



European Network of Economic Policy
Research Institutes

AGEING, HEALTH AND RETIREMENT IN EUROPE

THE AGIR PROJECT

FINAL REPORT ON SCIENTIFIC ACHIEVEMENTS

JØRGEN MORTENSEN

ENEPRI RESEARCH REPORT NO. 11

JULY 2005



ENEPRI Research Reports are designed to make the results of research projects undertaken within the framework of the European Network of Economic Policy Research Institutes (ENEPRI) publicly available. This paper was prepared as part of the **AGIR project** – *Ageing, Health and Retirement in Europe* – which has received financing from the European Commission under the 5th Research Framework Programme (contract no. QLK6-CT-2001-00517). Its findings and conclusions are attributable only to the author and not to ENEPRI or any of its member institutions.

This report presents the overall findings of the AGIR project, including both the research undertaken within the project and the review of significant contributions to ‘the state of the art’. A large number of researchers have thus indirectly contributed to this work, in particular (but not only): Ed Westerhout, (CPB), Jean Chateau and the INGENUE Team (CEPII and CEPREMAP), James Sefton, Justin van de Ven and Martin Weale (NIESR), Erika Schulz (DIW), Hannu Piekkola (ETLA), Namkee Ahn and José Antonio Herce (FEDEA), Marie-Eve Jöel (LEGOS) and Julie Mestdagh and Micheline Lambrecht (FPB). The author takes this opportunity both to recognise their contributions and to thank the partners for an excellent and fruitful collaboration during more than three years.

ISBN 92-9079-579-4

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Abstract

A question increasingly raised in recent years is whether the trend towards longer life expectancy has been accompanied by comparable increases in the expectancy of life in good health (active or disability-free life expectancy). Formulating an answer to this question is of essential importance for projecting health expenditure and for forecasting retirement patterns over the coming decades. The AGIR research project aimed essentially at exploring all available information to illustrate whether people are not only living longer but also ageing in better health.

Emerging from the AGIR project is, first of all, a pressing need to distinguish more clearly than is done in most of the public debate on population ageing between the 'known' and 'the unknown'. More precisely, this implies distinguishing between the features of past, current and future developments, which can be considered as relatively certain or known with only a small margin of uncertainty, and features that depend essentially on 'assumptions' or scenario calculation, which are surrounded by substantial margins of uncertainty.

Despite these remaining uncertainties the AGIR project unambiguously confirmed that ensuring at the same time the *sustainability* and *adequacy* of health care and retirement income for the population in EU member states over the coming decades is a task requiring action at all levels of society, government, firms and households. For public policy the issues at stake are not 'only' to undertake appropriate changes in the parameters of welfare systems but to reconsider the balance between public and private initiatives, and notably to thoroughly analyse to what extent the future necessary adjustments can be achieved through the play of market forces and to what extent policy intervention is required.

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Acknowledgements and Project Objectives

The AGIR research project received support under the 5th Framework Programme, Quality of Life and Management of Living Resources Programme (1998-2002), contract number: QLK6-CT-2001-00517; QOL action line: QOL-2001-6.1-3.

This project was motivated by an interest in verifying whether people are not only living longer but also in better health. It aimed at analysing how the economic impact of population ageing could vary when not only demographic factors, but also health developments and retirement behaviour are taken into consideration. The project started in January 2002 and finished in March 2005. The principal objectives of the study were to:

- document developments in the health of the elderly, ideally since 1950, based on a systematic collection of existing national data on the health and morbidity of different cohorts of the population;
- analyse retirement decisions and the demand for health care as a function of age, health and the utility of work and leisure;
- combine these results, and on that basis elaborate scenarios for the future evolution of expenditure on health care and pensions; and
- analyse the potential macroeconomic consequences of different measures aiming at improving the sustainability of European pension systems.

The project was developed in two phases. The first phase was devoted to the research and compilation of data, on which the second analytical phase was based. In particular, data were collected on: the demographic and health evolution of the population in various EU countries in the last 50 years; the use of health care services, particularly long-term care and informal care, and its relation to age and health as well as the link between informal care-giving and the labour force participation of women; and the determinants of retirement, considering the individuals' valuation of domestic work.

In a second phase, projections of future health and pension expenditure were prepared under different health and demographic scenarios. Building upon these results, the last part of the project analysed the public policy implications, in particular the scope to influence the development of health and retirement expenditure over the coming decades.

The AGIR project was carried out by a consortium of nine European research institutes, most of which are members of ENEPRI:

CEPS	Centre for European Policy Studies, Brussels
CEPII	Centre d'Etudes Prospectives et d'Informations Internationales, Paris
CPB	Netherlands Bureau for Economic Policy Analysis, The Hague
DIW	Deutsches Institut für Wirtschaftsforschung, Berlin
ETLA	The Research Institute of the Finnish Economy, Helsinki
FEDEA	Fundación de Estudios de Economía Aplicada, Madrid
FPB	Belgian Federal Planning Bureau, Brussels
NIESR	National Institute for Economic and Social Research, London
LEGOS	Laboratoire d'Economie et de Gestion des Organisations de Santé, Université de Paris-Dauphine, Paris

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Introduction

A question increasingly raised in recent years is whether the trend towards longer life expectancy has been accompanied by comparable increases in the expectancy of life in good health (active or disability-free life expectancy). Formulating an answer to this question is of essential importance for projecting health expenditure and for forecasting retirement patterns over the coming decades. The AGIR research project aimed essentially at exploring all available information to illustrate whether people are not only living longer but also in a better health. The project, which started on 1 January 2002, was implemented in two phases. The first phase was devoted to data search and compilation, on which the second analytical phase was based. In particular, data was collected on:

- the demographic and health evolution of the population in various EU countries and projections for the future (part 1);
- the use of health-care services, particularly of long-term care and informal care, and its relation to age and health, as well as the link between informal care-giving and the labour force participation of women (part 2); and
- the determinants of retirement, considering individuals' valuation of domestic work and their health status (part 3).

In a second phase, projections of future health and pension expenditure were prepared, with particular attention to their dependence on the health and demographic evolution of the population (part 4). Building upon these results, the last part of the project analysed the public policy implications, in particular the scope for influencing the development of health and retirement expenditure over the coming decades (part 5).

Separate reports on the findings of the two main phases of work have been prepared and are accessible through the website of the European Network of Economic Policy Research Institutes (ENEPRI).² This report presents first a summary of the findings of the five main work packages and thereafter a discussion of the issues for social and economic policy as assessed on the basis of the perspective arising from the research undertaken in this project. This section also draws on the findings from an associated, ongoing research project on the uncertainties in demographic projections (DEMWEL).

1. Population ageing: What we know and what remains uncertain

Emerging from the AGIR project is, first of all, a pressing need to distinguish more clearly than is done in most of the public debate on population ageing between the 'known' and 'the unknown'. More precisely, this implies distinguishing between the features of past, current and future developments, which can be considered as relatively certain or known with only a small margin of uncertainty, and features that depend essentially on 'assumptions' or scenario calculations, which are surrounded by substantial margins of uncertainty (see Box 1).

1.1 Falling mortality rates

Falling mortality rates have been, jointly with lower fertility, the driving force of the demographic transition that has taken place in Western Europe since the last century. While fertility rates more or less stabilised during the last two decades, mortality rates continue to diminish everywhere at almost all ages. Up until the 1960s, falling infant mortality rates were

² The ENEPRI website can be found at <http://www.enepri.org>.

the major cause of longer survival among individuals. More recently, increased survival at high or even extreme ages has taken the lead. Even since 1975 the observed mortality risk at almost any age has fallen by a significant amount everywhere.

The fall in mortality rates have allowed more and more individuals to reach higher ages, but has not entailed as strong a decrease in the mortality of the oldest persons. Thus while child mortality decreased considerably during the first half of the century, in the latter half of the century the reductions in mortality have been mainly in the adult age classes. Although in year 1900 very few individuals of a cohort reached the age of 90, in year 2000 this was the case for almost 25% of a cohort.

The declining mortality rate in the higher age classes has been reflected in a pronounced increase in the life expectancy of those who have survived to say 65 or 75. Life expectancy for women at age 75 in France during the latter half of the 20th century rose from just above 8 years in 1950 to more than 13 years in 2000. For men the rise was from 7 years in 1950 to just above 10 years in 2000, the gain being smaller than for women.

1.2 What about fertility?

The average fertility rate for the EU-15, which had peaked at some 2.8 in 1964, fell during the following 30 years to about half this level and tended to remain there during the latter half of the 1990s. The average fertility rate for the EU-15 was, in the Eurostat 1995 baseline scenario, assumed to be some 1.55 in 2000, to rise to 1.66 by year 2025 and to remain at that level until year 2050. In the low scenario, fertility was assumed to be 1.4 in 2000 rising to only some 1.45 in 2050. In contrast, in the high scenario, the fertility rate was assumed to reach 1.75 and to rise to 1.95 by 2025. In fact, in the scenarios elaborated in 1995, the assumptions concerning fertility in 2050 thus ranged between stagnation at the level of 1995 (1.45) and recovery to the level last attained in 1975.

A key difficulty with respect to interpreting the fertility assumptions is that much too little is known concerning the factors driving fertility in the developed countries. Fertility was not a subject for research within the AGIR project. Nevertheless, the perceptions and assumptions concerning fertility cannot but have a bearing on certain aspects of the long-term views on population ageing. At stake here is the reason(s) for the decline in fertility since 1970 in the European Community and perspectives with respect to a recovery to the level allowing, at least, for the EU population to remain stable in the longer run.

Recent research on the determinants of fertility suggests that in contemporary society fertility is largely determined by social and cultural factors. Surveys on the attitude of families to childbearing indicate that in several of the Mediterranean countries the present level of fertility does not correspond to the life cycle objectives: a majority of women appear to desire a higher number of children than is actually observed. Whereas this could, theoretically, be the result of biological constraints, other surveys suggest that the low fertility rate in these countries is in fact owing to the difficulties women have in finding adequate care for children and reconciling child rearing with social and cultural inclusion.

That the low fertility is essentially related to social constraints would seem to be confirmed also by the fact that within the EU-25, fertility tends to be highest in the member states with a high per capita income *and* a relatively high rate of women's labour force participation. Yet this may not necessarily imply a causal relationship between income and fertility. In fact, as underlined in

a study of transitions in world population by the Population Reference Bureau staff,³ the low level of fertility in a country such as Italy may be attributable to particular inconsistencies between several social variables: in the last quarter of the 20th century, young Italian women had greater individual choice and access to contraception than earlier generations. In sharp contrast to the Nordic countries, however, Italian cultural traditions and family patterns still discourage cohabitation and childbearing outside marriage. Thus in Italy by the late 1990s, less than one-tenth of births were outside marriage as against one-third or more in many other European countries and the US. Many young Italians remain single and live in their parents' homes longer and wait longer to have children than in many other European countries or the US. The struggle between traditional values and contemporary social reality in Italy is likely to have helped to push fertility to unprecedented low values in the past decade.

Fertility may therefore be considered to be a variable in the demographic theatre, which in the longer run may be influenced by policy measures aimed at improving the availability of and access to child care (either through the operation of market mechanisms or through public measures) and other policies seeking to facilitate the access of women to gainful employment. Consequently, the baseline scenarios for fertility are not necessarily to be interpreted as the *most probable outcome* but rather as an outcome that may be observed under certain assumptions concerning the accompanying social and economic policies.

1.3 The questionable assumptions on migration

Future trends in migration also appear increasingly subject to large margins of uncertainty. The Eurostat 1995 baseline projections assumed the maintenance of net immigration into the EU-15 in the range of around 600,000 persons per year. In the low scenario, immigration was assumed to be only about 400,000 while in the high scenario it was assumed to be as high as 1 million persons in year 2000 and to even stay at just under 800,000 in 2025 and beyond, until 2050.

During recent years, however, political resistance to and social tensions around immigration has clearly entailed a lowering of the inflow, with notably sharp declines in some countries in the number of asylums granted. As in the case of fertility, we must assume that migration is not an exogenously given variable but one that will be subject to strong influences from the political and social framework conditions.

Box 1. Considerations of the uncertainties and risks with respect to projections – some findings drawn from the DEMWEL research project

Although population ageing is a very likely and well-anticipated trend in the developed countries, too little attention has been paid to the fact that the actual extent of future population ageing is highly uncertain. Empirical studies of past forecast errors (e.g. Keilman, 1990 and 1997) suggest that official forecasts about population are much more uncertain than is generally believed. In particular, the decline in mortality was underestimated and future fertility was overestimated during the post World War II period. Evidence from the US (Cheeseman-Day, 1993) indicates that there may not be general improvement in forecasting accuracy in countries whose basic demographic data are accurate.

Alho et al. (2004) stress that although much of current ageing discussion involves future prospects of mortality, the major determinant of population ageing is fertility, both through the current low level that leads to negative growth and through the large baby-boom cohorts that will begin to retire soon. There is evidence (e.g. Lee, 1974) that forecasts in the US for total fertility have

³ *Population Bulletin: Transitions in World Population*, Vol. 59, No. 1, Population Reference Bureau, Washington D.C., March 2004.

essentially assumed the current value to persist indefinitely. This was later observed in many other (post-demographic transition) countries, as well.

A decrease in mortality does have, of course, an important effect on population ageing. Vaupel & Oeppen (2002) present evidence of the development of the so-called 'best practice life expectancy'. This is the life expectancy of the country that at any given time has the longest life expectancy. Vaupel & Oeppen show that the best practice life expectancy has improved by about 0.25 years annually from 1840 to 2000. In individual countries, however, the development has been quite erratic.

Consequences of demographic uncertainty for health and long-term care

Lassila & Valkonen (2004) estimated how the uncertainty in demographic projections transforms into uncertainty in future health and long-term care expenditures. They used as data the weights of current state subsidies to municipalities in Finland, which in turn are based on age-specific expenditure calculations. The data show that the costs, especially those related to long-term care, increase heavily during old age. Using this data and stochastic population simulations with an overlapping-generations economic model, they produced a predictive distribution of expenditures on health and long-term care/GDP. The median of expenditures/GDP increases almost by a half during the next 65 years from its current level of somewhat over 8%. The lower limit of the 80% confidence interval is 10% at the end of the period and the upper limit is about 14.5%. That is to say that the demographic transition raises the expenditures with very a high probability, but demographic uncertainty alone makes it very hard to predict the size of the increase.

Furthermore, in the majority of the population sample paths in Lassila & Valkonen the demand for services increases until the baby-boom generation has deceased, but expenditures per capita continue to grow because the working-age population diminishes and life expectancy increases. The analysis shows that the variation in the size of the working-age population is a crucial factor behind the outcomes, irrespective of the exact link between age and care expenditures.

Source: Unpublished summary by Jukka Lassila (project coordinator) of findings of the still-ongoing (as of July 2005) research project.

2. Issues in the field of health and health care

2.1 The difficult task of defining 'good health'

Population ageing affects individuals and nations everywhere. But a precise definition of what ageing is cannot be provided easily with regard to health aspects, social conventions and lifestyles that are intertwined with the ageing process. As a first step, the AGIR project attempted to describe this process in EU countries by observing as many dimensions as possible related to the definition and measurement of health.

Expansion or compression of morbidity?

For any given generation, disease and disability increase with age. What is not so clear, however, is whether a generation with a longer life expectancy spends a higher or lower proportion of their lives more healthy or unhealthy compared with a shorter life-expectancy generation. Or put otherwise, are we avoiding mortality at earlier ages, to live longer in bad health later in the life cycle?

When infectious and acute diseases were more common, the improvement in life expectancy was considered enough proof of the general improvement in health. Yet, since the 1970s, the

relationship between life expectancy and the evolution of the health status of the population has been subject to debate. The three main health scenarios that have been suggested are:

- *Expansion of disease.* This thesis suggests that medical advances have diminished the fatality of some chronic diseases, but not their incidence. Therefore, as people reach older ages, they will live more years with chronic disease. Moreover, as people reach older ages, they also have more time to develop other illnesses. Nusselder et al. (2000), using data for the Netherlands, concluded that elimination of highly fatal diseases led to an increase in the proportion of life spent with disability.
- *Compression of morbidity.* Fries (1988) argued that medical advances and changes in lifestyle would allow postponing the age of onset of chronic disease. This would result in a compression of morbidity into a shorter time span, against a fixed limit to human life.
- *Dynamic equilibrium.* Between the two previous hypotheses this thesis suggests that the increase in life expectancy is accompanied by an increased prevalence of total disease within an age group, but decreased prevalence of severe chronic diseases.

These different health scenarios have different consequences for the health-care planning of an ageing population. Nevertheless, to actually arrive at a relatively precise assessment of the nature of the health status of a given population is a major task, not least because today's morbidity may be the outcome of the whole life-cycle of an individual.

Health expectancy: A conceptual framework

As stressed by Bebbington,⁴ the number of years a person can expect to live in a given state of health provides a summary measure of the expected lifetime duration in ill-health of populations. An examination of various measures of life expectancy in ill health may therefore provide an indication as to whether we are facing an expansion or a compression of morbidity at given ages:

- As indicated above, expansion of morbidity occurs when the decline in the incidence of morbidity is less than the incidence of mortality. The most pessimistic assumption is that age-specific morbidity will be unchanged or even become worse.
- Compression of morbidity conversely implies a reduction in the proportion of life lived in chronic ill-health and is associated with low growth or even a decline in morbidity. An optimistic assumption is that the expectation of ill health will remain unchanged as the life span increases.⁵

Bebbington however underlines that current prevalence of ill health in certain age groups may be strongly affected by past history: past wars may continue to affect current disablement rates as may the previous state of health care. The health of present generations still reflects the consequences of the earlier polio epidemic and the thalidomide disaster, etc. Bad nutrition during the war may have lasting bearing on the survival curves of those who were born and grew up during those years.⁶

⁴ A.C. Bebbington, *Health expectancy and long-term care costs*, Discussion Paper No. 1185, PSSRU, University of Kent, January 1996, pp. 6-7.

⁵ *Ibid.*, p. 7.

⁶ These aspects are studied further in an FP6 research project on the determinants of health expenditure, AHEAD, which started in February 2004 and was undertaken by a consortium including the partners in

Consequently, for the purposes of preparing projections it is hardly sufficient to start from the present prevalence of bad health. More examples of this are found in detailed analyses of the history of health, stressing that the very notions of good and bad health have changed through time owing to changes in perception and in the capacity to diagnose illnesses.

Assessment of long-term trends by health historians

According to the health history specialist, Sheila Ryan Johansson,⁷ the concept of ‘health’ refers to a set of related but distinct phenomena, which has no simple core to which all the complementary dimensions of health can be reduced. In an influential paper produced in 1991,⁸ she argued that the generally shared perception that “as mortality falls, morbidity levels rise” was to be interpreted as largely the result of changes in the measurement “rods”, reflecting the interaction of underlying, biologically determined morbidity with changes in cultural forces, in the methodology of diagnosis and rising health expectations on the part of ordinary people (including their ability to perceive illness and their willingness to seek professional help). Added to this list are institutional pressures on medical professionals, rewarding them for discovering and treating an ever-growing set of non-fatal diseases.

She stressed that the “measured” increase (inflation) in sickness in developed countries may be the result of changes in cultural and social perceptions of illness rather than a genuine (real) increase in morbidity. She argued that:

- The decline in mortality has been the result of a reduction of exposure to the most severe infectious diseases (tuberculosis, smallpox, etc.), which in the past was the main cause of death.
- The share of the population seeking advice, prescription and cure from doctors and the medical profession has increased massively in developed countries during the last two centuries, from a possible 10-15% in the 18th century to some 95% today.
- The list of ‘named’ diseases that scientifically trained doctors are prepared to report and treat has probably more than doubled over the last 200 years.
- Ordinary residents in developed countries have been institutionally encouraged, indeed invited to “migrate” from well to sick and generously rewarded for staying ‘sick’ for longer and longer periods.
- Society no longer limits care to the terminal phase of any disease but increasingly tries to cure and care for the afflicted persons from the first diagnosis to recovery or mortality, while detecting disease in earlier and earlier phases.
- While in the past there was a “huge reservoir of socially unreported, unsupported disease among the aged”, society simply refused to pay for this age-related increase in sickness and disability: home-care went unreported and the cost of it was privately born.

the AGIR project but expanded to incorporate inter alia the PSSRU. For further information see www.enepri.org.

⁷ S. Ryan Johansson, “Doing ‘health’ research in an unhealthy research environment”, *Health Transition Review*, Supplement 6, 1996, pp. 371-84.

⁸ S. Ryan Johansson, “The health transition: The cultural inflation of morbidity during the decline of mortality”, *Health Transition Review*, Vol. 1, No. 1, 1991, pp. 39-65.

Johansson concludes that the observed rise in the rate of disease of the elderly is mainly owing to the “cultural propensity” to support frailty and not to an increase in real biological frailty. She does admit, however, that this is a hypothesis that needs to be proven or disproved not just by additional bio-medical research but also, and more importantly, by examining the cultural mechanisms of illness-reporting during health transition and also by paying more attention to such matters as changes in the duration of treatment and other ‘institutional’ aspects of the health care.

Earlier, in 1984 Charles Webster was already arguing that morbidity statistics in the recent and more distant past tended to undervalue the true underlying degree of severity of the most important illnesses. In a CEPR discussion paper,⁹ he argued that the tuberculosis notification procedure initiated in the UK in 1912 in fact gave an overly complacent estimate of the gravity of the extent of the disease:

[For] sound economic and potent social reasons, patients tended to disguise the symptoms of tuberculosis from themselves, their families and the general practitioner. And in turn, general practitioners frequently failed to comply with the obligations to notify since notification would lead to a labelling of a large number of individuals experiencing no more than minor symptoms. Classifying an individual as having tuberculosis would set them at a disadvantage in the labour market or with life insurance companies, besides placing the whole family under a cloud of suspicion in their neighbourhood. Thus many cases (and deaths) of tuberculosis were in fact classified as other forms of lung diseases such as pneumonia.

Webster also argued that the extent of lung cancer in the 1950s and 1960s may have been underestimated, albeit not for the same reasons as for tuberculosis. In fact, although the cancer diagnosis and registration had already started in 1911, techniques for diagnosing cancer (mainly x-ray), while available, were for a long time not installed in many regions and there are indications that in many areas only 50% of the cases were diagnosed and registered. The apparent rise in the cases of lung cancer in the post-war period may therefore to some degree be attributable to improved methods and availability of equipment for diagnosis rather than an underlying trend in morbidity.

On the other hand, there is hardly any doubt that recent decades have seen the emergence of new diseases such as, notably, AIDS or a rise in the number of cases of already existing diseases due to the fact that the primary causes of mortality have been eliminated. Thus the rise in dementia (such as through Alzheimer’s disease) may not be the result of changes in the underlying prevalence but rather to the fact that tuberculosis has been eliminated and many kinds of cancer are diagnosed earlier and treated more efficiently than previously.

2.2 Findings of the research on population ageing and health

The AGIR teams were asked to produce comprehensive data on population, mortality, longevity, life courses and morbidity for as many EU countries as possible and the leading team (FEDEA) was charged with summarising and elaborating on these data in various ways.¹⁰ Data has come mostly from national sources and from the European Community Household Panel

⁹ C. Webster, *Health: Historical Issues*, CEPR Discussion Paper No. 5, CEPR, London, January 1984.

¹⁰ This section draws from N. Ahn, R. Génova, J.A. Herce and J. Pereira, *Bio-Demographic Aspects of Population Ageing*, , ENEPRI Research Report No. 1, CEPS, Brussels, June 2004.

(ECHP), but we have also used data from the Human Mortality Database.¹¹ Data have been arranged in a database in Excel format following the criteria explained below. The countries covered are Belgium, Denmark, Germany, Spain, Finland, France, Ireland (partially), Italy, Sweden and the UK. Significant support was provided to the FEDEA team by the Belgian FPB, the German DIW, the Finnish ETLA, the French LEGOS, the British NIESR, the Italian ISAE and the Danish IHP.

Population ageing is the result of both longer average life years and fewer births. Life expectancy has been increasing dramatically in the last 100 years, and this has been compatible both with the *expansion* (more and more people reaching extreme ages) and with the *compression* (more and more people surviving at all ages) of mortality. In the last three decades, however, compression rather than expansion of mortality has been dominant in the process of ageing for most countries. Expansion on the other hand, means a higher limit for the human life if strictly defined. Yet relatively few people reach extreme ages, and only with rare exceptions surpass 110 years, while the share of survivors (for a given generation) at 80, for instance, have typically increased from 30 to 60% or more in the last 30 years.

In the last three decades, compression rather than expansion of mortality has been dominant in the process of ageing for most countries.

Life-course indicators have allowed us to document, with varying accuracy for different countries, a general trend in the EU towards longer years in school, delayed entrance to the labour market, delayed emancipation from the parental home, delayed household formation and first parenthood, earlier retirement and longer post-retirement spans. Some of these trends, as is well known, clash with each other, as is the case of shorter working lives and longer post-retirement spans.

Morbidity (health status or disability) puts a check on the quality with which longer lives can be lived. Data on these issues have not yet been comprehensively analysed because of the rarity and lack of homogeneity of health and disability surveys in different countries. Nevertheless, the ECHP has allowed us to document health and disability status and to use this information to compute adjusted life expectancies for years lived in good health or free of disability. Although some indications for some countries point to the fact that longer lives do not necessarily mean that they are lived in better health or with less prevalence of disability, when the recent past is analysed with the ECHP data, in general, a trend can be established whose projection forward implies greater proportions of longer post-retirement or adult lives lived either in better health or free of disability. Health and disability status is self-reported however, and this makes data fraught with problems and hard to compare among countries. We have shown this using the ECHP data – a fact that points to the need to be extremely careful with respect to making country comparisons on this matter.

All in all, since the middle of the last century European countries have had what could be termed a ‘second demographic transition’ concerning the evolution of fertility and mortality. It is not easy to say whether the absolute limit to a human life has increased, but what is more than

¹¹ Most of the data are extracted from the national statistical offices of the countries included in this study, although the AGIR teams have been responsible for gathering, documenting and manipulating the raw data. Where needed, these data have been completed with data from the Human Mortality Database of University of California, Berkeley (US) and the Max Planck Institute for Demographic Research (Germany) (retrieved from www.mortality.org or www.humanmortality.de). Finally, data from the database *La conjoncture des pays développés en chiffres* of the Institut National d’Études Démographiques (retrieved from <http://www.ined.fr/bdd/demogr/#>) has provided us with valuable information for all the countries included here.

certain is that survival at high or even extreme ages has experienced a dramatic increase in the last decades in Europe. Lifestyles and behaviours have changed no less, if we trust our 'life course' indicators, which warn us about possible unsustainable combinations of trends that will have to be contained before society discovers too late that liabilities are much higher than assets of any kind. Activity seems to be the most abundant and most wasted resource in Western countries whereas health and disability problems seem to be checked as post-retirement life spans increase, although not everywhere.

Despite the enormous advances in health in developed countries, ageing critically exposes people to new forms of morbidity.

Population ageing will continue in the future even at an accelerated speed, at least when defined in the rather strict manner in which we customarily do so (65s and over). Health and disability limitations will probably advance less rapidly than age, thus allowing for healthier life, but this is not to be taken for granted as available data still lacks enough conclusiveness. Despite the enormous advances in health in developed countries, ageing critically exposes people to new forms of morbidity. Perhaps some day in the future we can

speak of a 'third demographic transition' in Europe (and everywhere) – one of a more balanced equilibrium between age spans within the life cycle, healthier lifestyles, more active and less dependent old ages or improved options for the transition from work to retirement.

2.3 Health care and health expenditure

If the hypothesis that people live longer and in better health is true, it could be expected that the changes in the health of the elderly have important consequences for the future demand for health services, the need for long-term care and also for the development of health expenditures. But other trends could also be essential to determining the extent and structure of the demand for health care and health expenditures. In the case of long-term care, there are important effects that concern the structure of health care and institutional settings. Most long-term care recipients currently live in households and their caregivers are predominantly members of their family – especially daughters, daughters-in-law and spouses. The increasing labour force participation of women may affect the future supply of informal family care-giving and may increase the demand for professional home-care and institutional care. In all EU countries family structures are changing: the proportion of elderly persons living with their children has fallen.

These issues were researched by a team of the German DIW with support in the form of collection of data and information by the other teams in the consortium.¹² Projections on the use of health care and the need for long-term care require an analysis of the current situation in each EU country; a study of the determinants for using both (especially the influence of health) presented the results of data collection and analyses for EU countries that participated in the study – Belgium, France, Finland, the Netherlands, Spain, the UK and Germany. Additionally, data were provided for Denmark. Along with analysing the data provided, DIW investigated the relationships between health-care utilisation, health status and age respectively with long-term care-giving at home, based on the ECHP. Further, long-time series data from the OECD Health Data 2002 and 2003 were used to show the changes in the utilisation and supply of health-care services over time.

¹² This section draws upon E. Schultz, *Use of Health and Nursing Care by the Elderly*, ENEPRI Research Report No. 2, CEPS, Brussels, July 2004.

Age and health status are important drivers of health-care utilisation, but the improvements in life expectancy do not lead to lower utilisation rates in all countries. It could mostly be assumed that mortality could be prevented by an intensive use of hospital treatments and outpatient services. Medical and technological progress has improved the possibilities of preventing mortality, but at the same time this seems to be closely connected with higher utilisation. This fact could be shown by empirical analyses based on national sources of each single participating country, as well as by analyses based on the ECHP.

Health status depends on, among other things, health behaviour, which is influenced by socio-economic factors such as education, family status and income.

Health status depends on, among other things, health behaviour, which is influenced by socio-economic factors such as education, family status and income. A higher education level is normally associated with a healthier lifestyle. This includes more health-related activities and perhaps more preventive doctor visits on the one hand, and a better health status and therefore fewer doctor visits owing to illness on the other. Furthermore, married persons in general have a healthier lifestyle than single or widowed persons, and higher income may also be connected with a healthier lifestyle. The regression analysis undertaken within this study shows in the case of

hospital utilisation that a higher education level leads to fewer days spent in a hospital. The analysis reveals that single (or widowed or divorced) persons have a higher number of hospital days and that personal income plays a role. In the case of outpatient utilisation, the regression analysis shows that married persons go to a doctor more often, as do individuals with a lower education level. Personal income is a significant indicator, but the influence is marginal.

Inpatient utilisation and outpatient utilisation are well-documented, but information about the number of persons in need of long-term care is rare. Long-term care-giving seems to be the task of the family, and caregivers are mostly spouses, daughters and daughters-in-laws respectively. Data could be collected for care-giving in institutions and in some countries for care-giving at home by professional caregivers, but with the exception of Germany, no information exists about informal care-giving at home.

Long-term care-giving in institutions and professional care-giving at home concerns in particular the oldest old. The prevalence rates (the share of long-term care recipients within the population of the same age) increase sharply from the age of 70 onwards. Persons receiving professional long-term care at home are on average younger than institutionalised persons. Women have a higher probability of needing long-term care than men. This is explained by the higher proportion of widowed women in the oldest age groups. The prevalence rates for persons receiving long-term care in institutions show no clear trend: in Denmark and the UK the prevalence rates decreased, while it increased in France, Germany and the Netherlands especially among the oldest age groups.

Improvements in life expectancy do not seem to be directly connected with long-term care-giving in institutions. This could be the result of political decisions. In most countries there are waiting lists for nursing homes and there is a de-institutionalisation strategy. Therefore, an improvement in life expectancy is only one of several factors that influence institutionalisation. The prevalence rates for long-term care-giving at home by professional caregivers are stable in most countries. This could be caused by two contrary effects: a de-institutionalisation strategy, which prefers care-giving at home over care-giving in institutions, and improvements in life expectancy.

The ECHP provided data about severely hampered persons in households. As severe disability is a good proxy for the need for long-term care, data about these persons were used to obtain an idea about the number of individuals at home in need of such care. Around 3 to 5% of the

population (in EU countries) are reportedly severely hampered in their daily activities and have had to cut down on the things they usually do. The share of severely hampered persons increases with age along with the deterioration of health status.

Employment and care-giving seem to be adversely related. Studies show that if care-giving occurs within the household (or family) a great number of women – especially married women – give up their jobs.

Care-giving at home is in most cases a difficult burden for informal caregivers and on average a full-time job. The share of caregivers is higher among women than men and among persons who are inactive in the labour market than employed persons. The highest share of caregivers can be observed among those aged 45 to 59. Regression analysis shows that age, gender, employment status, health status and income have a significant influence on the hours of care-giving at home. The highest influences are gender – women spend many more hours care-giving than men – and employment status. The share of caregivers and the

number of hours spent on care-giving are lower among employed persons than among unemployed or inactive persons. Inactive women in the oldest ages spend the largest number of hours care-giving at home. Employment and care-giving seems to be adversely related. Studies show that if care-giving occurs within the household (or family) a great number of women – especially married women – give up their jobs.

2.4 Scenarios for health care

Various scenarios for the development of needs for health care were prepared by the German DIW in another work package of the AGIR project.¹³ Utilisation data from national sources were provided by the AGIR project participants about hospital admissions, length of hospital stay, contacts with a doctor, long-term care-giving in institutions and at home by professional caregivers, which were used and combined with two demographic scenarios. The data from national sources have two advantages: 1) they cover the whole population and therefore, forecasts of health-care utilisation can be made for the total population; and 2) they include information about long-term care-giving in institutions (for Belgium, Denmark, Finland, France, Germany and the Netherlands) and information about long-term care-giving at home (for Belgium, Finland, France and Germany). But they have the disadvantage of not differentiating between the health status of the population. Thus, in this section only the impact of demographic change and increasing life expectancy on the utilisation of health care can be presented.

Data from the ECHP include only persons in private households aged 16+, but allow for differentiating the utilisation data not only by age groups, but also by health status within the single age group. Information is available about hospital admissions, hospital days and contacts with a general practitioner. Thus, the main fields of acute health care are also covered by the ECHP. No data exists about persons receiving long-term care, but the number of severely hampered persons who have had to cut down things they usually do due to disability or longstanding illness are used as a soft proxy for need for long-term care at home. These data were combined with four demographic and health scenarios: baseline, baseline improving-health, a living longer high scenario and a living longer in better health scenario. The baseline scenario stems from EUROSTAT and includes increases in life expectancy, but in the living

¹³ This section draws upon E. Schulz, Ageing, Health and Retirement in Europe: Alternative Scenarios for Health, Life Expectancy and Social Expenditure, ENEPRI Research Report No. 4, CEPS, Brussels, February 2005.

longer high scenario, which was designed by the AGIR partner CPB¹⁴ a higher life expectancy of five years was assumed. In the health scenarios, which were formulated in this study, it was assumed that the share of persons in bad health decreases on average in the EU by 30% until 2050. This assumption was derived from the estimation of 'life expectancy in good health' carried out in AGIR WP 1.¹⁵

The results of the forecasts are not fully comparable, because they use different sources and different definitions of the variables, but in general they show similar trends:

- the development of hospital days and long-term care-giving respectively for severely hampered persons shows a higher dynamic than the development of hospital admissions and contacts with a doctor/general practitioner;
- the living longer high scenario leads to a higher population by 2050, but the development of the utilisation of health care still shows a higher dynamic; and
- countries with decreasing populations until 2050 do not show any generally lower increases in utilisation development than countries with increasing populations.

Under the assumptions applied, improvements in health cannot completely compensate for the effect of increasing life expectancy. In the EU, the rate of utilisation in 2050 is a little bit higher in the living longer in better health scenario than in the baseline scenario.

The study also shows that improvements in health status lead to a more moderate increase in utilisation compared with the scenarios without improvements in health. But in general, under the underlying assumptions the improvements in health cannot completely compensate for the effect of increasing life expectancy. In the EU, the rate of utilisation in 2050 is a little bit higher in the living longer in better health scenario than in the baseline scenario.

Finally, the development of the number of caregivers at home was calculated using constant care-giving rates in the single age group and health status. A better health status does not lead to a markedly higher number of caregivers. Yet the number of caregivers increases until 2050, especially in the living longer scenario, and the share of caregivers aged 70+ among the total rises sharply. The development of the relation of severely hampered persons to the number of caregivers shows that the pressure on informal care-giving will increase. If the higher development of long-term care recipients at home as shown in the national sources is taken into account, this pressure may even prove to be stronger. The expected changes to household composition and anticipated further increase of the labour force participation rates of women also strengthen this trend.

3. Work, leisure and retirement

3.1 Determinants of retirement and the option value of work and leisure

In recent years a number of studies have provided evidence showing that the pronounced decline in the effective retirement age in a number of European countries in the last three decades can be largely explained by the strong incentives to early retirement embedded in the public or semi-public pension schemes.

¹⁴ F. Pellikaan and E. Westerhout, ENEPRI Research Report No. 8, CEPS, Brussels, June 2005.

¹⁵ N. Ahn, R. Génova, J.A. Herce and J. Pereira, *Bio-Demographic Aspects of Population Ageing*, ENEPRI Research Report No. 1, CEPS, Brussels, June 2004.

While not in anyway questioning these findings, the AGIR project aimed at analysing whether in fact the lowering of effective pension age could not also be attributed to the value of ‘being at home’, undertaking do-it-yourself projects, gardening, caring for relatives or participating more actively in social life. However, since these activities are fully outside the market economy, a study of the potential influence of such non-market factors would require that they be attributed a fictive value, such as, notably the cost of obtaining such services in the market place (option value).

To test this hypothesis, the Finnish partner institute, ETLA, examined time use and incentives to retire including both the value of paid work and the value of domestic work. They assigned an economic value to domestic work and then used this in a calculation of a new estimate of replacement rates and the option value for retirement.¹⁶

When analysing the differences in time use among the countries, the variations are substantial, but can be classified along the lines of the welfare-regime typology:

1. Central Europe, which has relatively fewer paid work hours (Germany and Belgium) and average domestic work hours (Germany);
2. smaller countries (Finland, the Netherlands and Portugal) and the UK, which have more paid work hours and more domestic work hours for men (except for Portugal) and women; and
3. exceptions, such as Denmark, which has relatively little domestic work or Belgium which has little domestic work for women contrary to expectations about the continental regime.

The small number of countries in the study did not allow a deeper analysis of the southern regime (Portugal, Spain and Greece) or any definite conclusions about the Nordic regime (Denmark, Finland, Sweden and Norway). But some similarity can be seen among continental countries and within another group that includes the UK and the smaller countries, with the Nordic regime being somewhat distinct from the others.

In the classification of retirement schemes, a distinction was made between three regions: 1) Central Europe (Germany), Finland and Portugal have high replacement rates and flat option-value curves after the pensionable age. 2) Belgium and the Netherlands are similar but with greater incentives for retirement after reaching the pensionable age. 3) Denmark and the UK have the most incentive-compatible systems, since replacement rates are low and the option value rises after the pensionable age. These regimes overlap to some degree with general time-use patterns. It is shown that the inclusion of domestic work in incentive calculations makes retiring more attractive, and that the results of the calculations correlate with actual retirement ages in Europe. Replacement rates are close to or greater than 100% when domestic work is accounted for.

The second part of the study examined the effects of health status on the incentives to retire in five European countries: Denmark, Finland, Germany, the Netherlands and the UK. We considered individuals who report having ‘a chronic physical or mental health problem, illness or disability’ and admit being hampered by it in their daily activities at least to some extent having poor health status. Health status can have greater influence on the behaviour of women.

¹⁶ H. Piekkola and L. Leijola, *Time Use, Health and Retirement*, ENEPRI Research Report No. 3, CEPS, Brussels, September 2004.

Women in good health exhibit continuity of lifetime patterns and domestic work supply does not increase substantially after retirement. Yet women in poor health are faced with a dual burden of work that can explain their withdrawal from paid employment.

If women value domestic work higher than men do, they might be more prone to retire early for health reasons in order to be able to catch the benefit from domestic work while still able perform household chores. Women in poor health also have a relatively high total work burden. The average replacement rates are shown to be higher for women in poor rather than in good health. The reason for this could be attributed to either the relatively high labour supply of women in poor health, as in Denmark and Finland, or the high domestic work supply of non-employed women in poor health, strikingly so in Denmark, Finland and Netherlands. The high dual burden of paid work and domestic work may push these individuals towards retirement.

Health appears to have a different effect on men. The study finds that especially for healthy men, the increase in domestic work after withdrawal from the labour market is large in relative terms (doubles on average), and the effect of accounting for domestic work in the financial incentives to retire is greater for them. This can be explained by the gender specialisation of work and women's continuity of lifetime patterns: men supply more paid work while women tend to specialise in domestic work before retirement. After retirement, women's time use changes by less than men's. The marginal value of non-paid work time can therefore be higher in the retirement decision of men.

Especially for healthy men the increase in domestic work after withdrawal from the labour market is large in relative terms (doubles on average), and the effect of accounting for domestic work in the financial incentive to retire is greater for them.

In the smaller country group, health has the largest influence on labour supply. Men reporting bad health work 20 hours less per week in the Netherlands and the UK. Women reporting bad health work 4 to 6 hours less per week. In other countries the effects are minor or even the opposite (for Danish women). Country differences or differences between genders can be explained by at least four alternative points of view.

The first possible explanation is the *justification hypothesis*. Those with poor health justify low labour force participation by bad health. The disability pension rules can vary across countries, also explaining the need for justification. The justification hypothesis has been used to

explain why women report more bad health than men. (The study, however, used a fairly objective measure of health so that this would not play a crucial role. Further, health status had to be estimated in the countries except for Finland. Poor health thus captures the time-use effects of poor labour market status or being single, which correlate with it.)

The second reason could be related to *institutions and labour market characteristics*. In the Netherlands there is a high share of part-time workers. Those with poor health have a clear alternative to reduce their work burden. It is also clear that household work can play a greater role in the Netherlands compared with Scandinavian countries.

A third explanation can be explained by considering *health as one consumption bundle* following Grossman's model (1972). Health as a consumption bundle works as a clear substitute for paid work. Those with poor health need to consume health services more and can do this only by reducing paid work hours. Moreover, health as a consumption bundle can be a clear complement for unpaid household work, especially for women. It appears that household work supply is strikingly high for women in poor health in both the Netherlands and in the UK.

Finally, in Grossman's approach, health is also considered as a lifetime investment. Health capital corresponds to human capital, so it decays over time and requires continuing investment.

Unpaid work and the possibilities for combining work and domestic life are very important in retirement decisions. Domestic work radically increases in non-employment.

The final point of view relates to different needs for investing in *health capital and in the time horizons for extending health capital between the countries*. The Netherlands and the UK may appear to be countries with fairly good health services in the event of bad health. Thus there may appear less need for working longer in order to provide funds for covering the likely health expenses in the future when an individual is already in bad health.

Unpaid work and the possibilities for combining work and domestic life are very important in retirement decisions.

Domestic work radically increases in non-employment. Non-employed men at age 50-64 who are in good health do on average 11 hours per week more domestic work than older employed men. A similar difference applies to older women who are in bad health. One reason for this behaviour is certainly the lack of opportunities for undertaking domestic work while in paid employment, which has clear policy implications.

The labour supply decisions of men have often been modelled taking the spouse's current labour-force status to be an unchanging, external event. The study shows that domestic life and spouse's behaviour are of no less importance in the retirement decisions of men than those of women. Spillovers occur not only through income effects and complementarity of leisure, but also through substitutability/complementarity of domestic work and health consumption. Recent studies have found that men's retirement decisions are most sensitive to the labour market decisions of their spouses. The increase in domestic work for men and the mild increase for women show that time allocation indeed becomes more similar between genders in non-employment. This can be explained both by the complementarity of leisure and substitutability of domestic work. The policy implication is that economic incentives may work poorly unless the time-use allocation decisions are properly taken into account. In this study this is indicated by the very high replacement rates when household work is accounted for.

One important conclusion is that retirement policies should adapt to country characteristics, as discussed below.

- 1) Individuals in continental European countries with relatively short paid work hours (Germany, Belgium) and average domestic work hours (Germany) do not have similar difficulties in combining work and domestic life. Yet older German women still have a strikingly low labour market supply.
- 2) People in small countries (Finland, the Netherlands, and Portugal) and the UK have long paid work hours. Men experience long domestic work hours (except for Portugal) and women have long domestic work hours. It is clear that well-being at work and the successful balance of work and domestic life are very important. Health has a strong effect on labour supply, which can be explained by the justification hypothesis, the availability of part-time work, health consumption or by health-care systems that do not require an increase in labour supply to provide funds for health costs when health is expected to deteriorate in the future.

Retirement policies should adapt to country characteristics and take account of differences between countries with respect to patterns of domestic work.

- 3) Domestic work supply is low in Denmark (which is otherwise similar to other countries in the Nordic regime) and in Belgium. Combining work and domestic life is easier in these countries and domestic work interferes less with retirement incentives. The pension system in Belgium is, however, fairly generous.

3.2 Broader analysis of behavioural issues

A further econometric analysis of retirement behaviour was undertaken by the NIESR team using a structural model of labour/leisure and consumption/savings decisions.¹⁷ The model was specified so as to formulate the retirement decision as a dynamic programming problem and calibrate the model for use in analysis of three typical country cases.

Analyses of retirement behaviour are commonly based upon econometrically estimated models, which serve to clarify the relations that are exhibited by survey data. Such studies are, however, limited by the data that are available for estimation, and by the complexity of the retirement decision. Most econometric studies consequently report estimates for reduced form models, or for structural models that exclude household savings — neither of which is particularly adequate for inferring the likely behavioural responses of savings and retirement from policy counterfactuals. The NIESR study addresses these issues by using a behaviourally consistent model of savings and labour supply to compare the implications for retirement of alternative transfer systems.

Answers are sought to the following questions:

- 1) How far can the differences in retirement behaviour in Denmark, Germany and the UK be accounted for by differences in the provision of state benefits for old and older people?
- 2) Is this likely to be sensitive to the health status of the population?
- 3) Which of the three systems would voters be likely to select?

As such, this study contributes to the debate regarding the influence of pension policy on the timing of retirement. Furthermore, the study defines competing possibilities to existing government policy, and hence provides a useful platform for comparison and evaluation.

The countries that are compared by this study have been selected with some care. Most importantly, Germany, Denmark and the UK span the political typology that is advocated by Esping-Andersen (1990), which distinguishes between the 'liberal' systems that are commonly found in Anglo Saxon countries; the social democratic regimes that are typical of Scandinavian countries; and the conservative regimes of continental Europe. These three alternative welfare models involve very different value judgements, and it is consequently of interest to consider their respective implications for retirement behaviour. The practical relevance of the study is reinforced by the associated discussion regarding European integration. In addition, analysis presented in another part of the project suggests that, of the various European transfer systems that are considered by the AGIR project, the Danish state pension system is likely to impose the smallest fiscal burden on future generations, the German system will impose the greatest burden and the UK system falls between the two.

The principal innovation of the analysis reported here is the use of a structural model of the labour/leisure and consumption/savings decisions. The advantages of this model for an analysis

¹⁷ This section draws upon J. Sefton, J. van de Ven and M. Weale, *Pension Arrangements and Retirement Choices in Europe: A Comparison of the British, Danish and German Systems*, ENEPRI Research Report No. 5, CEPS, Brussels, March 2005.

of retirement behaviour are revealed by a brief review of the associated literature. Most econometric studies that have attempted to estimate behavioural responses to pension policy incentives consider reduced form models. These studies typically focus upon one of three forms of policy variation described by survey data: variation observed at a point in time for a single country due to the heterogeneity of individual circumstances; variation observed through time for a single country owing to a policy experiment; or variation observed at a point in time between the policies of alternative countries. Estimates obtained using country-specific data differ substantially between studies. Nevertheless, the general conclusion of this literature is that there is a significant, though modest, negative relation between public pension policy and the timing of retirement. In contrast, studies that consider cross-country data usually find that public pension policy has a substantial effect on retirement behaviour. This difference can be attributed to the subtlety of the policy variation that is usually described by country-specific data, and to delays in the behavioural response to policy change.

A common critique of the reduced form approaches to analysing retirement behaviour is that the reported estimates are affected by collinearity and omitted variable bias. In the case of studies that consider cross-sectional data for a single country, the variation of public pensions is often strongly correlated with other characteristics, such as individual income histories, which may relate to tastes for retirement. Studies of retirement behaviour that consider time-series data for a single country are often complicated by the fact that the policy variation described by the data is slight or exhibits a stable temporal trend. And cross-country studies of retirement behaviour usually suffer from undesirable population heterogeneity, in the form of institutional differences between countries.

More fundamentally, however, analyses of retirement behaviour that use reduced form models are susceptible to the critique formulated by Robert Lucas, that economic theory frequently (and erroneously) assumes that economic agents do not in the decisions incorporate information on and projections of policy measures taken or (more importantly) expected in the future.

Hence, although reduced form regression estimates can provide useful information regarding retirement behaviour given existing pension policy, they are usually inappropriate for considering the behavioural response to policy counterfactuals. Results presented by Lumsdaine et al. (1992) support this conclusion. Lumsdaine et al. compare the in-sample and out-of-sample predictive power of three models of retirement, using data that describe a policy experiment. The principal conclusion of this study is that “The option value and dynamic programming models are considerably more successful than the less complex probit model in approximating the rules individuals use to make retirement decisions” (Lumsdaine et al., 1992, p. 31).

In response to the shortcomings of reduced form models for analysing retirement behaviour, a number of studies have considered structural models of retirement. The most commonly cited of these include Burtless (1986), Burtless & Moffit (1984), Gustman & Steinmeier (1985, 1986), Berkovec & Stern (1991) and Rust & Phelan (1997). These models are comprised of three elements: a single period utility function, a discount factor and a transition probability density. Individuals are assumed to select their chosen action at any time t , from their range of possible options to maximise their expected discounted value of utility derived over all future periods. Estimation of the model progresses in three stages. First, the assumed beliefs regarding probable future outcomes – as embodied by the transition probability density – are estimated from survey data, subject to the additional assumption of rational expectations. Second, given the expectations estimated in the first stage, the dynamic programming problem is solved numerically by backward induction. And third, a likelihood function is formulated from the numerical solution to the dynamic programming problem, which is used to estimate the unknown discount factor and utility function parameters.

The general finding of the studies that are based upon econometric estimates of structural models is that public policy has a strong (negative) effect on labour supply. The structural analysis reported by Gustman & Steinmeier (1986), for example, suggests that the US retirement peaks at ages 62 and 65 can be motivated entirely by social security, pensions and mandatory retirement. Rust & Phelan (1997) extend upon the analysis of Gustman & Steinmeier, by adding the incentive effects of Medicare for an analysis of men's retirement behaviour in the US. Like Gustman & Steinmeier, the analytical results reported by Rust & Phelan capture the retirement peaks described by survey data. In the case of the peak at age 65, however, the results presented by Rust & Phelan depart from those reported by Gustman & Steinmeier, by suggesting that medical insurance plays an important role.

The analytical complexity of a structural model is usually purchased at the expense of the detail that is used to describe population heterogeneity. Perhaps the most important simplifying assumption that is commonly made is that households consume all of their income immediately, which omits consideration of the consumption/savings decision. The principal justification that is cited for this omission is the lack of accurate wealth data available for estimation.

Furthermore, an appeal can be made to statistical and theoretical evidence that downplays the role of wealth in the retirement decision (for example, Samwick, 1998, and Deaton, 1991). Nevertheless, such qualifications may fail to allay concerns regarding the results obtained. Omitting wealth from the analysis focuses attention upon the foregone opportunities that are associated with selecting a particular date for retirement. This is one aspect that affects the consumption that an individual can afford during retirement. Wealth and timing are clearly factors that have a bearing on the future consumption that an individual can afford.

The potential importance of wealth in determining the timing of retirement is reflected by a recent study by Blundell & Emerson (2003). They estimate a reduced form probit model that describes retirement in terms of an individual's wealth, their age, and their option value (following Lumsdaine et al., 1990). Importantly, Blundell & Emerson (p. 12) report that "In each specification, the coefficients on wealth are always strongly significant and suggest that the restrictions underlying the standard option value model need to be relaxed to allow saving and borrowing against future pension wealth".

These results suggest the intuitive conclusion that an early accumulation of wealth tends to encourage early retirement. Notably, the coefficient on the option value variable estimated by Blundell & Emerson (2003) ceased to be significant (at any reasonable confidence interval) following the addition of wealth to the probit regression. Rust (1987) undertook one of the first studies to suggest a method for estimating structural models of retirement that incorporate the consumption/savings decision. Nevertheless, practical applications have been frustrated by the implied computational burden. For example, one of the most recent attempts to estimate a structural model of the consumption/savings decision is by Gourinchas & Parker (2002), who use an optimal consumption model to account for the lifecycle spending pattern described by the American Consumer Expenditure Survey. Although Gourinchas & Parker choose the parameters of the utility function to minimise an econometric criterion, they do not fit their model to the whole cross-section of data. Rather, they optimise for mean consumption as a function of age, and do not account for differences of behaviour between consumers of the same age. Their model does not address the labour/leisure margin and, as far as we are aware, no researcher to date has suggested a method for making this problem computationally tractable, given the limitations of current state-of-the-art personal computing technology.

The model considered here is specified to simulate endogenously the labour/leisure and consumption/savings decisions. Calibration of the model closely follows the existing literature that considers structural models of retirement. Specifically, the required transition probability density is estimated from survey data. The retirement decision is formulated as a dynamic

programming problem, which is solved numerically, by imposing the estimated transition probability density. But unlike the method of likelihood estimation that is commonly adopted in the literature, the discount rate and utility function parameters are manually calibrated to reflect broad observations drawn from survey data regarding consumption, employment status and wealth. This side-steps the immense computational burden that is associated with econometric estimation.

In the countries studied (Denmark, Germany and the UK) differences in labour force participation by people in the years leading up to retirement can be accounted for by differences in the benefit systems in place.

The NIESR team find that in broad terms differences in labour force participation by people in the years leading up to retirement can be accounted for by differences in the benefit systems in place in Denmark, Germany and the UK. Taking benefits in Denmark at their face value and without exploring the other aspects of the benefit system, they nevertheless find that incentives to work are weak for people of all ages. They make the assumption that benefits available to persons of working age in Denmark are worth only 75% of their true value; in fact the high labour supply is probably achieved by a combination of a strong work ethic and a policy of limiting the duration of some benefits

and encouraging people to work in other ways.

The assumption that people's welfare is affected by their state of health has the effect of raising the cost of living in old age – at least on a probabilistic basis. This in turn raises labour force participation among individuals close to retirement because the expenses associated with achieving any particular living standard after retirement are increased. Yet in broad terms, conclusions about the relative effects of the different welfare schemes are not affected.

The NIESR team find that the tax/transfer system is cheapest in the UK (seen in terms of net payment to the government discounted to the start of working life) and most expensive in Germany. This, of course, reflects the fact that it is not possible to distinguish between different forms of taxation.

The higher tax burden means that young voters prefer the UK system to the German system. Voters over age 45, however, typically prefer the German system and the degree of longevity is such that, even for a steady-state population, such voters will be in the majority. This draws attention to obvious political problems that countries with generous pension systems may find difficult to address.

4. Alternative scenarios for health care and retirement

AGIR included a broader analysis, undertaken by a team of researchers from the CPB, of various scenarios of the effects of population ageing on public health expenditure, public pension expenditure and the sustainability of public finances.¹⁸ It pays particular attention to the role of new insights concerning the relation between living longer and in better health and health consumption, health expenditure and pension expenditure. The fact that life expectancy may increase further than standard demographic projections until now have suggested has among others been argued by Vaupel (1998), Vaupel & Lundström (1996) and Held (2002). Likewise, many authors have paid attention to the incidence of declining disability among the elderly and more generally to the fact that the health of older persons is improving. If the health

¹⁸ E. Westerhout and F. Pellikaan, *Can we Afford to Live Longer in Better Health?*, , ENEPRI Research Report No. 10, CEPS, Brussels, July 2005.

of older persons improves further in the future this may lead to a smaller rise in health and pension expenditures than projected to date. Their study combines both features to investigate how the population ageing process may impact on the future development of health and pension expenditures if we take account of these factors.

This part of the project thus builds a bridge between the descriptive analysis presented in the previous work packages on the one hand and the examination of macroeconomic implications and broader policy issues presented below. The CPB study thus based itself on the data collected in the first three work packages to make projections for public health expenditure and public pension expenditure, using different assumptions with respect to demography, health and labour force participation and provided input in the subsequent analysis of policy issues.

More precisely, the study investigated the effect of population ageing on public health and long-term care expenditures, public pension expenditures and government finances in EU countries in the projection period 2002-50. Specific attention was paid to new insights about the development of demography and health in these projections. In this regard, the view has been expressed that people may live substantially longer in the future, when compared with current demographic projections, but will also spend part of this increase in life expectancy in better health. Both developments have obvious implications for the correct projection of public expenditures on health and long-term care, pensions and government finances. To investigate the effects of living longer in better health, the authors developed four scenarios. First a base case scenario, second a living longer scenario, third, a living in better health scenario and fourth a living longer in better health scenario.

The base case scenario uses the best data currently available and methods used in previous studies when projecting health-care and pension expenditures. In this regard, this analysis closely followed the findings and data presented in the EPC (2001) study, which to our knowledge is the most comprehensive and accurate report presenting projections on health care and pensions for the EU. The base case scenario, however, differed in several respects from the projections made in the EPC report. First, it included the costs made during the last years of life in the projections. The inclusion of these costs is important because an increase in life expectancy will postpone these costs to later ages. When standard age profiles are used to project future health-care expenditure, an increase in life expectancy may thus overestimate health-care expenditures if it is assumed that a 65 year-old in the future has the same health-care profile of a 65 year-old today, when that person is expected to live much longer and likely to be much healthier. Second, the study decomposed the cost of mortality into a health-care and long-term care component, which differs by age. Third, government revenues were incorporated in the projections for government finances. Using all of the above information, projections were made of government finances in the future and more specifically assessed as to whether government finances are sustainable under current social policy rules. To this end, the study uses a measure, the 'sustainability gap', which is also used in other studies to indicate whether government finances are sustainable or not. If the sustainability gap is positive, sustainability problems will arise. If it is negative, the opposite holds.

The living longer scenario differs in only one aspect from the base case scenario and that is the assumption about future possible demographic developments. As already mentioned, there is a lot of uncertainty about how demography may develop in the future. Three scenarios are run to take account of this uncertainty, respectively labelled the low, middle and high living longer scenario. All scenarios assume that life expectancy will increase further than standard projections have suggested so far, which is 82.6 years at birth for an average EU country. This is realised by reducing the mortality rates for specific ages. In the low scenario, life expectancy at birth will increase further by 1.2 years, but it is also assumed that the reduction in mortality rates will not take place at old ages (that is, above age 85). In the middle scenario, life

expectancy will increase further by 3.2 years and the reduction in mortality rates also takes place at relatively high ages, i.e. above 85 years old. The high scenario assumes that life expectancy will increase further by 4.8 years – the assumptions are the same as in the middle scenario but the rate of reduction in mortality rates is assumed to be higher.

The living in better health scenario uses the same assumptions as in the base case scenario, thus also the same demographic assumptions, but a positive health trend is incorporated in the projections for health and long-term care expenditures and pension expenditures. This follows the reasoning of many authors who have found that the disability rate or occurrence of specific health problems has been falling through time, implying that the health of the average person is improving. An improvement in health will not only influence expenditures on health, but also on pensions. Healthier persons are assumed to need less medical attention and are able to work longer. To incorporate the effect of an improvement in health on health and pension expenditures, the study uses results found in the literature where this relation is directly or indirectly estimated. For health expenditures the authors searched for an elasticity representing the relation between a change in health and health expenditures. For pension expenditures they searched for an elasticity representing the relation between a change in health and outflow from the labour market. Coupled with information on how health will develop, the influence of health on health and long-term care and pension expenditures can then be calculated. In the projections, the variable life expectancy in good health is used to reflect the improvement in health taking place in the projection period.

Finally, in the living longer and better health scenario, the assumptions made in the living longer scenario with regard to possible demographic changes are combined with the assumptions made in the living in better health scenario about possible health improvements.

Table 1 shows the respective results of the projected increase in health and long-term care expenditures, pension expenditures, total expenditures and the sustainability gap for the various scenarios just discussed for the EU average as measured in the period between 2002 and 2050. Except for the base case scenario, all scenarios reflect changes in the mentioned variables compared with the base case.

Table 1. Change in EU average expenditures in the projection period between 2002 and 2050 (% of GDP)

	Base case 2050	Living longer 2050	Living in better health 2050	Living longer in better health 2050
Health and long-term care expenditures	2.7	0.8	-0.9	-0.3
Pension expenditures	2.9	1.4	-0.9	0.4
Total expenditures	5.6	2.2	-1.9	0
Sustainability gap	3.2	0.9	-0.7	0.2

Source: F. Pellikaan & E. Westerhout (2005).

As can be seen in the base case scenario, population ageing will lead to a significant increase in both total health and pension expenditures and to unsustainable government finances, reflected in the fact that on average taxes have to be increased by 3.2% of GDP to keep EU government finances sustainable. A further increase in life expectancy, as postulated in the living longer scenario, will lead to higher expenditures and thus a deterioration of government finances,

reflected by the fact that taxes have to be increased by an additional 0.9% on average. An improvement in health on the other hand will lead to less expenditure on both total health and

The ageing of the population will significantly increase expenditures on public health and long-term care and pensions. The widespread belief that people may live longer, but are on average also healthier, will only marginally change the base case projections if the expected increase in life expectancy and health develops according to the CPB team's premises.

long-term care and pensions and will improve government finances by 0.7%. An improvement in health will not, however, be large enough to counter the expected increase in expenditures in the base case scenario. Living longer in better health finally has different effects on health and pension expenditures. While expenditures on health care are expected to decline, expenditures on pensions are expected to increase. This can be explained by the fact that an increase in life expectancy normally leads to two opposing effects on health-care expenditures. On the one hand it leads to a reduction in the number of mortalities, which are much more expensive than the health-care

costs of survivors; on the other hand it leads to an increase in the population as people live longer and thus to an increase in the consumption of health care in this period. The first effect leads to a savings in expenditures, while the latter effect leads to an increase in expenditures. Combined with an improvement in health, living longer may thus lead to a decline in expenditures.

The ageing of the population will thus significantly increase expenditures on public health and long-term care and pensions. The widespread belief that people may live longer, but are on average also healthier, will only marginally change the base case projections if the expected increase in life expectancy and health develops according to the CPB team's premises. It has to be emphasised, however, that it is very uncertain how either demography or health will develop in the future. A larger-than-expected health improvement may, for example, have profound effects on the sectoral structure of a country as it will have to shift fewer resources to the health-care sector; it has the availability of a larger workforce and is thus able to target more resources on productive sectors. A further increase in life expectancy will have the opposite effect.

Two remarks are in order. When projecting future health-care expenditures, this study has only focused on the effect of population ageing on these expenditures. Yet the projection of health and long-term care expenditures is very difficult and surrounded by many uncertainties. For instance, previous studies have found that the introduction of new medical technologies, the price of the development of medicines and institutional aspects have been more important factors than ageing in explaining increases in health-care expenditures. These factors are very difficult to model and are usually not incorporated in projections. While ageing is likely to become a more dominant factor in explaining the development in health-care expenditures, the omission of the other factors is obviously a miss. Health-care expenditures may therefore increase at faster rates than projected here. Lastly, it is important to note that all projections were carried out in a policy neutral environment. The projected increase in expenditures on health and pensions will obviously provoke policy reforms, but no account is taken of possible reactions in this field.

5. A world perspective on the impact of population ageing

An analysis of the broader implications for the world economy was undertaken by the INGENUE team (CEPII and CEPREMAP).¹⁹ This analysis made use of an applied, international, overlapping generations, general-equilibrium (OGGE) model of the world economy built upon the 2000 UN demographic projections to study the prospects of asset accumulation and investment in the various regions of the world and of international capital flows over the next few decades. The study involved both the calibration of a baseline scenario and the study of alternative scenarios involving various assumptions concerning the reforms of health care and pension systems in Europe.

5.1 The baseline scenario

Demographic transition and the consequent population ageing are putting the pay-as-you-go (PAYG) pension systems of OECD countries under stress and fostering various reforms whose economic consequences are likely to be important and far reaching, both in the domestic economies of the countries implementing them and in the world economy, given the current and foreseeable degree of international economic and financial integration. Current population structures and demographic projections for the various regions of the world show that the ageing process is not synchronous: over the next decades, while OECD countries – and most notably Europe and Japan – will experience large increases in their old-age dependency ratios, other regions of the world will be facing relatively low ratios and still-rising working-age populations. This difference in the time profiles of demographic changes suggests that inter-temporal trade, in the form of international capital flows, would be mutually advantageous and might improve the economic outcomes of population ageing compared with a situation of economic and financial autarky.

While populations in OECD countries have been ageing for a long time now, rising living standards in other parts of the world are also bringing longer life expectancy and falling fertility rates in developing countries: the so-called ‘demographic transition pattern’ is progressively spreading over the entire world; thus, the world population is ageing, but at a different pace in the various regions of the world. Whereas various economic and social consequences of population ageing have been investigated in OECD countries, very few analyses have explicitly taken the worldwide aspect of the problem into account. Indeed, this generalised but differentiated ageing process is occurring in a world of increasing capital mobility and financial globalisation, which suggests that it may give rise to new opportunities for profitable exchanges among regions, a situation of mutually beneficial gains from inter-temporal trade through international financial transactions. The purpose of this analysis is therefore to evaluate the potential magnitude of such capital flows: if they are found very large compared with what has been observed in the past (the end of the 19th century up to World War I) or in more recent years, such a prospect raises the issues of international financial instability and the institutions and regulations that would have to be set up to make such large capital flows sustainable between developed and ageing countries and developing countries with younger populations.

Under the assumptions adopted, simulating the INGENUE model yielded a dynamic equilibrium path for the world economy, which slowly converges in the very long run on

¹⁹ M. Aglietta, V. Borghy, J. Chateau, M. Juillard, J. Le Cacheux, G. Le Garrec and V. Touzé, *Scenarios for Global Ageing: An Investigation with the INGENUE 2 World Model*, ENEPRI Research Report No. 9, CEPS, Brussels, July 2005.

stationary populations and a steady-state economic growth rate of 2.27% per annum. Over the 21st century, this equilibrium path of the world economy may be characterised along three major dimensions: the world capital market equilibrium, economic growth in the various regions, and the distribution of wealth and current accounts, i.e. the magnitude of international capital flows.

At each point in time, the world's real interest rate is determined on the single world capital market by equating world capital demand and world capital supply, or equivalently the stocks of accumulated productive capital and accumulated wealth. Due to the fact that the consequences of demographic evolutions in the various regions of the world partly cancel each other out in terms of investment and saving, the interest rate does not vary much after its initial, marked decline from over 5.6% in 2000 to about 5.1% in 2025, with slight recovery up to a little over 5.3% in 2045. But, insofar as the interest rate is the discounting factor for all decisions, small

As a result of the regional savings fluctuations, the world capital supply will increase markedly up until 2025 and then show a much more modest rise until about 2050.

fluctuations in the interest rate would have large consequences on the regional wealth distribution and on the constellation of current accounts, as well as on the intergenerational distribution of wealth and welfare. Most of the action moving the world interest rate is on the supply side of the world capital market and

results from demographic changes. The aggregate households' saving rates of the six regions amply fluctuate, especially those of two out of the three most-developed regions – Europe and Japan – whose saving rates are initially high, but decline quite sharply until 2050.

The impact of such fluctuations in regional savings rates on the world interest rate is all the more important in the first decades of the century, as these regions have a relatively large weight in world GDP and total world wealth. The developing region that is most advanced in the demographic transition process (China, Eastern Europe and Russia) has a similar profile of aggregate savings rates. In the other regions, including North America, aggregate savings rates fluctuate relatively less over the first four decades of the century, then gently decline as populations age. As a result of these regional savings fluctuations, the world capital supply markedly increases up until 2025, then much more slowly until about 2050. Afterwards, the relative stabilisation of the world interest rate is mostly attributable to a slight recovery in savings rates of those regions having experienced the sharpest decline and a mild reduction in those of the others.

Because of the assumed technology and slow convergence, the regional growth rates are essentially determined by working-age population dynamics, especially over the first half-century; afterwards, the effects of the, albeit slow, diffusion of technical progress is noticeable on the growth rates of relatively backward regions, with annual growth rates around 3%. Over the first decades of the century, Europe and Japan experience a marked decline in annual growth, reflecting the reduction in working-age populations.

The resulting time profile of the aggregate world GDP growth rate is roughly parallel to the movement of the world interest rate, mostly as a result of the conservative assumption with respect to technological convergence.

Given the small magnitude of the fluctuations in regional capital demands, most of the action on regional current accounts is the result of differences in time profiles of wealth

Most of the change in regional current accounts is the result of differences in time profiles of wealth accumulation across regions, such differences being largely related to discrepancies in demographic evolutions.

accumulation across regions, such differences being in turn largely owing to discrepancies in demographic evolutions, especially time lags in the changes in the share of high-savers in the total populations of the six regions.

Resulting differences between domestic savings and domestic investment in each of the 10 regions yield current account surpluses or deficits. In stock terms, at a point in time, the ratio of the stock of productive capital installed in a region and the stock of accumulated wealth of households resident in that region (ownership ratio) is an indicator of the net external position of the region considered. Given the differentiated effects of variations in the interest rate and other economic variables on the savings and investment behaviour in the various regions, these regional ownership ratios do fluctuate considerably over the century in the baseline scenario. Starting from a net lender initial position – ownership ratios above one – the core regions of Japan and Europe (and to a much lesser extent, China and Russia) have ownership ratios that increase until 2015 for Japan, 2025 for Europe then decrease thereafter, mostly reflecting the evolution of the shares of high savers in these regions. Strikingly though, Europe, one of the large creditors at the beginning of the century, moves to an equilibrated position in the second half of the century while North America becomes a net creditor region in the last third of the century. Consistent with the changes in regional savings and investment flows, and the resulting evolutions of ownership ratios, the current accounts (and hence the international capital flows) reach significant magnitudes and vary a great deal over the century. The relationship between stocks and flows is indeed simple in a steady state: in the very long run, when populations have become stationary, an ownership ratio above (or below) one is associated with a current account surplus (or deficit). But during transitions, this simple relationship does not hold. At the beginning of the century, thanks to the large shares of high-savers in their populations, Japan and Europe are the two regions exporting capital, while Asia, Africa and South America and North America, whose demographics are more dynamic than those of other developed regions and which were endowed with a larger time preference parameter, attract these capital flows. After 2020, the Japanese current account is no longer in surplus; it starts fluctuating around equilibrium. And after 2030 Europe plunges into a persistent current account deficit.

5.2 Pension reforms in Europe in a world model: Three scenarios

In the baseline scenario (BS), the European pension system is characterised by two major features, which we have supposed untouched all along the century – a low legal retirement age (60) and a fairly high replacement rate (70%). Below we investigate the consequences, in the model, of three kinds of pension reforms in Europe, keeping the institutions in other regions of the world identical to the baseline. First is a constant contribution rate (CCR), which involves locking in pension contribution rates at the level they reached at the end of the 20th century (18.5%). The result is a progressive and

significant decline of the replacement rate as the European population ages: by 2050, it would be reduced by 50%. But in the baseline scenario, keeping the replacement rate constant induces a marked increase in the contribution rate, which reaches 37.5% by mid-century and stabilises at around 32% in the very long run, in the aftermath of the baby-boom shock. The second effect considered is that of postponing the legal retirement age (PRA) from 60 to 65, progressively over the period 2000-20 (one additional year of working life per five-year period). In this

CCR – keeping contribution rates constant (and reducing replacement rates)

PRA – postponing retirement age from 60 to 65 over the period 2000-20, while keeping the replacement rate constant

CGR – indexing pensions on gross, instead of on net wages (contribution rate higher than in the baseline scenario)

scenario, the replacement rate is held constant at its initial level, and, as a result, the contribution rate increases much less than in the baseline scenario – it reaches 29% in 2050, and about 25% in the very long run.

The third reform investigated is constant gross replacement (CGR), which involves indexing pensions on gross, instead of net wages. This, of course, corresponds to a scenario that has a philosophy opposite to the two previous ones: the replacement rate is actually fixed at a higher level, so that the contribution rate rises even higher than in the baseline scenario.

Macroeconomic consequences

Because these reforms are assumed to be perfectly anticipated as soon as they are announced (at the end of the 20th century), their major direct and most immediate effects are, of course, on individual savings behaviour, hence on aggregate savings. Unsurprisingly, compared with the BS scenario, CCR raises the savings rate throughout the century, while CGR lowers it. As the public pension system is made less (or more) generous, households save and accumulate more (or less) in order to compensate the effect of lower pensions on consumption in retirement. Because labour supply is exogenous, this savings effect is the only direct effect on households, and it corresponds to a change in the time profile of their budget constraint. The direct effects of the PRA reform are less easily depicted and explained. Initially, the announcement and progressive implementation of the postponement of retirement age reduces aggregate savings in Europe, as those initially concerned are the high-savers, who immediately expect a higher lifecycle income and the necessity to finance consumption over a shorter retirement period. But after 2025, the European aggregate savings rate is, in the PRA scenario, permanently above those of the baseline and CGR, due to general-equilibrium, indirect effects mostly through the world interest rate and to the important increase in the incomes resulting from the rise in the labour factor.

As expected, the *CCR reform is associated with a permanently lower interest rate, as European savings rates are constantly above their baseline level*; symmetrically, the CGR reform yields a persistently higher world interest rate. The effects of the PRA reform are more ambiguous. Initially, the world interest rate is higher than in any other scenario, mostly as a result of two mechanisms: as already stated, European aggregate savings are lower at first than in the baseline scenario; and in addition, there are more working-age workers in the economy, who have to be equipped with capital, so that European investment is permanently higher than in the baseline scenario. Consequently, until 2035, the world interest rate is higher than in the baseline; afterwards, it is almost identical, as the PRA reform has little persistent effect with a stationary population.

The European pension reforms will have induced consequences on the rest of the world, through the changes in the world capital market equilibrium and hence in the world interest rate.

These European pension reforms thus have induced consequences on the rest of the world, through the changes in the world capital market equilibrium and hence in the world interest rate. As expected, the CCR reform, which increases European aggregate savings over the whole century, also improves the ownership ratio of Europe. Conversely for the

CGR reform, the ownership ratio is always below the baseline and its deterioration is much more pronounced after 2035, so that it reaches a very low level (around 55%) at the end of the century. In the PRA reform, the European ownership ratio is permanently lower than in the baseline case, as European investment is permanently increased, whereas the initial increase in savings is only temporary. In this last case, therefore, Europe exports much less capital to the rest of the world over the first decades of the century. Compared with the baseline current

account evolutions, two reform scenarios (PRA and CGR) yield a substantially smaller European surplus over the first two decades of the century. After 2025, however, the outcomes are the opposite: the PRA reform leads to increasing current account surpluses in Europe, as the transitory implementation effects of the reform on savings and investment have vanished; thereafter, the European current account is close to its baseline. In the CCR reform scenario, on the contrary, Europe is a permanent exporter of capital to the rest of the world, with very large initial current-account surpluses. In the rest of the world, the constellation of regional current accounts is only mildly affected by European pension reforms, their consequences being indirect through the world interest rate.

Distributional and welfare consequences of pension reforms

Static indicators

Both the CGR and CCR scenarios have a low influence on world economic growth rates with respect to the baseline, then the reform effects on consumption per capita are the opposite in Europe and in the other regions. More capitalisation leads to a decline in the financial position of European households until 2040 relative to BS scenario, and to an increase after 2040. For CGR it is roughly the opposite as the effects of the reforms are inverted. In the rest of the world

The main effect of the PRA reform is to directly increase European GDP with the employment. The resulting increase in the European wage bill leads to an important rise in consumption in the short run.

the effects of the two reforms are the converse of those in Europe. Indeed, in integrated capital markets the extra-savings in Europe for retirement motives implies necessarily international capital export flows under CCR, which implies an increase in the GDP and in the wages in the other countries, and then an increase in their consumption. As time passes, Europeans reduce their extra savings (because they have found enough of their retirement income), the interest rate will increase and retired persons will begin to have more important asset income from their domestic investment but also from financial investment abroad. Because a more important share of the other countries' GDP is now going to European households (through capital income flows) consumption in these countries will be reduced with respect to the baseline in the long run.

In the PRA case, the main effect of the reform is to directly increase European GDP with the rise in employment. The resulting increase in the European wage bill leads to an important rise in consumption. But this also implies new opportunities for investment in Europe by the rest of the world in the short run (as European marginal productivity of capital rises with European labour) so in those countries consumption will decrease at this time. In the long run, this policy suggests an obvious increase of resources at the world level: Europeans still have a greater consumption level than in any other scenario (GDP per capita is higher). But this reform is also profitable to the rest of the world, which had previously accumulated more ownership in the European stock of capital than in the CCR or BS scenarios.

Over the next 50 years, the CCR reform seems to be the more appropriate policy in order to redistribute resources to persons younger than 60. This kind of intergenerational redistribution may be justified by the fact that, in the benchmark economy, a European household with persons older than 60 had at the end of the last century a standard of living that is double that of persons who are under 40. A similar wedge in the consumption per capita of the different generations is only perceptible in Europe. After 2050, the effects of the reforms on the distribution of consumption over the age cohorts progressively fade. In the long run, whatever

the pension policy chosen, the relative fall of average consumption as a result of ageing will bear essentially on the consumption per capita of the more aged persons.

Longitudinal indicators

The CCR reform benefits generations born after 1985 while the CGR reform only benefits generations born before that year. So the CGR reform is welfare-enhancing only for current generations because the burden of demographic transition will be supported by future generations.

In agent-based models, the welfare of each generation is the standard criterion to evaluate the relevance of a reform. Here, because leisure brings out no satisfaction it is obvious that every reform that increases the level of labour supply will be welfare-enhancing. So this kind of criterion must be taken very cautiously in this context. PRA reform then increases the welfare of all the generations in Europe because it acts as a global and permanent rise of the GDP. The two other reforms have opposite effects. The CCR

reform benefits generations born after 1985 while the CGR reform only benefits generations born before that date. Indeed, the important increase of baby-boom retirees between 2005 and 2015 will imply a sharp rise in contribution rate if replacement rates stay constant or a drastic fall if contribution rates stay fixed. So the CGR reform is welfare-enhancing only for current generations because the burden of demographic transition will be supported by future generations. Conversely, the CCR reform puts the burden on the current generation, letting future generations accumulate wealth for their old days. It is interesting to note that if reforms in Europe have only a very small effect on the welfare of generations in the rest of the world (through interest rate changes) the signs of these effects are not trivial. The most notable feature is that the CCR reform in Europe has a negative impact on the welfare of all cohorts in the other regions. Because in the beginning of the century this extra savings will imply a fall in the world interest rate and then a fall of income of older persons in the other regions of the world where personal savings is the main source of income of retired individuals. In the life cycle this is not compensated by higher wage rates between the ages of 20 and 40 (due to European extra accumulation).

In the middle of the century, the extra de-savings of Europeans will imply a rise in the world interest rate and then a slight amelioration of welfare for individuals born after 1980 in the other regions. The PRA reform also presents a non-monotonic profile of welfare by cohorts in the other regions, resulting from similar changes in the world interest rate.

In the middle of the century, the extra de-savings of Europeans will imply a rise in the world interest rate and then a slight amelioration of the welfare of individuals born after 1980 in the other regions.

Pension reforms are usually evaluated in terms of their effects on equity thanks to a financial criterion: the internal rate of return of the PAYG system. This is the discounting factor calculated by equalising the present value of the total lifetime contributions paid by a cohort to the present value of the total lifetime pensions received by the same cohort. As the

PAYG system is time-to-time balanced, if there are demographic transitions and/or reforms in the system, the previous criterion will be different for the different cohorts. In 1995 the more aged cohorts were more concerned by reforms that modified pension rights; thus, the CGR reform is very interesting for them (their rate of return from PAYG is increasing) whereas it penalises the younger generations, who support the rise of contribution rates (their rate of return of PAYG is decreasing). The CCR reform, however, is more favourable to future generations (only generations born after 1995 benefit of this reform compared with the BS case) but also tends to smooth the criterion over all the generations. When the age of retirement is postponed,

the contribution period increases and the pension benefit period is reduced and the rate of return then decreases for the adults. But in the future, the resulting decrease of the contribution rate (in respect of the BS) will allow better returns for future cohorts than in the BS case. Moreover, in the long run (for generations born after 2060) this reform appears to be the best in terms of return on the PAYG system. Except for generations born between 1985 and 1994, the intergenerational criterion and the lifetime welfare gives the same insights about ‘losing generations’ and ‘winning generations’ in the CCR and CGR reforms. PRA reform reveals some ‘losing generations’ compared with other scenarios in terms of PAYG return, whereas it is consistently the best reform in terms of welfare.

5.3 Concluding remarks on the three world scenarios

The interplay between ageing populations displaying different time profiles in the various regions of the world and PAYG pension systems with different characteristics yields significant fluctuations and discrepancies in world and regional economic variables.

When analysing the prospects of public PAYG pension systems in OECD countries, the emphasis in most studies over the past two decades has been on the macroeconomic and intergenerational, distributional consequences of ageing populations in the framework of models that have tended not to take into account (or conversely to over-stress) the implications of economic and financial

globalisation on domestic evolutions. The model used here to accommodate such analytical needs has tried to present its major features, its functioning and a number of distinctive results that differ markedly from what would be obtained in autarkic, closed-economy models or in small, open-economy models. The interplay between ageing populations displaying different time profiles in the various regions of the world and PAYG pension systems with different characteristics yields significant fluctuations and discrepancies in world and regional economic variables, as well as fairly large international capital flows in our baseline scenario and in the various pension reforms studied. Such large capital flows on average help the smoothing of the long accumulation cycles that arise from ageing and fluctuations in population sizes. Although they may seem excessive, the INGENUE team shows that they are significantly smaller in an integrated world model than in models that treat developed countries in isolation as small, open economies.

6. New health problems over the coming decades?

If the rise in the Body Mass Index in a number of developed countries is confirmed and pursued, this development may cause an aggravation of many health care problems and even a levelling off of the rise in life expectancy assumed in demographic projections.

The AGIR project did not involve a systematic study of the pros and cons of the various proxies used or proposed for the health status of a population or specific groups. Yet, a number of studies suggest that general markers of nutritional status, such as height and body mass index (BMI),²⁰ are significant predictors of health status although their interpretation is confounded by the fact that they reflect influences from early childhood and family background. Energy intake and, less clearly, quality

²⁰ Body mass index (BMI) is the accepted international indicator for comparing whether individuals are overweight.

of diet have also been found to be predictive of physical and intellectual performance. The identification of causal pathways in these studies is, however, difficult and involves statistical assumptions about unobserved heterogeneity that are difficult to test. Nevertheless, height and weight have traditionally been used as predictors of morbidity and mortality risk among children. More recently, adult height and BMI have been put forward as indicators of the probability of dying or of developing chronic diseases at middle and late ages (Fogel, 1994, Strauss & Thomas, 1998) and as measures of living standards (Steckel 1995). Adult height and BMI measure different aspects of nutrition and health. Adult survival rates (ASR) and age of menarche have also been used to complement the estimates of the effects of health on earnings.

Further, several studies have shown a significant correlation between an individual's height, their success in the labour market and personal income. The seminal work by Fogel (1994 and 1997) documented secular increases in height that parallel economic growth. In the study published in 1994, the author also used energy cost-accounting techniques to estimate the increase in the energy available for work over two centuries in Great Britain. Improvements in nutrition raised the labour force participation rate by bringing into the labour force the bottom 20 percent if consuming units in 1790 that had, on average, only enough energy for a few hours of strolling. Moreover, for those in the labour force, the intensity of work per hour has increased because the number of calories available for work increased. This change in the intensity of effort, by itself, appears to have accounted for about 20 percent of the long term growth rate.²¹

To the extent that height and BMI can be considered relevant and rather reliable proxies for the health status of a population (or at least of changes in this measure), the recent development of height and BMI in a number of developed and developing countries must be a cause for serious concern. In fact, as suggested by Fogel (1994) using a Waaler diagram,²² an increase in BMI from, say 28 to 29 or by about 5% for an adult man, would tend to increase the risk of morbidity by around 10%.

In fact, BMI data show increases over the recent decades of more than 10% in the US, notably for certain ethnic groups, and more lately also in Brazil and in a number of European countries. This, by health specialists, is considered a major health challenge for future generations. For a start, it cannot be excluded that if confirmed this trend will aggravate many health-care problems and, not least, may result in a levelling off of life expectancy in the countries most severely hit by the rise in obesity and the associated illnesses such as, notably, diabetes.

7. Summary, conclusions and policy issues

7.1 Summary

As underlined at the very beginning of this review, the AGIR project has revealed a pressing need to acknowledge first that we unfortunately have only incomplete knowledge of past trends in the health status of the population and secondly that prospective developments over the coming decades are more uncertain than is generally recognised in the public debate on the consequences of population ageing.

- 1) In recent decades the decline in mortality and the resulting rise in life expectancy have increasingly been obtained through a higher survival rate of the elderly. Whether there is a biological limit to life expectancy is still under discussion among demographers but we still

²¹ R.W. Fogel, "Economic Growth, Population Theory, and Physiology: The Bearing of Long-Term Processes on the Making of Economic Policy", *American Economic Review*, Vol. 84, No. 3, 1994.

²² An approach invented by Hans Th. Waaler and presented in "Height, Weight, and Mortality: The Norwegian Experience", *Acta Medica Scandinavica*, Supplement 679, 1984.

expect more and more people to live to higher ages. Against this, however, obesity is on the rise in most highly developed countries and a continuation of this trend risks being translated into a rise in morbidity and, possibly, into a slowdown of, or even, in some countries, a halt to the rise in life expectancy.

- 2) The decline in fertility in EU countries during the last three decades is the result of new techniques of contraception and the liberalisation of abortion, but in a number of countries it is also caused by inconsistencies and contradictions between social and economic developments on one side and culture and tradition on the other side. Fertility is therefore not an 'exogenous' variable in the social model but one that is subject to influence by the accompanying social and economic policies.
- 3) Forecasts of net migration into the EU over the coming decades range between a low of a few hundred thousand to a high of close to a million persons a year. During recent years, however, resistance to and social tensions around immigration have clearly entailed a lowering of the inflow, with in particular a decline in the number of asylums granted. Whether or not immigration will offer a solution to the problem of population ageing is doubtful but what is clear is that it is not an exogenously given variable but one that, like fertility, is an outcome of socio-economic developments and policies.

In any case, 'health', although difficult to measure is importantly determined by individual behaviour, which again is influenced *inter alia* by education, family status and income. For public health policy the most important developments would seem to be:

- the continued increase in the number of visits to health-care providers accompanied in most countries by a decline in the duration of hospital stays;
- the prospective decline in the capacity for informal and family care in response to changing family structures and increasing labour force participation by women;
- the large and unavoidable increase in the number of elderly persons and the likely huge increase in the objective need for long-term care for the oldest old; and
- the associated prospective need for a substantial increase in the demand for institutionalised long-term care with the resulting problems of planning and painful choices between public and private initiatives.

The potential pressure on the capacity for institutionalised care-giving could even be further accentuated as a result of an increase in the rate of employment in the age group 55-64. The study of retirement behaviour as a function of the estimated option value of work and leisure has, in particular, demonstrated the intimate connection between retirement behaviour on one side and health status, family status and care-giving on the other side:

- The dual work load on women (gainful employment and housework) gives a strong incentive to retire or to stay out of the labour market, in particular when coupled with the need for providing care to children or disabled or old family members.
- When the value of domestic work is taken into account, the incentives to retire after the age of 55 are still very strong for healthy men: in some countries the option value of retirement for the average wage earner is actually higher than the income from gainful employment.
- For married persons or persons living with someone else the incentives to retire are stronger than for singles.

- As a result of the significant differences between EU member states with respect to the detailed functioning of the retirement schemes and the scope for early retirement, the incentives to retire show pronounced variations within the EU.

A further, econometric, analysis of retirement behaviour confirms that differences in retirement behaviour between three typical country cases, Denmark, Germany and the UK, can be largely accounted for by differences in the benefit systems in place in those countries. There are signs, however, in Denmark in particular that the relative level of benefits does not provide a full explanation of the high labour force participation ratio of the elderly (in age group 55-64). In fact, the latter seems to be achieved by a combination of a strong work ethic and a policy of limiting the duration of certain benefits and of encouraging even the elderly to seek or accept work propositions.

The baseline scenarios prepared within the framework of the AGIR project, starting from the projections prepared by the Ageing Working Group (AWG) of the Economic Policy Committee and including new assumptions concerning health-care expenditure in the period near mortality, confirm the estimates of a looming sustainability gap for public finance over the coming decades.

The additional alternative scenarios, based on certain new assumptions as compared with the initial AWG baseline scenario, suggest the following outcomes:

- A higher life expectancy in 2050 (living longer) can be expected to lead to higher expenditures on health and long-term care and pensions as compared with the EPC baseline scenarios.
- An improvement in health (living in better health) should be expected to lead to both lower health- and long-term care expenditures and to lower expenditure on pensions (as people will tend to retire later).
- A higher life expectancy combined with better health (living longer in better health) could be expected to result in somewhat lower expenditures on health and long-term care but to higher pension expenditure. On reasonable assumptions concerning the combination of the two, the net effect could be zero.
- A worst-case scenario involving higher life expectancy but in worse health (an outcome that on present trends cannot be totally excluded) would imply both higher expenditure on health care and additional expenditure on pensions, and would consequently lead to a serious aggravation of the sustainability problem for public finances.

The AWG scenarios and the alternative sensitivity calculations prepared within the framework of the AGIR project demonstrate the gravity of the sustainability problems facing the EU as a result of the demographic changes over the coming decades. Nevertheless, as such these scenarios are to be considered as one point of departure for assessing the impact on output, growth and employment of various potential policy measures aimed at ensuring the sustainability of public finances *and* of the health and pension arrangements.

It was therefore decided to ask an AGIR research team to feed various assumptions concerning replacements rates and health spending into a macroeconomic model and analyse the potential macroeconomic consequences of the measures ensuring the sustainability of health-care and pension systems. Given that such measures taken by EU governments would not fail to have effects on the rest of the world, it was agreed to undertake such simulations using a modified version of the INGENUE general equilibrium model, presenting the advantage of covering the whole world, in this case with a breakdown by 10 main regions.

The simulations undertaken using the INGENUE model suggest the following effects of measures (simplified at the EU level) to ensure sustainability of the financing of the health and retirement schemes:

- Keeping contribution rates constant at the level of year 2000 (and reducing replacement rates to about 50% of present levels) would entail an increase in household savings as households would need to save more in order to compensate the effect of lower PAYG pensions. This would result in an outflow of capital to the rest of the world, a lowering of world interest rates and a higher level of GDP. This reform measure would be beneficial to the generations born after 1985 as the lowering of replacement rates would essentially affect those born before that year.
- Increasing retirement age from 60 to 65 years of age over the period 2000-20 while keeping replacement rates constant should be expected to lead to higher growth and employment in the EU, less capital outflow to the rest of the world and a lower level of the world interest rate.
- A scenario involving the indexation of replacement rates on gross rather than net wages would entail a higher contribution rate, which in the baseline scenario would essentially shift the burden of financing welfare schemes on to future generations. Outflow of capital from Europe would be smaller and the level of the world interest rate would be higher.

7.2 Conclusions and policy issues

According to Assar Lindbeck,²³ the achievements of social-welfare arrangements in Western Europe are well known: considerable income security, relatively little poverty and, in some countries, ample supply of social services. But there are also well-known weaknesses and hence considerable scope for improvement. Social-welfare arrangements are often not financially robust to shocks; individuals make undesirable behavioural adjustments in response to welfare-state arrangements and their financing; and social-welfare arrangements are often poorly adapted to recent changes in socio-economic conditions and the preferences of individuals. Other observers may argue that the disparities between the national welfare arrangements are so wide that to encompass these systems within a single framework (a model) is in some ways an abuse of terminology. As stressed by Commissioner Anna Diamantopoulou in a speech in Brighton in September 2003, however, the term ‘European social model’, for example in the context of the European Social Policy Agenda, is not limited to social policy in the narrow sense of welfare, health care, care of the elderly and pensions. It includes employment policy as well – labour market rules, equality rules and policies, benefit rules, how job centres work and the training of workers. These elements, and in particular the systems for old-age income maintenance and health care are now increasingly subject to the procedure of ‘open coordination’. It therefore appears wholly appropriate to consider the adequacy of pension and health-care systems as a subject liable to be analysed simultaneously by EU member states with the aim of identifying common problems and the scope for a certain convergence.

Ensuring at the same time the *sustainability* and *adequacy* of health care and retirement income for the population in EU member states over the coming decades is indeed a task requiring action at all levels of society, government, firms and households. For public policy the issues at

²³ See A. Lindbeck, “Incentives in the Welfare State: Lessons for Would-Be Welfare States, The Austin Robinson Lecture, Tunis, Dec. 1995” in Y. Mundlak (ed.), *Contemporary Economic Issues, Proceedings of the Eleventh World Congress of the International Economic Association*, Vol. 2: Labour, Food and Poverty, Macmillan Press Ltd., London, 1998, pp. 3-24 (also IIES Reprint No. 587).

stake are not ‘only’ to undertake appropriate changes in the parameters of welfare systems but to reconsider the balance between public and private initiatives, and notably to thoroughly analyse to what extent the future necessary adjustments can be achieved through the play of market forces and to what extent policy intervention is required.

This would imply undertaking, probably at the level of the EU and in the framework of the open method of coordination, a common reflection over themes such as:

- To what extent can the likely need for a future considerable expansion of the capacity for health care for the elderly be ensured through the operation of market forces and is there a risk of ‘market failure’, which should be handled by stronger action from the side of public policy?
- How should child care, health care, notably long-term care and retirement provision be designed in view of ensuring a high degree of flexibility, taking account of the prevailing uncertainties of demographic projections *and* the risk that the actual development of public health, mortality and fertility could turn out to be substantially different from the baseline projections?
- Assuming that a substantial increase in the effective retirement age must be part and parcel of policies to ensure sustainability, what actions could be envisaged to ensure that the ‘parametric and systemic changes’ will effectively translate into behavioural changes at the level of businesses, households and individuals?
- What can authorities, businesses and households do to enhance human capital formation in general and to achieve the Lisbon target of life-long learning with the particular aim of supporting the employability of the elderly?
- What can public policy do to facilitate and stimulate the rise in the employment rate for women in general, notably in the countries where this ratio is still far below the level of the 60% fixes in the Lisbon agenda?
- Assuming that the most likely scenario for coping with the consequences of population ageing will include a certain increase in the effective retirement age *and* a rise in the public and private savings ratio plus an increase in capital exports to other countries, what would be the most appropriate macroeconomic policy stance?

It is therefore generally recognised by researchers from very different camps that (in modern society with loose family connections) retired persons may end up with insufficient private means to finance an adequate standard of living during retirement. The fact that most or many people in practice do not save enough to ensure appropriate replacement income is therefore a major argument for government intervention in the system of old-age income maintenance.

Nevertheless, even if the need for a certain degree of government intervention is recognised, three issues need to be addressed:

- the identification of ‘market failures’ that governments can tackle without running the equally significant risk of ‘policy failures’;
- the capacity of representative (democratic) governments to take decisions in the ‘general interest’ and the decision-making process translating public perceptions and manifested voter preference into appropriate political decisions; and
- the capacity (increasingly in focus) of governments to take account not only of the interest of present cohorts of voters but also to hand down a sustainable regime to the future generations.

The Eurobarometer survey of perceptions of pension issues, undertaken in 2001, showed that more than 60% of EU citizens considered population ageing as a major problem. More than 50% expected to encounter some difficulties in getting by with their state pension while nearly 30% of respondents were not able to reply to this question.²⁴ Furthermore, an additional question concerning the anticipation of the situation after retirement revealed a considerable degree of uncertainty and general lack of awareness and/or knowledge of the situation. While many respondents recognised that population ageing was a problem, a majority were somewhat or very reluctant towards the idea of increasing the retirement age. There was a comparatively strong support for a principle of basing one's pension strictly on the amount of contributions paid into the pension scheme but only weak support (albeit with large cross-country differences) for introducing flexible retirement schemes.

Theoretically-founded concerns about a declining legitimacy of the welfare state have been expressed regularly over the last 30 years. In that period, however, empirical studies such as the Eurobarometer survey have repeatedly shown permanent and substantial popular support for welfare. This mismatch might be related to two factors. First, the understanding of people's motivations to support welfare may be inadequate. In fact, the prognostic theories tend to overemphasise either an interest-base or a value-base for such motivations, thereby neglecting the possibility that people might be motivated at the same time by interest and by moral values. In addition, other types of motivation could play a role too. Second, thus far people's motivations to contribute to welfare have only been measured indirectly, which can easily lead to false conclusions.

But a key issue is whether in a representative democracy a sufficiently large part of the electorate will continue to support pension reforms aimed at providing the intergenerational transfers necessary to ensure sustainability. In a democracy, reforms are only feasible when they are supported by the majority of the electorate. Given that, from about 2015 the number of persons aged 50 and above will make up more than 50% of the population and even more of the electorate, the most important issue for public policy may increasingly be to drum up sufficient public support for policies aimed at ensuring that the young and the unborn generations are not charged with undue burdens of debt inherited from the baby-boom generations.

²⁴ *The Future of Pension Systems*, Special Eurobarometer Survey, January 2004. This public opinion survey was carried out at the request of the Directorate-General Employment and Social Affairs and organised by the Public Opinion Analysis Sector of the Directorate-General Press and Communication. It was conducted in all the EU member states between 17 September and 26 October 2001, under the general coordination of the European Opinion Research Group EEIG in Brussels.

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Appendix. List of AGIR Project Research Reports

Summary Reports

- Can we Afford to Live Longer in Better Health?*, E. Westerhout and F. Pellikaan, ENEPRI Research Report No. 10, CEPS, Brussels, July 2005.
- Scenarios for Global Ageing: An Investigation with the INGENUE 2 World Model*, M. Aglietta, V. Borgy, J. Chateau, M. Juillard, J. Le Cacheux, G. Le Garrec and V. Touzé, ENEPRI Research Report No. 9, CEPS, Brussels, July 2005.
- Alternative Scenarios for Health, Life Expectancy and Social Expenditure: The Influence of Living Longer in Better Health on Health and Pension Expenditures and Government Finances in the EU*, F. Pellikaan and E. Westerhout, ENEPRI Research Report No. 8, CEPS, Brussels, June 2005.
- Pension Arrangements and Retirement Choices in Europe: A Comparison of the British, Danish and German Systems*, J. Sefton, J. van de Ven and M. Weale, ENEPRI Research Report No. 5, CEPS, Brussels, March 2005.
- Ageing, Health and Retirement in Europe: Alternative Scenarios for Health, Life Expectancy and Social Expenditure*, E. Schulz, ENEPRI Research Report No. 4, CEPS, Brussels, February 2005.
- Time Use, Health and Retirement*, H. Piekkola and L. Leijola, ENEPRI Research Report No. 3, CEPS, Brussels, September 2004.
- Use of Health and Nursing Care by the Elderly*, E. Schultz, ENEPRI Research Report No. 2, CEPS, Brussels, July 2004.
- Bio-Demographic Aspects of Population Ageing*, N. Ahn, R. Génova, J.A. Herce and J. Pereira, ENEPRI Research Report No. 1, CEPS, Brussels, June 2004.

Country Reports

- Bio-Demographic Aspects of Ageing: Data for Finland*, ETLA, Helsinki, April 2003.
- Bio-Demographic Aspects of Ageing: Data and Findings for Spain*, N. Ahn, R. Génova, J.A. Herce and J. Pereira, FEDEA, Madrid, May 2003.
- Bio-Demographic Aspects of Ageing: Data and Results for France*, F. Arestoff, T. Barnay, S. Dufour-Kippelen, M.-E. Joël, C. Smith and J. Wittwer, LEGOS, University of Paris, October 2003.
- Bio-Demographic Aspects of Ageing: Data for Belgium*, J. Mestdagh and M. Lambrecht, Working Paper 10-03, Federal Planning Bureau, Brussels, July 2003.
- Life Expectancy and Morbidity in Germany*, E. Schulz and B. Müller-Unger, DIW, Berlin, February 2003.
- Mortality, Family Circumstances and Health in the United Kingdom*, M. Weale, NIESR, London, May 2003.
- Use of Health Care and Nursing by the Elderly: Data for the Netherlands*, T. Brouwer and E. Westerhout, CPB Communication, CPB Netherlands Bureau for Economic Policy Analysis, The Hague, September 2003.

Use of Health and Nursing Care by the Elderly: Data and Results for Germany, E. Schulz, DIW, Berlin, October 2003.

Use of Health Care and Nursing by the Elderly in Finland, H. Piekkola, ETLA, Helsinki, April 2003.

Use of Health and Nursing Care by the Elderly: Spanish Country Report, FEDEA, Madrid, September 2003.

Use of Health and Nursing Care by the Elderly: Data and Results for France, T. Barnay, S. Dufour-Kippelen, M.-E. Joël, C. Smith and J. Wittwer, LEGOS, University of Paris, October 2003.

Use of Health and Nursing Care by the Elderly: Data for Belgium, J. Mestdagh and M. Lambrecht, Working Paper No. 11-03, Federal Planning Bureau, Brussels, July 2003.

AGIR – Ageing, Health and Retirement in Europe

AGIR is the title of a major study on the process of population ageing in Europe and its future economic consequences. This project was motivated by an interest in verifying whether people are not only living longer but also in better health. It aims at analysing how the economic impact of population ageing could vary when not only demographic factors, but also health developments are taken into consideration. The project started in January 2002 for a period of three years.

The **principal objectives** of the study are to:

- document developments in the health of the elderly, ideally since 1950, based on a systematic collection of existing national data on the health and morbidity of different cohorts of the population;
- analyse retirement decisions and the demand for health care as a function of age, health and the utility of work and leisure;
- combine these results, and on that basis to elaborate scenarios for the future evolution of expenditure on health care and pensions; and
- analyse the potential macroeconomic consequences of different measures aiming at improving the sustainability of the European pension systems.

The **AGIR** project is carried out by a consortium of **nine European research institutes**, most of which are members of ENEPRI:

- **CEPS** (Centre for European Policy Studies), Brussels
- **CEPII** (Centre d'Etudes Prospectives et d'Informations Internationales), Paris
- **CPB** (Netherlands Bureau for Economic Policy Analysis), The Hague
- **DIW** (Deutsches Institut für Wirtschaftsforschung), Berlin
- **ETLA** (the Research Institute of the Finnish Economy), Helsinki
- **FEDEA** (Fundación de Estudios de Economía Aplicada), Madrid
- **FPB** (Belgian Federal Planning Bureau), Brussels
- **NIESR** (National Institute for Economic and Social Research), London
- **LEGOS** (Laboratoire d'Economie et de Gestion des Organisations de Santé, Université de Paris-Dauphine), Paris

It has received finance from the European Commission, under the Quality of Life Programme of the 5th EU Research Framework Programme. The project is coordinated by **Jorgen Mortensen**, Associate Senior Research Fellow at CEPS. For further information, contact him at: jorgen.mortensen@ceps.be.

About ENEPRI

The European Network of Economic Policy Research Institutes (**ENEPRI**) is composed of leading socio-economic research institutes in practically all EU member states and candidate countries that are committed to working together to develop and consolidate a European agenda of research. **ENEPRI** was launched in 2000 by the Brussels-based Centre for European Policy Studies (CEPS), which provides overall coordination for the initiative.

While the European construction has made gigantic steps forward in the recent past, the European dimension of research seems to have been overlooked. The provision of economic analysis at the European level, however, is a fundamental prerequisite to the successful understanding of the achievements and challenges that lie ahead. **ENEPRI** aims to fill this gap by pooling the research efforts of its different member institutes in their respective areas of specialisation and to encourage an explicit European-wide approach.

ENEPRI is composed of the following member institutes:

CASE	Center for Social and Economic Research, Warsaw, Poland
CEPII	Centre d'Études Prospectives et d'Informations Internationales, Paris, France
CEPS	Centre for European Policy Studies, Brussels, Belgium
CERGE-EI	Centre for Economic Research and Graduated Education, Charles University, Prague, Czech Republic
CPB	Netherlands Bureau for Economic Policy Analysis, The Hague, The Netherlands
DIW	Deutsches Institut für Wirtschaftsforschung, Berlin, Germany
ESRI	Economic and Social Research Institute, Dublin, Ireland
ETLA	Research Institute for the Finnish Economy, Helsinki, Finland
FEDEA	Fundación de Estudios de Economía Aplicada, Madrid, Spain
FPB	Federal Planning Bureau, Brussels, Belgium
IE-BAS	Institute of Economics, Bulgarian Academy of Sciences, Sofia, Bulgaria
IER	Institute for Economic Research, Ljubljana, Slovenia
IHS	Institute for Advanced Studies, Vienna, Austria
ISAE	Istituto di Studi e Analisi Economica, Rome, Italy
ISWE-SAS	Institute for Slovak and World Economy, Bratislava, Slovakia
NIER	National Institute of Economic Research, Stockholm, Sweden
NIESR	National Institute of Economic and Social Research, London, UK
NOBE	Niezalezny Osrodek Bana Ekonomicznych, Lodz, Poland
PRAXIS	Center for Policy Studies, Tallinn, Estonia
RCEP	Romanian Centre for Economic Policies, Bucharest, Romania
TÁRKI	Social Research Centre Inc., Budapest, Hungary

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