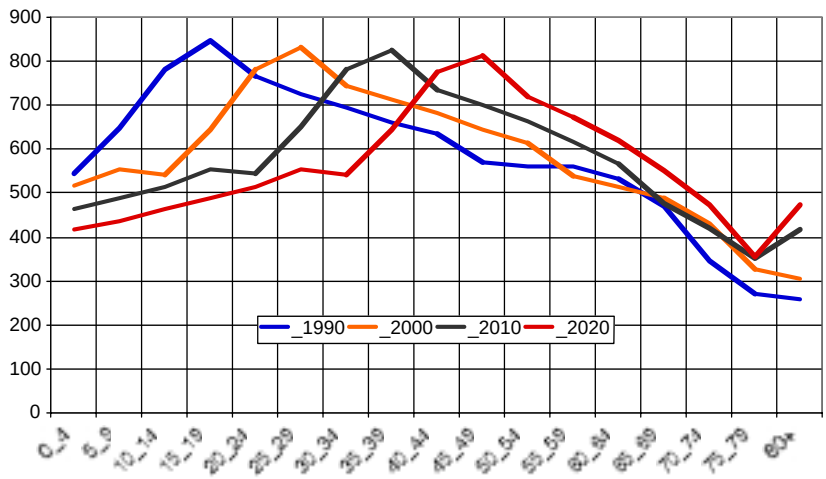
Luxembourg



Netherlands



Portugal

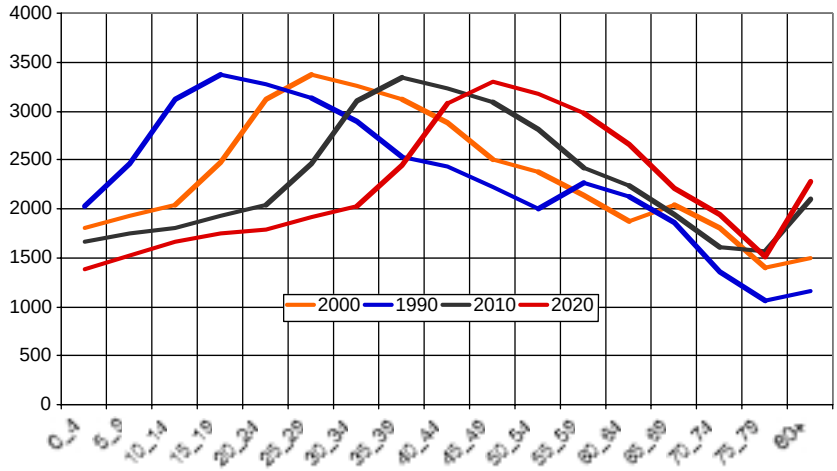


Source: Population by age and sex, United Nations, 1998 revision.

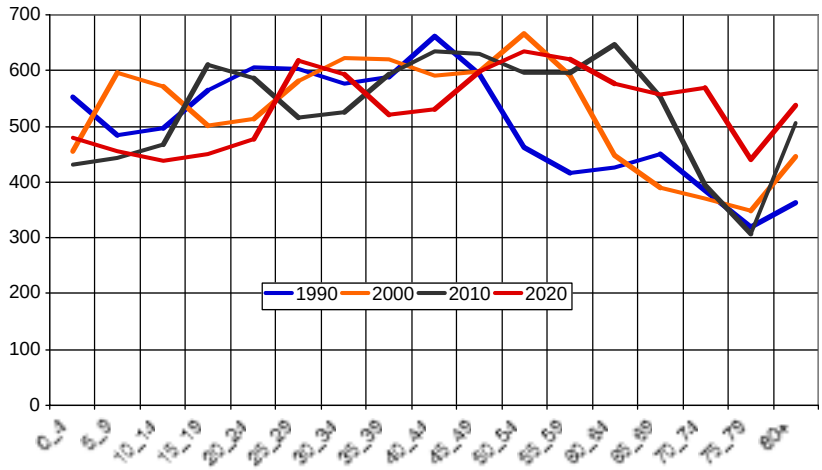
Figure 2. Age structure changes in European Union member states, 1990-2020

5-year age groups, in thousands.

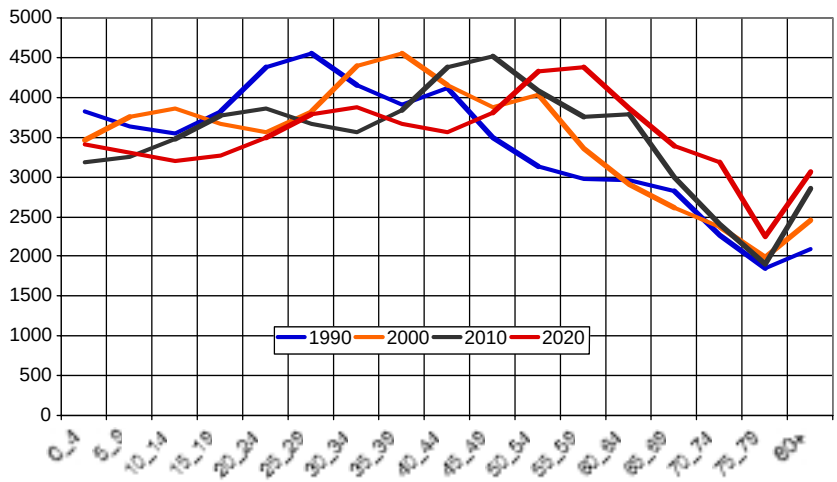
Spain



Sweden



UK

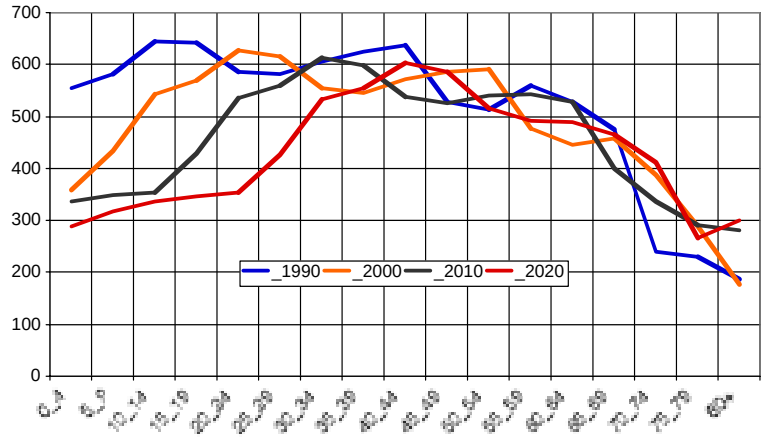


Source: Population by age and sex, United Nations, 1998 revision.

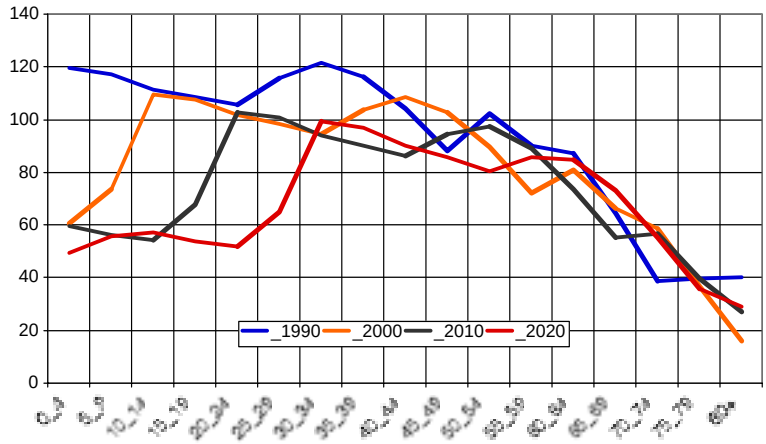
Figure 3. Age Structure changes in European Union candidate countries, 1990-2020

5-year age groups, in thousands.

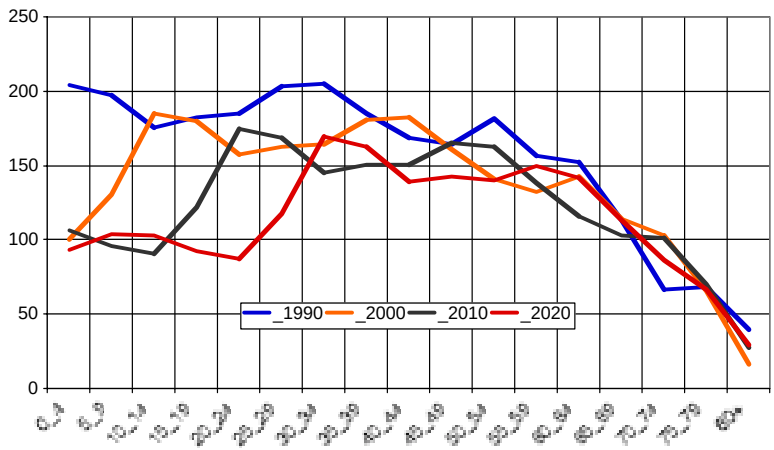
Bulgaria



Estonia



Latvia

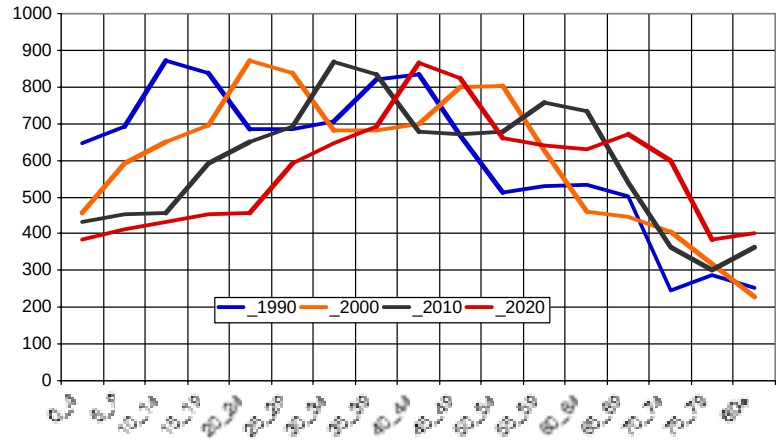


Source: Population by age and sex, United Nations, 1998 revision.

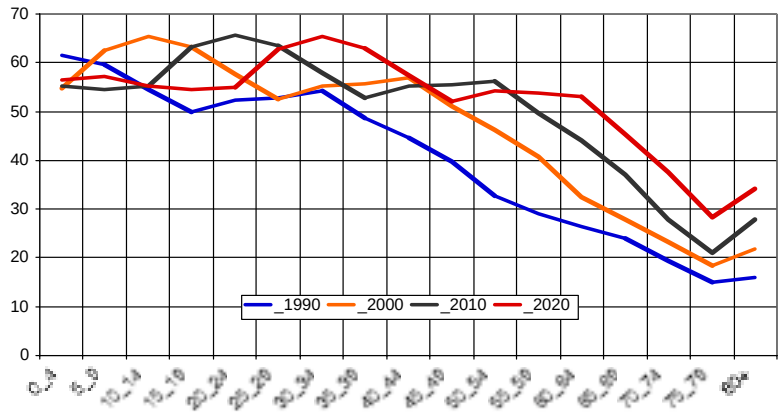
Figure 3. Age Structure changes in European Union candidate countries, 1990-2020

5-year age groups, in thousands.

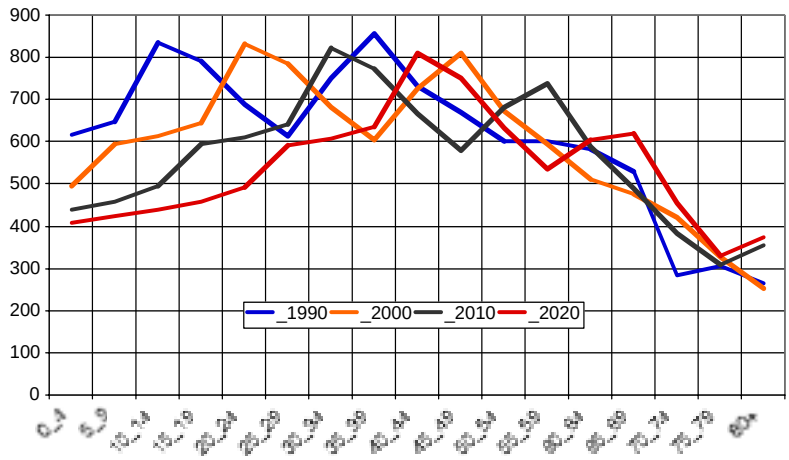
Czec Republik



Cyprus



Hungary

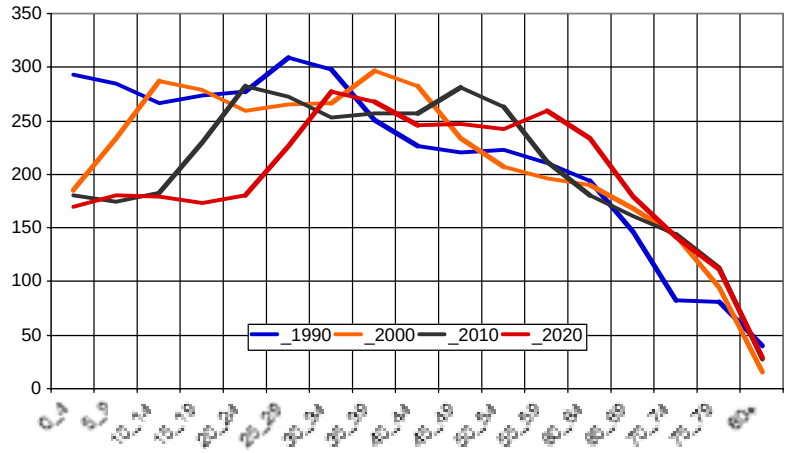


Source: Population by age and sex, United Nations, 1998 revision.

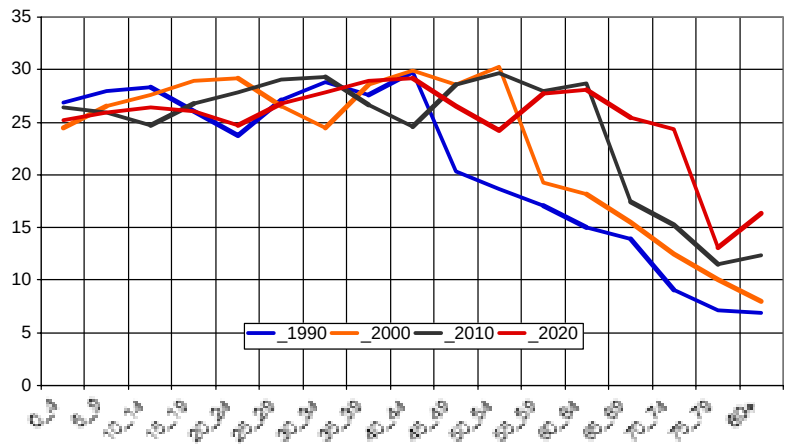
Figure 3. Age Structure changes in European Union candidate countries, 1990-2020

5-year age groups, in thousands.

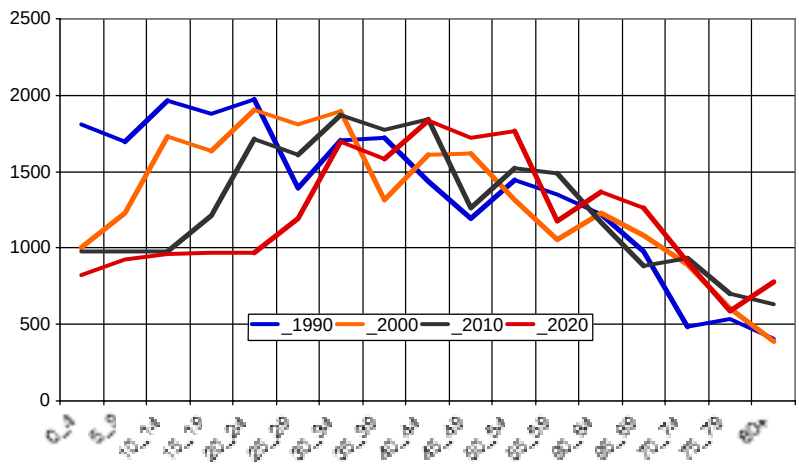
Lithuania



Malta



Romania

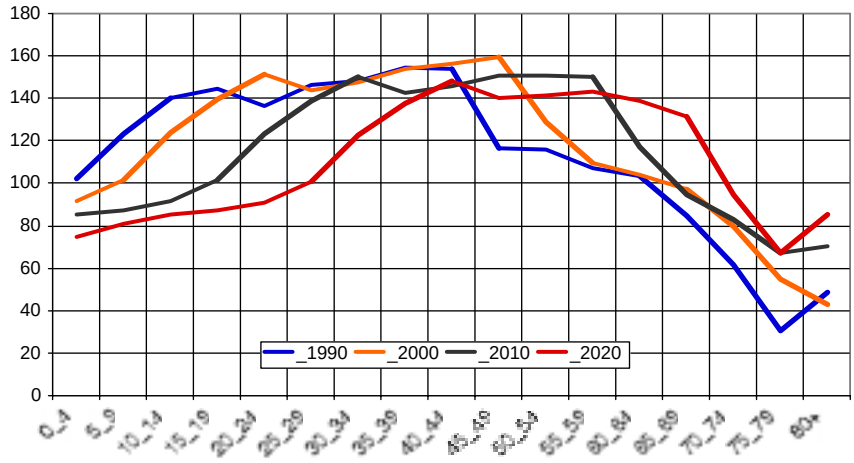


Source: Population by age and sex, United Nations, 1998 revision.

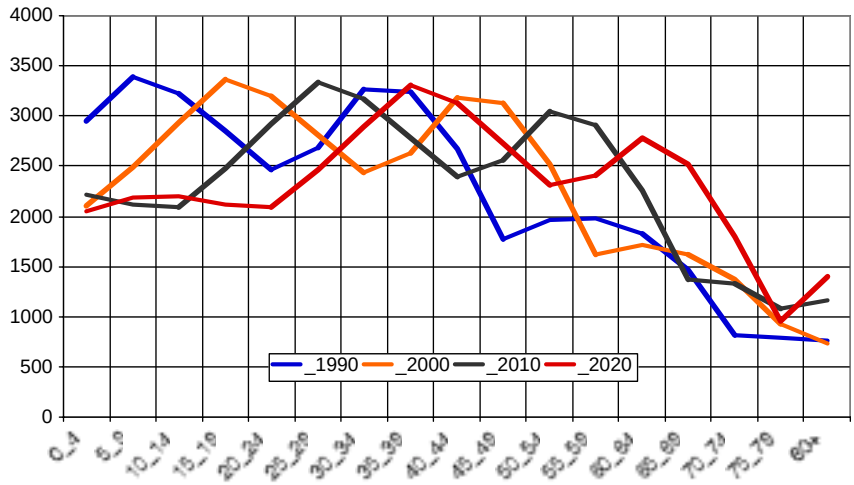
Figure 3. Age Structure changes in European Union candidate countries, 1990-2020

5-year age groups, in thousands.

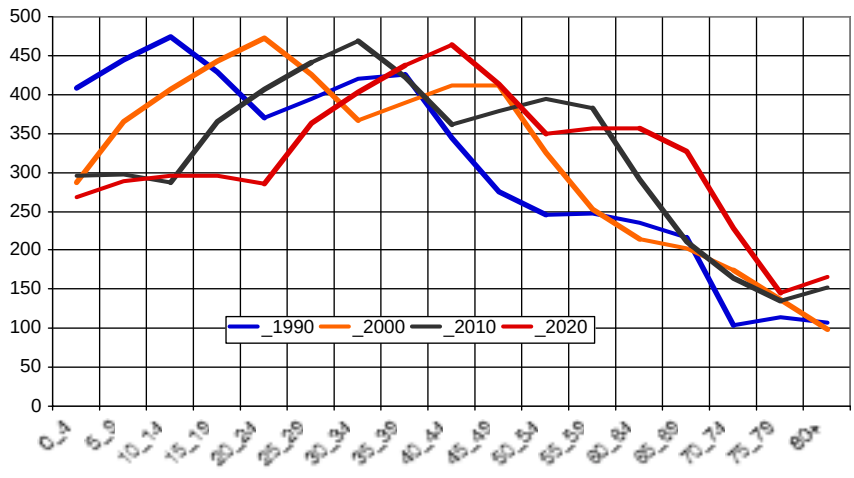
Slovenia



Poland



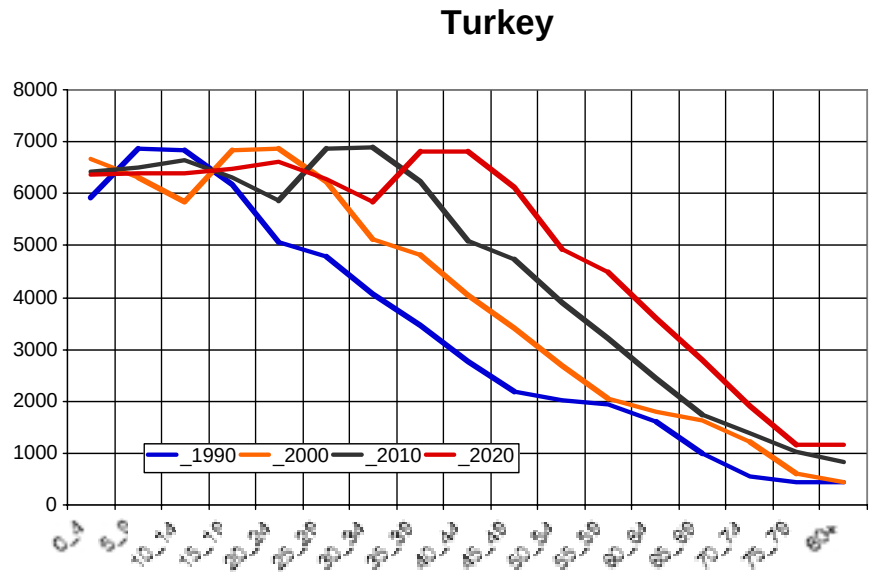
Slovakia



Source: Population by age and sex, United Nations, 1998 revision.

Figure 3. Age Structure changes in European Union candidate countries, 1990-2020

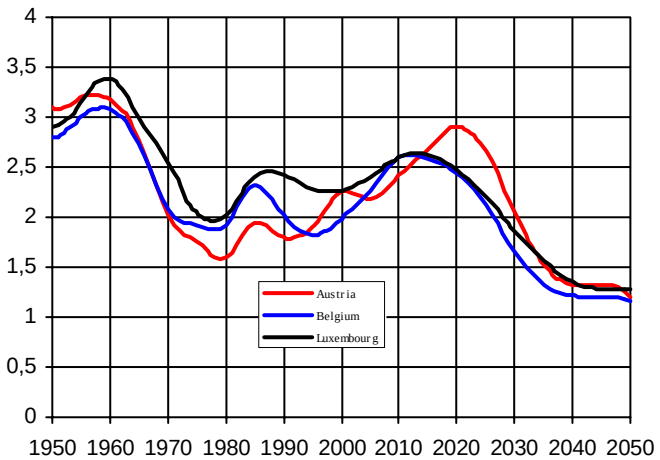
5-year age groups, in thousands.



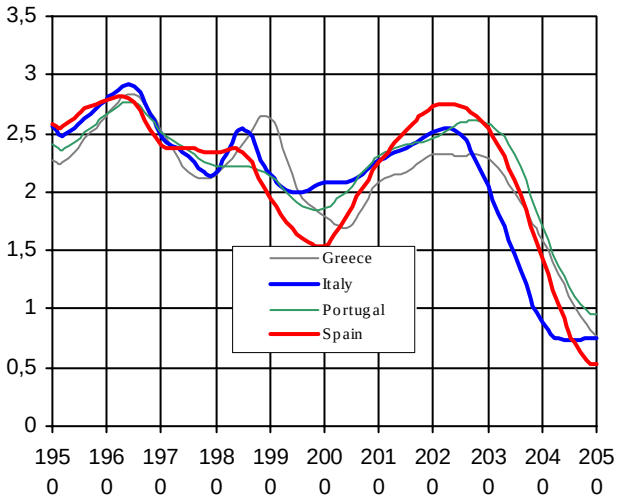
Source: Population by age and sex, United Nations, 1998 revision.

Figure 4. Age effects on economic growth in European Union member states, 1950-2050.

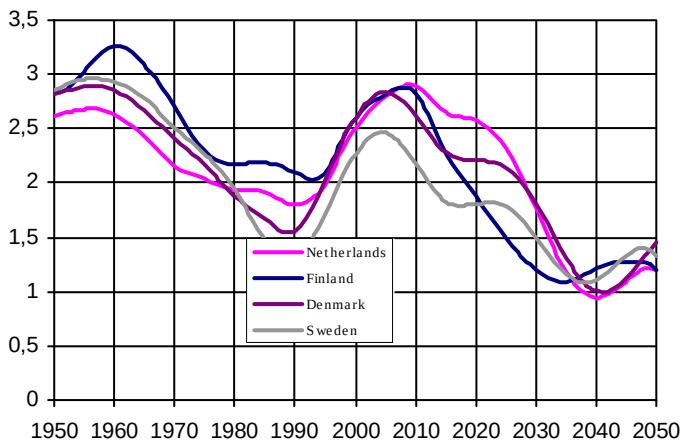
Age effects on economic growth: Austria, Belgium, Switzerland, Luxemburg



Age effects on economic growth: Southern Europe



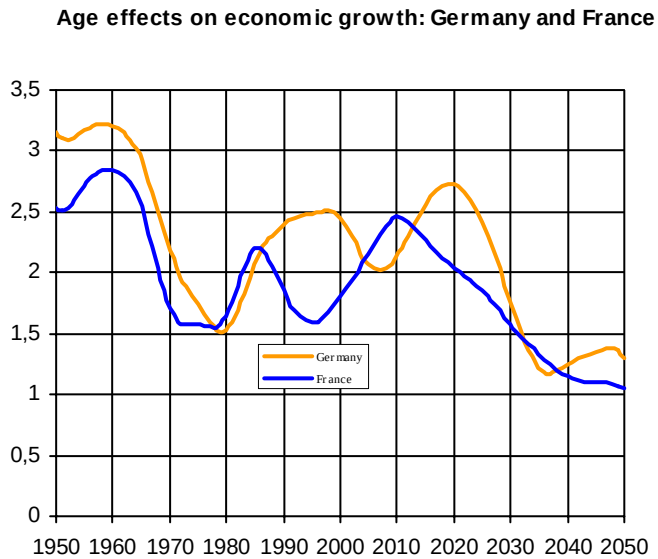
Age effects on economic growth: Nordic countries + Netherlands

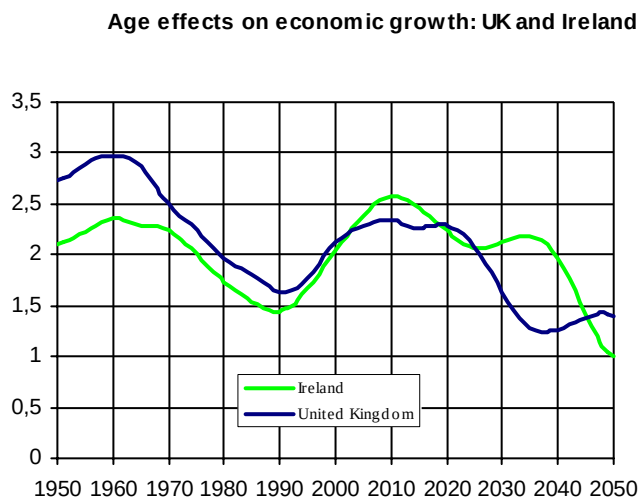


Note: The estimates of age structure effects on economic growth (in real GDP per worker) are based on two sources: 1. The UN Population estimates and projections, 1998 revision. 2. The model of age effects on economic growth presented in Lindh, T. and B. Malmberg (1999). "Age structure effects and growth in the OECD, 1950-1990." Journal of Population Economics 12: 431-449.

In addition to age variables the Lindh-Malmberg model also takes into consideration initial GDP per worker, the rate of gross investment, labor force growth and the technological gap. The projections presented here focuses only on the effect of a changing age structure. The estimated age effects are in percentage points and they have been normalized to reflect the impact of age structure on growth in an average OECD country.

Figure 4. Age effects on economic growth in European Union member states, 1950-2050.





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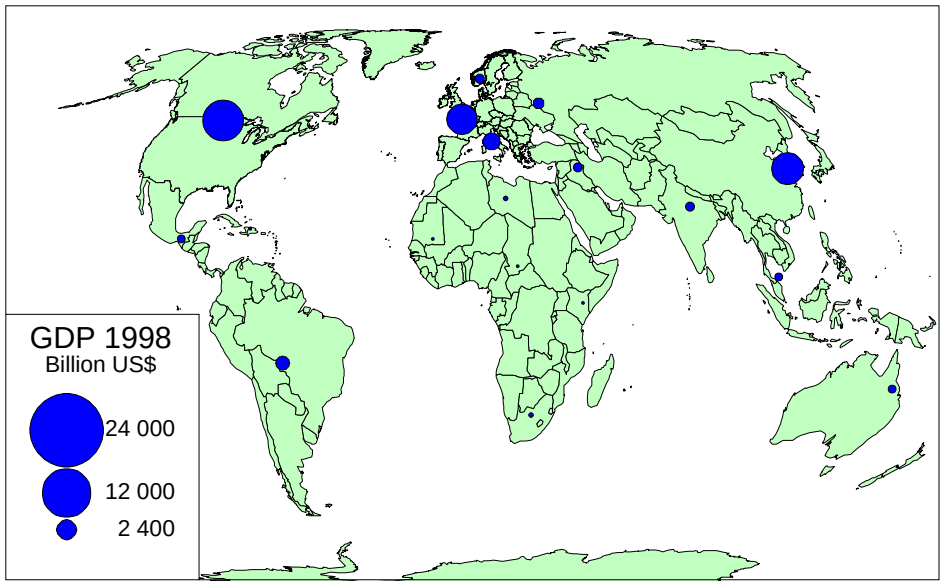
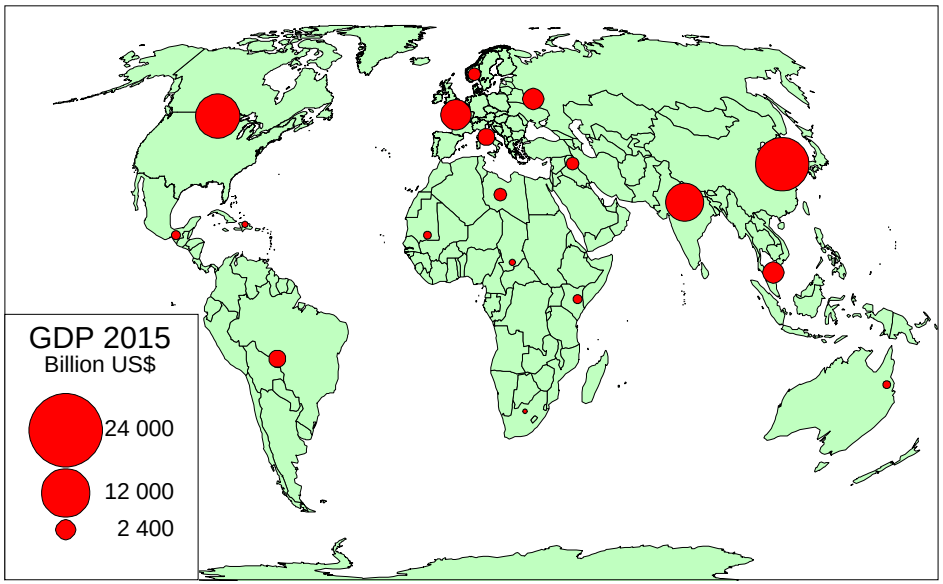
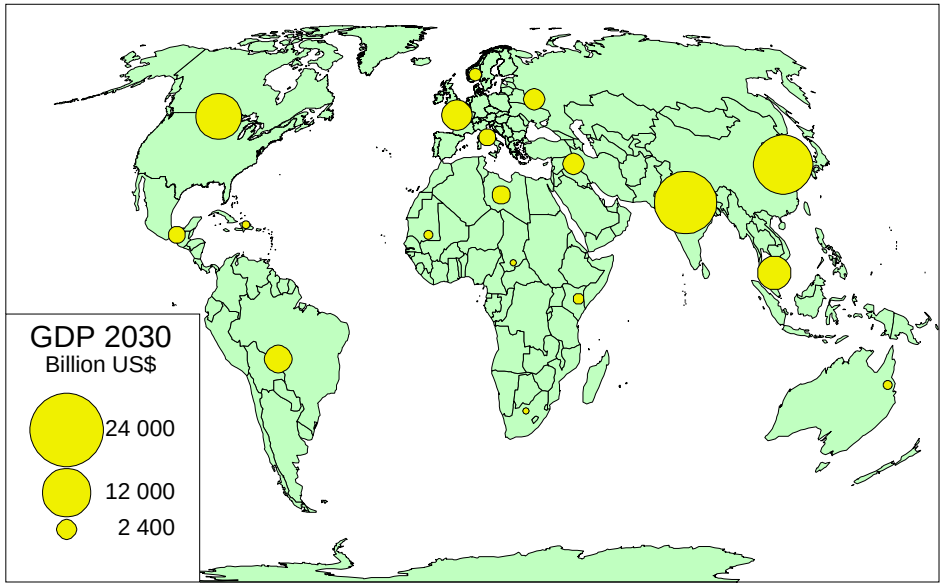
Distribution of world income, by region, 1998-2050







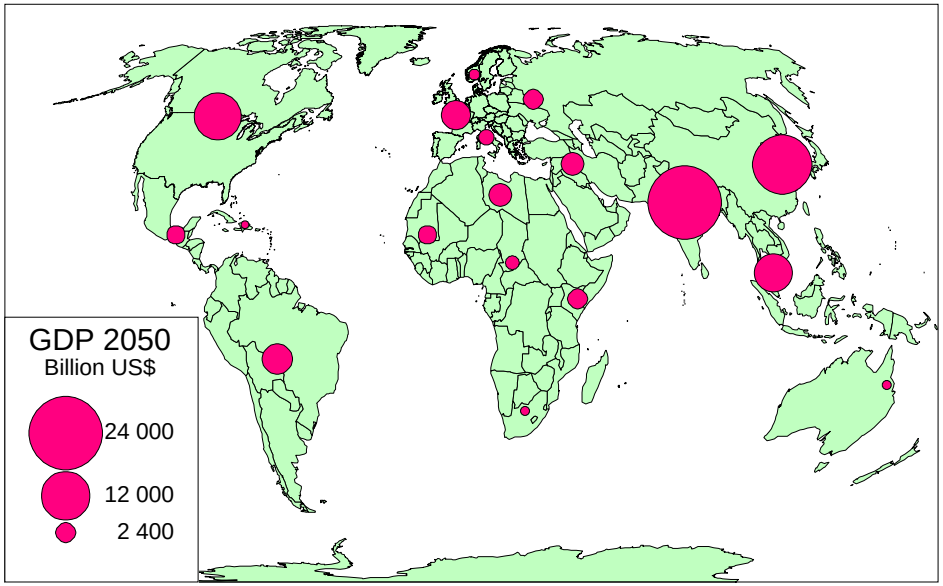
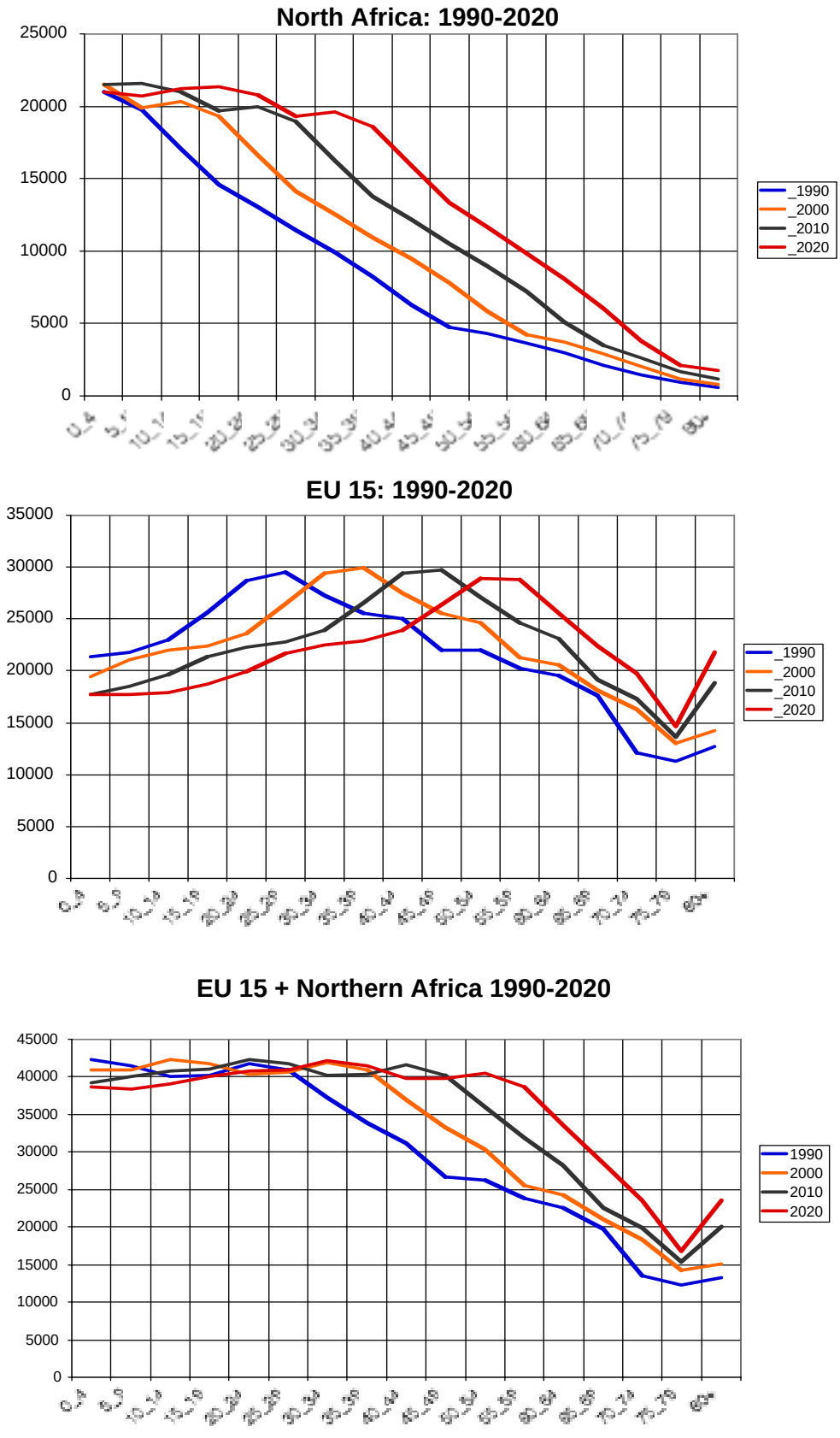


Figure 6. Age structure changes in the European Union and North Africa, 1990-2020
5-year age groups, in thousands.



Source: Population by age and sex, United Nations, 1998 revision.

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